AMERICAN UNIVERSITY OF BEIRUT

GRADUATE CATALOGUE 2024-25

MSCHE
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Notice

For information pertaining to graduate programs offered by the various Faculties and Schools at AUB, consult 2024–25 edition of the Undergraduate Catalogue.
Information in this catalogue applies to academic year 2024–25. The university reserves the right to make changes without prior notice in programs, course offerings, academic requirements, and teaching staff as the need arises.

Student Responsibility for Catalogue Information

Students are responsible for reading the information in this catalogue. Failure to read and comply with faculty and university regulations will not exempt students from whatever penalties they may incur.
All students are assigned post office boxes and email addresses. Students are responsible for checking their post office boxes and email regularly for official announcements and information.

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This catalogue and relevant updates can also be viewed at www.aub.edu.lb/registrar.
Additional information about course requirements can be viewed on the online Banner Catalogue available at the AUB webpage.

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Office of the Registrar University Calendar 2024-2025

REGULAR CALENDAR				
EVENT	**Day 1**	**FROM**	**Day 2**	**TO**
Academic year begins for Med. III, and Med. IV	Mon	3-Jun-24		
Registration for Med. III, and Med. IV	Mon	3-Jun-24		
Fee payment for Med. III, and Med. IV	Fri	14-Jun-24	Fri	2-Aug-24
Al-Adha, holiday* No classes	Mon	17-Jun-24	Wed	19-Jun-24
Academic year ends for Med. I	Fri	28-Jun-24		
Confirmation fee payment deadline for new students, Fall 2024-25	Sun	30-Jun-24		
Hijra New Year, holiday* No classes	Mon	8-Jul-24		
Ashoura, commemoration* No classes	Wed	17-Jul-24		
New students orientation (virtual)	Thu	18-Jul-24	Fri	23-Aug-24
Fall 2024-25 Installment Plan Application submission for all current, registered students and for new sophomore/ first-year students	Mon	22-Jul-24	Fri	23-Aug-24
Registration for Med. I students	Fri	9-Aug-24		
Fee payment for Fall 2024-25 current students	Wed	7-Aug-24	Fri	13-Sep-24
Fall 2024-25 Installment Plan Application submission for all old returning, new students coming from abroad, new graduates, new freshman students, and special and transfer students	Wed	7-Aug-24	Fri	23-Aug-24
Registration for Med. II students	Mon	12-Aug-24		
Assumption Day, holiday. No classes	Thu	15-Aug-24		
Academic year begins for Med. I students	Mon	12-Aug-24		
Academic year begins for Med. II students	Mon	12-Aug-24		
Required official document submission deadline for all new students, Fall 2024-25	Fri	16-Aug-24		
Fee payment for Med. I, Med. II, and FM graduate students	Fri	16-Aug-24	Fri	23-Aug-24

International Student Welcome Day (all new degree-seeking and visiting/ exchange students)	Sun	18-Aug-24		
On-Campus New Student Orientation	Mon	19-Aug-24	Wed	21-Aug-24
Visiting and exchange student group advising meeting	Tue	20-Aug-24		
New and old returning student advising	Tue	20-Aug-24	Wed	21-Aug-24
Online course registration for all new and old returning students according to the Registration Guide	Thu	22-Aug-24	Fri	23-Aug-24
FALL Term 2024-25				
EVENT	**Day 1**	**FROM**	**Day 2**	**TO**
Fall 2024-25 term begins for all Faculties/ Schools except the MD program	Mon	26-Aug-24		
Change of schedule for Fall 2024-25 (drop & add)	Tue	27-Aug-24	Fri	30-Aug-24
Fee payment for Fall 2024-25 for new students	Wed	28-Aug-24	Fri	13-Sep-24
Opening Ceremony	Mon	2-Sep-24		
Late fee payment for fall 2024-25 for all students	Mon	16-Sep-24	Fri	20-Sep-24
Prophet's Birthday, holiday* No classes	Mon	16-Sep-24		
Registration cancellation for all students who did not settle their fees or make alternate payment arrangements with the Office of the Comptroller (No Show)	Thu	26-Sep-24		
Deadline for submitting NSSF declaration for the academic year 2024-25	Thu	26-Sep-24		
Financial holds set for all students who did not settle their financial account (Comptroller's Office)	Fri	27-Sep-24		
Spring 2024-25 advising for continuing students	Mon	4-Nov-24	Fri	8-Nov-24
Inter-Faculty/School online transfer applications for Spring 2024-25	Mon	4-Nov-24	Fri	13-Dec-24
Advising and registration for winter session 2025	Thu	7-Nov-24		
Spring 2024-25 online course registration for continuing students	Tue	12-Nov-24	Fri	6-Dec-24

Withdrawal from courses deadline for Fall 2024-25	Fri	15-Nov-24		
Fee payment for the Winter Session 2025	Thu	21-Nov-24	Thu	28-Nov-24
Independence Day, holiday. No classes	Fri	22-Nov-24		
Last day of classes for Fall 2024-25	Thu	28-Nov-24		
Reading Period for Fall 2024-25 **	Fri	29-Nov-24	Mon	2-Dec-24
Founders Day	Mon	2-Dec-24		
Spring 2024-25 Installment Plan Application submission for all current registered students	Tue	3-Dec-24	Fri	17-Jan-25
Fall 2024-25 final examinations	Tue	3-Dec-24	Sat	14-Dec-24
Fall 2024-25 ends for all Faculties/ Schools except the MD program	Sat	14-Dec-24		
WINTER Session 2025				
EVENT	**Day 1**	**FROM**	**Day 2**	**TO**
Winter Session 2024-25 begins	Mon	16-Dec-24		
Change of schedule for Winter 2024-25 (drop & add)	Tue	17-Dec-24		
Grade submission deadline for All Faculties except MD Program for Fall 2024-25	Tue	17-Dec-24		
Christmas and New Year break. No classes	Tue	24-Dec-24	Wed	1-Jan-25
Fee payment for continuing students for Spring 2024-25	Thu	2-Jan-25	Fri	31-Jan-25
Armenian Christmas, holiday. No classes	Mon	6-Jan-25		
Spring 2024-25 Installment Plan Application submission for all old returning, new students coming from abroad, new graduates, new freshman students, and special and transfer students	Tue	7-Jan-25	Fri	17-Jan-25
Required official document submission deadline for all new undergraduate students, Spring 2024-25	Tue	7-Jan-25	Fri	10-Jan-25
Inter-Faculty/School online transfer applications for Fall 2025-26	Tue	7-Jan-25	Fri	11-Apr-25
New Student Orientation (virtual)	Tue	7-Jan-25	Fri	31-Jan-25

Confirmation fee payment deadline for new students for Spring 2024-25	Wed	8-Jan-25		
Withdrawal from courses deadline for Winter 2025	Fri	10-Jan-25		
International Student Welcome Day for all new degree-seeking and visiting/ exchange students	Sun	12-Jan-25		
On-Campus New students orientation	Mon	13-Jan-25	Tues	14-Jan-25
Visiting and exchange group advising meeting	Tue	14-Jan-25		
Winter 2024-25 final examinations	Tue	14-Jan-25		
Spring advising and online course registration for all new students	Tue	14-Jan-25	Wed	15-Jan-25
Fee payment for new students for Spring 2024-25	Thu	16-Jan-25	Fri	31-Jan-25
SPRING Term 2024-2025				
EVENT	**Day 1**	**FROM**	**Day 2**	**TO**
Spring 2024-25 begins for all Faculties/ Schools except MD program	Thu	16-Jan-25		
Change of schedule for Spring 2024-25 (drop & add)	Fri	17-Jan-25	Fri	24-Jan-25
Confirmation fee payment deadline for early-admitted students	Thu	30-Jan-25		
Late fee payment for all students for Spring 2024-25	Mon	3-Feb-25	Mon	10-Feb-25
St. Maroun's Day, holiday.	Sun	9-Feb-25		
Deadline for submitting NSSF Declaration for Spring 2024-25	Fri	14-Feb-25		
Annunciation Day, holiday. No classes	Tue	25-Mar-25		
Eid Al Fitr, holiday*. No classes	Mon	31-Mar-25	Tue	1-Apr-25
Advising for continuing students for Summer 2024-25 and Fall 2025-26	Tue	8-Apr-25	Thu	10-Apr-25
Withdrawal from courses deadline for Spring 2024-25	Thu	10-Apr-25		
Online registration for continuing students for Summer 2024-25	Fri	11-Apr-25	Tue	15-Apr-25
Fall 2025-26 online course registration for continuing students	Wed	23-Apr-25	Fri	8-Aug-25

Latin and Greek Easter vacation	Fri	18-Apr-25	Mon	21-Apr-25
Academic year ends for Med. II	Fri	25-Apr-25		
Classes end for Spring 2024-25 for all Faculties/Schools except the MD program	Sat	26-Apr-25		
Reading Period for Spring 2024-25**	Mon	28-Apr-25	Wed	30-Apr-25
Labor Day. No classes	Thu	1-May-25		
Spring 2024-25 final examinations	Fri	2-May-25	Wed	14-May-25
End of Clinical Clerkships for Med. IV	Sun	4-May-25		
End of Clinical Clerkships for Med. III	Sun	4-May-25		
Required official document submission deadline for all new students, Summer 2024-25	Tue	6-May-25		
Advising and registration for all new students for Summer 2024-25	Tue	6-May-25	Fri	9-May-25
Fee payment for Summer 2024-25 for all students	Mon	12-May-25	Fri	13-Jun-25
Spring 2024-25 ends for all Faculties/ Schools except MD program	Wed	14-May-25		
Grade submission deadline for all Faculties/Schools except MD Program for Spring 2024-25	Sat	17-May-25		
Academic year ends for Med. III and Med. IV	Tue	20-May-25		
Commencement Exercises (Graduate)	Fri	30-May-25		
Commencement Exercises (Undergraduate)	Sat	31-May-25		
SUMMER Term 2024-2025				
EVENT	**Day 1**	**FROM**	**Day 2**	**TO**
Classes begin for Summer 2024-25 for all Faculties/Schools except MD program	Mon	2-Jun-25		
Change of schedule for Summer 2024-25 (drop & add)	Tue	3-Jun-25	Fri	6-Jun-25
Late Payment for Summer 2024-25	Sat	7-Jun-25	Thu	12-Jun-25
Al Adha, holiday* No classes	Sat	7-Jun-25	Mon	9-Jun-25
Academic year ends for Med. I	Fri	27-Jun-25		

Hijra New Year, holiday*	Fri	27-Jun-25		
Ashoura, holiday* No classes	Sun	6-Jul-25		
Withdrawal from courses for Summer 2024-25	Fri	11-Jul-25		
Classes end for all Faculties/Schools except the Faculty of Agricultural & Food Sciences and MD Program	Thu	24-Jul-25		
Reading period for Summer 2024-25 **	Fri	25-Jul-25	Sat	26-Jul-25
Summer 2024-25 final examinations for all Faculties/Schools except the MD program, Faculty of Agricultural and Food Sciences	Mon	28-Jul-25	Sat	2-Aug-25
Classes end for the Faculty of Agricultural & Food Sciences	Thu	31-Jul-25		
Summer 2024-25 final examinations for the Faculty of Agricultural & Food Sciences	Mon	4-Aug-25	Fri	8-Aug-25
Grade submission deadline for all Faculties/Schools except FAFS and MD Program for Summer 2024-25	Wed	6-Aug-25		
Grade submission deadline for FAFS for Summer 2024-25	Mon	11-Aug-25		
Assumption Day, holiday. No classes	Fri	15-Aug-25		

(*) Tentative Dates

(**) The first two days of the reading period may be used for make-up sessions if needed. No final exams may be given during the reading period.

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The University

The American University of Beirut (AUB) is a private, independent, non-sectarian institution of higher learning founded in 1866. It functions under a charter from the State of New York and is governed by a private, autonomous Board of Trustees.

The university has seven faculties: Agricultural and Food Sciences, Arts and Sciences, Health Sciences, Medicine, the Maroun Semaan Faculty of Engineering and Architecture, the Rafic Hariri School of Nursing, and the Suliman S. Olayan School of Business. At present, AUB offers programs leading to Bachelor, Master, MD, and PhD degrees.

The university became co-educational in 1921. The language of instruction is English.

Accreditation and Quality Assurance

Degrees awarded by the American University of Beirut (AUB) are officially registered with the Ministry of Education and Higher Education (MEHE) in Lebanon and with the New York State Education Department (NYSED) in the United States (US). AUB is accredited as an institution by the Middle States Commission on Higher Education (MSCHE) www.msche.org, 1007 North Orange Street, 4th Floor, MB #166, Wilmington, DE 19801, +1 267 284 5011. MSCHE is an institutional accreditor recognized by the United States Secretary of Education. The university was first accredited in June 2004. This accreditation was reaffirmed in 2009, 2014, and 2019. The American University of Beirut – Mediterraneo (AUB Mediterraneo) in Pafos, Cyprus, is approved by MSCHE as a branch campus in 2022. The university's full and updated Statement of Accreditation Status is maintained on the MSCHE website.

Six of AUB's faculties/schools have earned accreditation from professional accrediting agencies as listed below. In many cases, AUB's faculties/schools are the first or the only ones of their kind outside of the US to have programs accredited by US agencies:

The Faculty of Agricultural and Food Sciences' undergraduate Nutrition and Dietetics Coordinated Program (NDCP) was the first and only nutrition and dietetics program in the Middle East to receive US accreditation, in 2013, under the International Dietitian Education program standards by the Accreditation Council for Education in Nutrition and Dietetics (ACEND), which is the Academy of Nutrition and Dietetics' accrediting agency of nutrition education programs. The program secured full reaccreditation, for the maximum allowable time of seven years, in 2017, renewable subject to an upcoming review in 2024.

The Maroun Semaan Faculty of Engineering and Architecture's Bachelor of Engineering (BE) in Civil Engineering, BE in Computer and Communications Engineering, BE in Electrical and Computer Engineering, and BE in Mechanical Engineering were accredited by the Accreditation Board for Engineering and Technology (ABET) in 2010, retroactive to 2008; renewed in 2016 and in 2023. MSFEA's undergraduate programs in Chemical Engineering, Bachelor of Science (BS) in Chemical Engineering and BE in Chemical Engineering, were also accredited by ABET in 2016 retroactive to 2012 and 2013 respectively. This accreditation was renewed in 2023. MSFEA's BE in Industrial Engineering was accredited by ABET in 2023 retroactive to 2020. The Bachelor of Landscape Architecture (BLA) program was accredited by the Landscape Architectural Accreditation Board (LAAB) in 2021.

The Public Health Program (PHP) at **the Faculty of Health Sciences** received its initial accreditation in 2006 from the Council on Education for Public Health (CEPH), an independent agency recognized by the US Department of Education that accredits schools of public health and public health programs. In 2012, the program was reaccredited for a seven-year term. In December 2019, the CEPH Board voted to renew the accreditation of the program for another seven-year term, ending in 2026. The accredited PHP includes the Bachelor of Science in Environmental Health, Bachelor of Arts in Health Communication, Master of Public Health, Master of Science in Epidemiology, Master of Science in Environmental Sciences—major Environmental Health, and the PhD in Epidemiology. The PHP at FHS was the first to be accredited by CEPH outside the Americas and remains the only CEPH-accredited program in the Arab region. Internationally, it is one of only three non-US PHPs to hold CEPH accreditation. This has allowed FHS to become a full member of the Association of Schools and Programs of Public Health and to join the Delta Omega Honorary Society in Public Health, which are recognitions of academic excellence limited to CEPH-accredited schools and programs.

The Faculty of Medicine was granted full accreditation effective January 1, 2019, for a period of six years by the Association for Evaluation and Accreditation of Medical Education Programs (TEPDAD) International Medical Education Accreditation Council, the authorized medical school accrediting body of the World Federation for Medical Education (WFME) based in Turkey. This accreditation places FM in compliance with the requirements of the Educational Commission for Foreign Medical Graduates. The Faculty of Medicine received institutional accreditation from the Accreditation Council for Graduate Medical Education-International (ACGME-I) in 2015. Currently, 18 residency programs are ACGME-I accredited: Anesthesiology, Dermatology, Diagnostic Radiology, Emergency Medicine, Family Medicine, General Surgery, Internal Medicine, Neurology, Neurosurgery, Obstetrics & Gynecology, Ophthalmology, Orthopedic Surgery, Otorhinolaryngology, Pediatrics, Plastic Surgery, Psychiatry, Radiation Oncology, and Urology.

The Rafic Hariri School of Nursing became the first nursing school outside American territories to have its baccalaureate and master's degree programs accredited by the Commission on Collegiate Nursing Education, 655 K Street NW, Suite 750, Washington, DC 20001, +1 202 887 6791 initially in 2007 (reaccredited in 2012). The Bachelor of Science in Nursing program (BSN) and Master of Science in Nursing (MSN) programs were reaccredited for 10 years effective March 7, 2022.

The Suliman S. Olayan School of Business (OSB) is accredited by the Association to Advance Collegiate Schools of Business (AACSB International). It was the first school of business in Lebanon to earn this accreditation in 2009 (reaffirmed in 2014 and 2019). OSB boasts a portfolio of AACSB accredited programs that include the following: Bachelor in Business Administration, Master in Business Administration, Online Master in Business Administration, Executive Master in Business Administration, Master in Finance, Master in Human Resource Management, and Master in Business Analytics (MSBA). In September 2022, the programs offered at the American University of Beirut – Mediterraneo (Bachelor in Business Administration–Management and Master in Business Analytics) were included among the accredited programs.

Mission Statement

The American University of Beirut (AUB) is an institution of higher learning founded to provide excellence in education, to participate in the advancement of knowledge through research, and to serve the peoples of the Middle East and beyond. Chartered in New York State in 1863, the university bases its educational philosophy, standards and practices on the American liberal arts model of higher education. The university believes deeply in and encourages freedom of thought and expression and seeks to foster tolerance and respect for diversity and dialogue. Graduates will be individuals committed to creative and critical thinking, lifelong learning, personal integrity, civic responsibility and leadership.

History

The American University of Beirut was established as the Syrian Protestant College in 1866. The college opened with its first class of 16 students on December 3, 1866. Throughout its history, the university has expanded and developed new faculties and programs. In 1867, the university started the School of Medicine. Four years later, in 1871, it added both a school of pharmacy and a preparatory school. The latter became independent in 1960 and is now known as International College. The opening of the hospital (currently the American University of Beirut Medical Center) in 1905 was followed by the establishment of a school of nursing (named the Rafic Hariri School of Nursing in 2008). In the early 1950s several new programs were introduced. The Faculty of Engineering and Architecture (named the Maroun Semaan Faculty of Engineering and Architecture in 2017) was established in 1951; the Faculty of Agriculture (now the Faculty of Agricultural and Food Sciences) opened its doors in 1952; and the School of Public Health (now the Faculty of Health Sciences) was started in 1954. In 2000, the university, which had been offering business education since 1900, established an independent school of business (named the Suliman S. Olayan School of Business in 2003) as its sixth faculty. AUB celebrated its 150th anniversary in 2016. The Rafic Hariri School of Nursing became AUB's seventh faculty in 2018. On September 6, 2023, AUB welcomed the first cohort of 53 students to the American University of Beirut – Mediterraneo (AUB Mediterraneo) in Pafos, Cyprus, AUB's first twin campus outside Lebanon.

The number of degrees and diplomas that AUB has awarded to date totaled 106,436.

FORMER PRESIDENTS

Peter F. Dorman 2008-15
John Waterbury 1997-2008
David S. Dodge 1996-97
Robert M. Haddad 1993-96
Frederic P. Herter 1987-93
Calvin Plimpton 1984-87
Malcolm H. Kerr 1981-84
Harold E. Hoelscher 1977-81
Samuel B. Kirkwood 1965-76
Norman Burns 1961-65
J. Paul Leonard 1957-61
Stephen B.L. Penrose, Jr. 1948-54
Bayard Dodge 1923-48
Howard S. Bliss 1902-20
Daniel Bliss 1866-1902

Also Served:
Makhlouf Haddadin (acting) 2015
George Tomey (deputy) 2006
Samir Makdisi (acting deputy and then deputy) 1993-98
Makhlouf Haddadin (acting deputy) 1992-93
Ibrahim Salti (deputy) 1987-93
Lutfi Diab (acting) 1986-87
Raja N. Khuri (acting) 1985-86
Samir K. Thabet (acting) 1984
David S. Dodge (acting) 1981-82
James Cowen (interim) 1976-77
Constantin K. Zurayk (acting) 1954-57
Edward F. Nickoley (acting) 1920-23

Non-Discrimination Notice

AUB encourages a diverse student body and workforce, and is committed to the principle of equal opportunity in education and employment. Consistent with this commitment and with Lebanese, U.S., and other applicable laws, it is the policy of AUB not to tolerate discrimination or discriminatory harassment including sexual harassment, and to provide those who feel they are victims of discrimination, discriminatory harassment, and sexual harassment with mechanisms for seeking redress as described in AUB policies and procedures.

Inquiries or complaints regarding discrimination, discriminatory harassment, or sexual harassment may be addressed to the Title IX Coordinator titleix@aub.edu.lb, Office of the President, College Hall, telephone +961-1-350000 ext. 2514.

For AUB's policies and procedures, visit www.aub.edu.lb/titleix.

Admissions

Graduate

The American University of Beirut seeks students of sound character and demonstrated academic achievement and promise. In accordance with the policies of its founders and with its equal opportunity policy, the university admits students regardless of race, color, religion, gender, disability, or national origin. While it attracts students from more than ninety countries, AUB primarily serves applicants from Lebanon, the Arab world, and other countries of the Middle East and seeks to maintain geographic distribution within the region. The university values its strong ties with its alumni and considers the attendance of alumni children important to the maintenance of these ties and to the continuation of its traditions.

Graduate Studies

Study leading to the Master degree begun at the American University of Beirut in 1904; the first Master degree was awarded the following year. Study leading to the degree of Doctor of Philosophy was initiated in 1961; the first PhD degree was granted in 1966.

Graduate study is under the direction of the graduate studies committees of the various faculties and the Board of Graduate Studies. The Board of Graduate Studies is accountable to the University Senate. The Graduate Council is the executive body with oversight of graduate programs at AUB.

New programs may be added upon recommendation by the faculty graduate committee and approval of the faculty(ies) concerned, the Board of Graduate Studies, the University Senate, and the Board of Trustees. All programs are approved and registered by the New York State Education Department (NYSED) and listed on NYSED Inventory of Registered Programs.

Graduate Council

The Graduate Council (GC) reports to the Provost of the university and plays a vital role in implementing the rules and regulations governing graduate work uniformly across the university, in accordance with policies approved by the Board of Graduate Studies (BGS) and the Senate, and as recommended by the faculties and schools. The Graduate Council facilitates and coordinates graduate education and follows up on the implementation of graduate policies and deadlines. The Graduate Council works closely with the BGS and Faculty Graduate Studies (FGS) Committees to provide mechanisms for the quality control of all aspects of graduate education. In cooperation with faculty, students, and staff, the Graduate Council undertakes preparatory steps and coordinates graduate recruitment programs to ensure a selection process from a highly qualified pool of student applicants, provides information about admissions to all graduate programs, administers graduate standards of scholarship and policy, and encourages the development and success of students through workshops, training activities, counseling, and initiatives which promote timely degree completion. The Graduate Council also administers AUB's Graduate Assistantship and Fellowship policy (GFAP).

Areas in Which Graduate Study Is Offered

The university offers the master's degree, the degree of doctor of philosophy, and two types of graduate diplomas: academic diplomas and professional diplomas.

Master's Degrees

Faculty of Arts and Sciences

Thesis-based	
MS	• Biology • Chemistry • Computational Sciences • Computer Science • Geology (Frozen Admissions) • Mathematics/Applied Mathematics • Mathematics/Pure Mathematics • Physics
MSES	• Environmental Sciences/ Environmental Policy Planning
MA	• Anthropology • Arab Language and Literature • Archeology • Art History & Curating • Clinical Psychology • Economics • Education/Science Education • Education/Teaching of English as a Foreign Language • Education/Administration and Policy Studies • Education/Elementary Education • Education/Mathematics Education • Education/Psychology-School Guidance • Education/Psychology-Tests and Measurements • English Language (Frozen Admissions) • English Literature • Psychology (Frozen Admissions) • History • Islamic Studies • Media Studies • Middle Eastern Studies • Philosophy • Political Studies • Public Administration (Frozen Admissions) • Public Policy and International Affairs • Sociology • Computing in Education, Online Program

Non-thesis project-based	
MS	• Computer Science
MA	• Education/Administration and Policy Studies • Education/Elementary Education • Education/Mathematics Education • Education/Psychology-School Guidance • Education/Psychology-Tests and Measurements • Education/Science Education • Education/ Teaching of English as a Foreign Language • Financial Economics (Frozen Admissions) • Media Studies • Middle Eastern Studies • Public Policy and International Affairs

Faculty of Agricultural and Food Sciences

Thesis-based	
MS	• Agricultural Economics • Animal Science • Food Security • Food Technology • Food Safety • Irrigation • Nutrition • Plant Protection • Plant Science • Poultry Science • Public Health Nutrition • Rural Community Development
MSES	• Environmental Sciences/ Ecosystem Management

Non-thesis project-based	
MS	• Agricultural Economics • Animal Science • Food Security • Food Technology • Food Safety • Irrigation • Nutrition • Plant Protection • Plant Science • Poultry Science • Public Health Nutrition • Rural Community Development

Suliman S. Olayan School of Business

Thesis-based	
MS	• Business Analytics
EMBA	• The Executive MBA in Business Administration
MBA	• Business Administration/ Accounting • Business Administration/ Business Information and Decision Systems • Business Administration/ Finance • Business Administration/ Management • Business Administration/ Marketing
Non-thesis project-based	
MBA	• Business Analytics
Non-thesis course-based	
MF	• Finance
MBA	• Business Administration/ Accounting • Business Administration/ Business Information and Decision Systems • Business Administration/ Finance • Business Administration/ Management • Business Administration/ Marketing
MA	• Human Resource Management

Maroun Semaan Faculty of Engineering and Architecture

Thesis-based	
MS	• Biomedical Engineering • Energy Studies
MSES	• Environmental Technology
MUDS	• Urban Design
MUPP	• MUPP Urban Planning and Policy
ME	• Chemical Engineering • Civil Engineering • Electrical and Computer Engineering • Environmental and Water Resources • Mechanical Engineering
MEM	• Engineering Management
Non-thesis project-based	
MS	• Environmental Technology
Non-thesis course-based	
ME	• Chemical Engineering • Civil Engineering • Electrical and Computer Engineering • Environmental and Water Resources • Mechanical Engineering
MS	• Biomedical Engineering • Energy Studies
MEM	• Engineering Management

Faculty of Health Sciences

Thesis-based	
MS	• Epidemiology • Public Health Nutrition
MSES	• Environmental Sciences / Major: Environmental Health
Non-thesis project-based	
MSES	• Environmental Sciences / Major: Environmental Health
Non-thesis practicum-based	
MPH	• Public Health/ Epidemiology and Biostatistics • Public Health/ Health Management and Policy • Public Health/ Health Promotion and Community Health

Faculty of Medicine

Thesis-based	
MS	• Orthodontics • Scholar in HeAlth Research Program (SHARP)
MSBS	• Biomedical Engineering • Biomedical Science / Physiology • Biomedical Sciences / Biochemistry • Biomedical Sciences / Human Morphology • Biomedical Sciences / Microbiology and Immunology • Biomedical Sciences / Pharmacology and Therapeutics • Biomedical Sciences / Neurosciences
Non-thesis project-based	
MSBS	• Biomedical Science / Physiology • Biomedical Sciences / Biochemistry • Biomedical Sciences / Human Morphology • Biomedical Sciences / Microbiology and Immunology • Biomedical Sciences / Neurosciences • Biomedical Sciences / Pharmacology and Therapeutics
Non-thesis course-based	
MS	• Orthodontics • Scholar in HeAlth Research Program (SHARP) • Biomedical Engineering

Rafic Hariri School of Nursing

Thesis-based	
MSN	• Adult Gerontology Clinical Nurse Specialist • Community and Public Health Nursing • Nursing Administration and Management • Psychiatric Mental Health Clinical Nurse Specialist • Pediatric Clinical Nurse Specialist
Non-thesis project-based	
MSN	• Adult Gerontology Clinical Nurse Specialist • Community and Public Health Nursing • Nursing Administration and Management • Psychiatric Mental Health Clinical Nurse Specialist • Pediatric Clinical Nurse Specialist

Interfaculty Program

Thesis-based	
MSES	• Environmental Sciences / Environmental Health • Environmental Sciences / Ecosystem Management • Environmental Sciences / Environmental Technology • Environmental Sciences / Environmental Policy Planning
MS	• Public Health Nutrition • Scholar in Health Research Program (SHARP) • Biomedical Engineering • Biomedical Sciences / Neurosciences
Non-thesis Project-based	
MSES	• Environmental Sciences / Environmental Health • Environmental Sciences / Ecosystem Management • Environmental Sciences / Environmental Technology • Environmental Sciences / Environmental Policy Planning
MS	• Biomedical Sciences / Neurosciences • Biomedical Engineering • Public Health Nutrition

PHD Degrees

AUB offers the Doctor of Philosophy degree in twelve disciplines. The programs have been designed for students whose academic backgrounds and interests in specific research areas suggest a potential for scholarly success and significant contribution to the body of knowledge. Students will work on a specific research plan with a contributing scholar and mentor in their department.

All PhD candidates at AUB will normally receive full tuition waiver and a monthly stipend. PhD students are required to be involved in teaching activities. These include: teaching a full course, assisting in group learning activities, or servicing in the labs as assigned by the department.

Further information on programs, research possibilities, requirements for candidacy, and specific requirements for the PhD degree can be found on the corresponding faculty's section of this catalogue and on its webpage.

PhD programs include the following:

Faculty of Arts and Sciences

- Arabic Language and Literature
- Arab & Middle Eastern History
- Cell and Molecular Biology
- Theoretical Physics

Faculty of Health Sciences

- Epidemiology

Rafic Hariri School of Nursing

- Nursing

Maroun Semaan Faculty of Engineering and Architecture

- Civil Engineering
- Electrical and Computer Engineering
- Environmental and Water Resources Engineering
- Mechanical Engineering

Faculty of Medicine

- Biomedical Sciences

Faculty of Medicine and Maroun Semaan Faculty of Engineering and Architecture

- Biomedical Engineering

Graduate Diploma Programs

- Graduate Academic Diplomas
- Graduate Professional Diplomas

Application Procedures

The online Graduate application link is the following: https://graduateadmissions.aub.edu.lb or on SLATE at https://join.aub.edu.lb/apply/.

Applications submitted will be reviewed based on the deadlines stated below (and indicated on the online application), and decisions of the department/program and the Graduate Studies Committee will be announced by the Office of Admissions. Accepted applicants are given one month to decide whether to accept, defer, or decline admission.

FOR ADMISSIONS TO:	APPLICATION DEADLINE	DECISIONS
Spring 2024-25	Tuesday, November 5, 2024	Monday, December 16,2024
Fall 2025-26	Thursday, March 13, 2025	Friday, May 16, 2025

Readiness for University Study in English (RUSE)

Applicants to any graduate program (except for AUB graduates and graduates of recognized colleges or universities in North America, Great Britain, Australia, and New Zealand) must demonstrate proficiency in the English language. This can be done by submitting official test scores for (at least) one of the following tests, English Entrance Examination (AUB-EN), Test of English as a Foreign Language Internet Based (TOEFL), International English Language Testing System (IELTS), DUOLINGO English Test (DET), GRE (Verbal Part), and GMAT (Verbal Part). Updated scores to meet the RUSE can be found on the following URL: https://www.aub.edu.lb/admissions/english/

Applicants may also be admitted with English language proficiency test scores lower than those listed in the URL above. In such cases, the applicants will be required to take English language courses upon starting their graduate degree programs.

Applicants to graduate diploma programs are expected to demonstrate proficiency in the English language following the university's requirements for graduate diploma programs.

English Language Intensive/Remedial Courses

Applicants who obtain scores lower than the required ones will be placed in the remedial graduate English course, ENGL300

After Change of Schedule (Drop and Add), no new test scores will be accepted and no new placement will be made.

Further Requirements

An applicant's scores on the tests below must be made available to the appropriate departments and faculty graduate studies committees in time for graduate study admission selection. It is the responsibility of applicants to register for and take the required tests on the appropriate dates to ensure that the Office of Admissions receives the scores in time for admission selection.

Applicants for the master's degree in certain programs at the Faculty of Arts and Sciences are required to take the Graduate Record Examination (GRE) general test and submit the score along with the application. GRE test scores are valid for five years after the testing year in which the applicant is tested.

Applications missing the GRE will not be considered by departments. Some departments in the Faculty of Arts and Sciences recommend that applicants present GRE subject tests. Applicants are advised to check with the department or program to which they are applying regarding this requirement.

Applicants for the MBA program are required to take the Graduate Management Admission Test (GMAT).

Applicants need to submit the official valid scores no later than one month after the application deadline.

A valid score should be recent (no older than 5 years at the time the application is submitted) and no less than 570.

Upon registering for GMAT, applicants must specify that results be sent to the AUB Office of Admissions (ETS school code 0902). Some faculties and departments have additional requirements regarding admission to their programs. Prospective applicants should ascertain from the faculty/ department/program concerned whether they meet all requirements. For detailed information regarding admission to a particular faculty or department, see the sections on graduate study in the relevant faculty and department.

Admission

Admission to Master's Programs

Graduate study is offered on a selective basis to students who have shown distinctive academic ability. Applicants for graduate study may be considered for admission into one of three categories:

Admission to the Master's Degree Programs

To be considered for admission to the graduate programs at AUB, applicants must hold a bachelor's degree from AUB or its equivalent from a recognized institution of higher learning. Applicants who have a good record of academic achievement and a potential for creative and independent work may be admitted into one of the following categories:

- Admission as a Regular Graduate Student, with the possibility of financial support via the Graduate Fellowship and Assistant Program (GFAP)
- Admission on Probation
- Admission as Prospective Graduate Student (FAFS, FAS, and MSFEA)

The minimum admission requirements for all categories are described below. Additional requirements may be set by the individual departments/programs as approved by Faculty Graduate Studies Committees. Applicants are advised to check with the concerned department or program to which they are applying or with the Office of Admissions for additional requirements.

Admission to the master's program at AUB is competitive based on the academic record and achievements of the applicant. Departments may also recommend admission for those students with particular research interests or characteristics, which are compatible with the areas of expertise of the faculty or the faculty goals within that program.

Applicants who hold degrees from institutions other than AUB must present, along with their official transcript, a letter from the institution awarding the degree indicating the denotation of their grading system in terms of its equivalence on a 4.0 GPA scale or in terms of letter grades A, B, C with +/- scales. Alternatively, applicants may present an official letter from the Office of the Registrar of their respective institutions indicating the graduating class average of previous years along with standard deviation and class size.

Admission as a Regular Student

An applicant is considered for admissions as a regular student to a graduate program if s/he meets the following minimum admission requirements:

- An undergraduate average of at least 3.3 (or standardized equivalent from other institutions of higher learning) in the major field of study and a cumulative average of at least 3.0 (or standardized equivalent) for all work done at the undergraduate level leading to a bachelor's degree or its equivalent from AUB or other recognized institutions of higher learning are required. In the Maroun Semaan Faculty of Engineering and Architecture and the Interfaculty Graduate Environmental Sciences Program (IGESP), an average of at least 3.3 is required for the last two years of undergraduate study or its equivalent at AUB or other universities as determined by the faculty.
- Students who hold a minor in a field of specialization with at least a 3.3 may be considered for admission as regular students in that field.
- At least two letters of recommendation are required.
- A detailed statement of purpose (around 400-500 words) for each choice (major or concentration) indicating the purpose for pursuing graduate study in the particular field at AUB, and specifying the applicant's research interests and/or practical experience in the field is required.
- Additional requirements may exist that are specific to each graduate program as included in the department or program listings

In selecting students to the master's program, the Faculty Graduate Studies Committee recognizes other evidence of achievement—whenever present—such as research potential or experience, work experience, publications, or other creative work or scholarly activity. In considering such criteria, the Graduate Studies Committee of the faculty will, in some cases, give serious consideration to departmental recommendations for admission to applicants who do not meet the minimum requirements of the undergraduate grade point average indicated above but instead have presented clear evidence of creative activity and academic potential. Departments must present to the faculty Graduate Studies Committee a justification of such admission recommendations. The Graduate Studies Committee will review these cases and will make its final recommendation to the dean on a case-by-case basis.

Admission on Probation

An applicant is considered for admission on probation if s/he meets the following minimum admission requirements:

- An undergraduate average of at least 3.0 (or standardized equivalent from other institutions of higher learning) in the major field of study and a cumulative average of at least 3.0 (or standardized equivalent) for all work done at the undergraduate level leading to a bachelor's degree or its equivalent from AUB or other recognized institutions of higher learning are required. In the Maroun Semaan Faculty of Engineering and Architecture and the Interfaculty Graduate Environmental Sciences Program (IGESP), an average of 3.0 is required for the last two years of study or its equivalent at AUB or other universities as determined by the faculty.
- The requirements for application and the governing regulations for admission recommendations as presented under "regular admission" remain the same in this case.

In addition, an applicant who does not meet the above minimum requirements but appears to have reasonable potential for success as a graduate student as manifested by appropriate practical experience or a high score on a relevant standardized exam such as GRE or GMAT, may be admitted on probation.

A student admitted on probation must complete ten (10) credits of graduate level courses during the first two terms of graduate studies, pass all courses, and attain a minimum cumulative average of 3.3 in order to achieve the status of "regular" student. If the student fails to meet any of these conditions, s/he will be dropped from the program. Students admitted on probation are not considered for financial assistantship until they achieve the status of "regular" student.

Admission as a Prospective Graduate Student (FAFS, FAS, and MSFEA)

Applicants who hold a bachelor's degree in a major field of study other than the one to which they are applying, and who do not have sufficient academic preparation in the field, may be admitted as a prospective graduate student who must complete certain undergraduate course requirements. Guidelines governing such course requirements are presented below.

- To be considered for admission as a prospective graduate student, the applicant must have attained an undergraduate average of 3.0 (or standardized equivalent) in all work done at the undergraduate level leading to a bachelor's degree or its equivalent from

AUB or another recognized institution of higher learning. In the Maroun Semaan Faculty of Engineering and Architecture, an applicant is considered for admission as a prospective graduate student if s/he has attained an average of 3.0 at AUB for the last two years of undergraduate study or its equivalent at other universities, as determined by the faculty, and has demonstrated good performance in courses related to the field being sought.

- The requirements for application and the governing regulations for admission as presented under Regular Admission are the same in this case.
- The following policies relate to undergraduate course requirements for students admitted into the prospective student category:
    - Prospective students are normally required to take a maximum of fifteen (15) credits of undergraduate courses in the major field of study to which they are applying and must achieve an average of at least 3.3 in these courses to be admitted to the graduate program and begin work towards their master's degree.
    - Departments may recommend reducing the fifteen (15) credits minimum requirement for prospective students subject to the provision of supporting evidence to the Faculty Graduate Studies Committee. Students who have taken courses in the intended field of study or in areas judged by departments as relevant to the intended field of study may have their requirements reduced. In considering undergraduate courses as prerequisites towards beginning an MA/MS/ME degree in a field of study, departments may recommend to the Faculty Graduate Studies Committee consideration of courses other than the strictly defined field of study that they consider relevant. Outstanding work and/or research experience relevant to the intended field of study may (in exceptional cases) be considered in partial fulfillment of required courses. All recommendations to reduce the requirements below 15 credits require the approval of the Faculty Graduate Studies Committee following departmental justification.
    - Departments may recommend waiving some course requirements after the student's first term subject to justification and outstanding performance to the Faculty Graduate Studies Committee.
- For the purpose of change of status (after completion of requirements) to regular graduate student, a minimum average of 3.3 will be required in all fifteen (15) credits of undergraduate courses in the field (including the ones taken prior to acceptance). If an average of 3.0-3.3 is attained, the student may have her/his status changed to graduate on probation pending department recommendation and approval of the Faculty Graduate Studies Committee.

Prospective graduate students who have completed all but one undergraduate prerequisite course may begin taking one graduate course along with the last undergraduate course requirement upon the approval of their department and the Faculty Graduate Studies Committee. The supplementary courses must be completed within four consecutive regular terms.

Requirements for Dual Master Degrees

Qualified graduate students may enroll and earn two master's degrees in distinct fields from two programs in the same Faculty or in different Faculties. Dual master's degrees are degrees that have been proposed by two departments/programs from the same or different Faculties, recommended by concerned Faculties to the Board of Graduate Studies and approved by the University Senate. In such cases, a student will be concurrently granted two degrees at the time of graduation contingent upon successful completion of requirements of each program. If tuition differs between the two programs, students will pay the higher of the tuitions. Students can register as dual degree candidates only in programs that are approved by the university and are listed in the AUB graduate catalogue. The list is restricted to compatible pairs of master's degrees that students can pursue in parallel so that their research stays focused. Refer to the graduate catalogue to determine whether dual master's degrees are available in your areas of interest.

To fulfill the basic requirement for the two degrees, a student must complete a minimum of eighteen (18) credit hours of graduate course work in each degree program. The remaining credits include additional course work and a thesis for the thesis option program or a project for non-thesis option that are credited for both master's degrees. In cases where a thesis option is offered by one program and a project by another, the thesis option must be adopted. The student will submit one thesis/project for the two degrees. The thesis/project must be approved by both departments/programs and by the Faculty Graduate Studies Committee to which each program resides. The thesis/project committee for dual degrees must include at least one member from each degree program. The single thesis presented for dual degree programs cannot be used to satisfy the thesis requirements of any third or additional graduate degree program different from those in the dual degrees.

The minimum total credit hours for a dual master's degree program, if both programs require thirty (30) credit hours for degree completion, is forty-eight (48) graduate credit hours which apply for both thesis and non-thesis option programs. If one of the programs for dual degrees requires forty-two (42) credit hours for completion and the other program requires thirty (30) credit hours, the minimum total credit hours for the dual degrees is sixty (60) credits, including the thesis/ project as mentioned in the previous paragraph. Students must also meet any other specific requirements of each master's program.

Application Processes for Dual Master Degrees

A student wishing to apply for dual degrees may submit a single dual degree application that will be sent to each degree program simultaneously when first applying for graduate admissions. If the student is already registered in one degree, s/he may apply for the second degree no later than the end of a student's second term at AUB to be considered for the dual degree.

- The student application will be considered separately by each department/program and must satisfy the admissions requirements of both programs and be accepted to both programs to be admitted to the dual degree.

- A student admitted to dual master's degree programs may benefit from the Graduate Fellowship and Assistantship Program (GFAP) in either or both of the participating units; the total awarded cannot exceed what each unit provides for a graduate assistant for one academic year.
- A student admitted to dual master's degree programs will receive a single transcript identifying both degrees and the two program titles.
- A student may leave the dual degree programs before completion of both degrees. If the requirements for one degree have been fulfilled, that degree may be awarded.

Transfer of Credits

Up to nine (9) transfer credits may be applied to one of the two degree programs or may be divided between the two degree programs. The transfer of credit follows university policy with regards to the minimum grade required for transferrable courses from other institutions.

Residency Requirement

To meet the minimum residency requirement for dual master's degrees, a student must register and be in residence as a graduate student for at least three regular terms.

All requirements for the dual degrees must be completed within a period of five years after admission to the dual master's degrees. Extension beyond the maximum allowed period of study requires approval from the Faculty(ies) Graduate Studies Committee/s.

Admission to PhD Programs

Applicants who have an excellent record of academic achievement and a potential for creative and independent work may be admitted into one of the following categories:

- Admissions for Students Holding a Master's Degree
- Admissions for Students Holding a Bachelor's Degree

The minimum admission requirements for the two categories are described below. Additional requirements may be set by the individual programs as approved by the Faculty Graduate Studies Committee and the Board of Graduate Studies. Applicants are advised to check with the department/program administration to which they are applying or with the Office of Admissions for additional requirements.

Admission to the PhD program at AUB is competitive, based on the academic record and achievements of the applicant and the research foci of the department/program.

Applicants who hold degrees from institutions other than AUB must present, along with their official transcript, letter/s from the institution/s awarding the degree/s, indicating the denotation of their grading system in terms of its equivalence on a 4.0 GPA scale or in terms of letter grades A, B, C with +/- scales. Alternatively, applicants may present an official letter from the Registrar's office of their respective institutions indicating the graduating class average of previous years along with standard deviation and class size.

Admission for Students Holding a Master's Degree

Applicants to PhD programs are expected to have demonstrated distinctive academic ability. An applicant is considered for admission to the PhD program if s/he meets the following minimum admission requirements:

- Holds a master's degree in any of the disciplines approved by the department/program to which the candidate is applying from AUB or other recognized institution of higher learning with a minimum cumulative average of 3.7 or its equivalent.
- Submits a complete application including transcripts of academic record from all the institutions that were attended after high school.
    - General GRE test scores. Scores up to five years old will be accepted in most programs requiring the GRE scores. The departments may set minimum required scores; refer to the specific program for more information.
    - A written statement of purpose (about 400-500 words) indicating the purpose for pursuing graduate study in the particular field at AUB, and specifying the applicant's research interests and/or practical experience in the field.
    - A portfolio that includes a resume and samples of work if required by the specific program.
    - Three letters of recommendation.
- Completes an interview either in person, by phone, or online.
- Students from non-English-speaking countries must show proficiency in the English language. For additional information, refer to RUSE.

Admission for Students Holding a Bachelor's Degree

Applicants who have an excellent record of academic achievement, and a potential for creative and independent work at the bachelor level, may be admitted into a PhD accelerated track at the bachelor level if this track is available at the department/program.

An applicant is considered for admission as a PhD track student if s/he meets the following minimum admission requirements:

- A bachelor's degree in any of the disciplines approved by the department to which the candidate is applying from AUB or other recognized institution of higher learning with a minimum major and cumulative average of 3.7 or its equivalent.
- The same requirements for the application, for students holding a master's degree, apply to the accelerated PhD track.

The student should consult with specific programs to learn about minimum requirements for completion of the accelerated PhD track degree. It is possible that some programs will require that the student complete her/his master's degree before starting the PhD degree.

In selecting students to the PhD program, the Faculty Graduate Studies Committee recognizes other evidence of achievement—whenever present - such as research potential or experience, work experience, publications, or other creative work or scholarly activity. In considering such criteria, the Faculty Graduate Studies Committee will give serious consideration to departmental recommendations for admission in some cases for applicants

who do not meet the minimum requirements of grade point average indicated above but instead have presented clear evidence of creative activity and academic potential. Departments must present to the Faculty Graduate Studies Committee a justification of such admission recommendations. The Graduate Studies Committee will review these cases and will make its final recommendation on a case-by-case basis.

Admission to a Graduate Diploma Program

For graduate academic diplomas, the student must have an undergraduate bachelor's degree (or its equivalent from AUB or other recognized institution of higher learning) with an average of at least 3.0 (or standardized equivalent from other institutions of higher learning). An applicant, who does not meet the minimum undergraduate average requirement but appears to have reasonable potential for academic success as manifested by relevant practical experience or high scores on relevant standardized exams, may be admitted based on justified recommendation.

For graduate professional diplomas, the same admission requirements apply as for graduate academic diplomas but without a minimum constraint on the undergraduate average.

For both graduate professional and graduate academic diplomas, Faculties/Schools may set additional admission requirements for specific graduate diploma programs.

Applicants to certain Diploma programs in certain Faculties might be required to take the Graduate Record Examination (GRE) general test or the Graduate Management Admission Test (GMAT) and submit the score along with the application. GRE and GMAT test scores are valid for five years after the testing year in which the applicant is tested.

Admission as a Visiting Graduate Student

This category applies to students who are on study abroad, from another university or as part of an exchange program.

Applicants must be students at another recognized institution of higher learning pursuing graduate studies at the master's or PhD level. Applications should be submitted to the Office of Admissions along with the degree and transcript of record by the end of January if applying for the following fall, by the end of October if applying for the following spring, or by the end of March if applying for the following summer. GRE test scores are not required in this case. Applicants should specify their intended course of study during their visiting status. Applications are reviewed by departments where courses are to be taken. Recommendations for admission as visiting students require the approval of the Faculty Graduate Studies Committee.

Admission is offered normally for one term but may be extended an additional term depending on the specific agreement and following the approval of the department(s), where courses are taken, and the Faculty Graduate Studies Committee.

Deferred Registration of Admitted Students

Graduate applicants who are offered admission for a term and who do not register are eligible for admission the following term based on the approval of a petition. For programs where admission is granted only once a year, graduate applicants are eligible for admission the following year based on the approval of a petition. The petition should be submitted by the applicant to the Office of Admissions at least one month before the start of the term during which they plan to enroll.

Medical Record

All new students* are required to submit a complete medical record including vaccination records to the University Health Services (UHS) and finalize their medical clearance before registration.

Upon acceptance to AUB, students are required to start the process of medical clearance by following the below steps:

1. DOWNLOAD the Entrance Student Medical Record Form http://www.aubmc.org.lb/clinical/FM/Documents/student_medica_record.pdf
2. The form should be completed by the student's personal physician or a physician at the AUBMC Family Medicine clinics**. Remember to take your vaccination record with you to the physician's visit.
3. Activate your AUB net account. Complete the necessary information including immunization and other medical history using the link: http://uhs.aub.edu.lb and upload the form. You can scan or take a snapshot of the filled form using your phone. Make sure the document is readable.
4. If the submitted form is declined by UHS, an automatic email will be sent to the concerned student. The student will be responsible for updating the vaccination with the personal physician and resubmitting it.

Old returning students need to update their medical record by contacting UHS at 01350000 ext. 3015 or 7822.

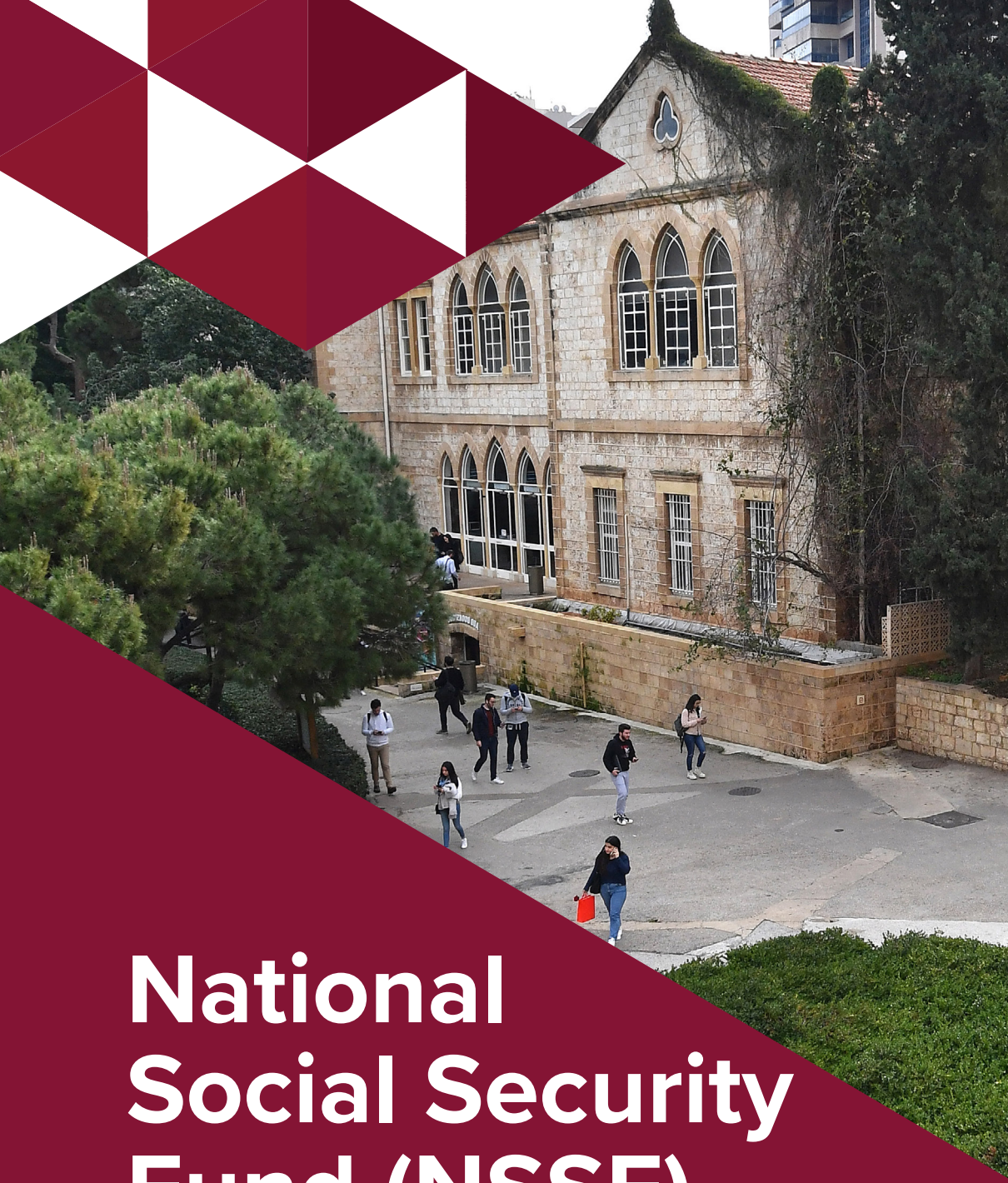
All medical records are confidential.

For more information, please contact the University Health Services at 01350000 ext. 3015 or 7822 from 8:00 am to 5:00 pm – Monday to Friday.

Students may use UHS for all their health concerns (sickness, medical conditions, immunization, medical advice etc.).

* Undergraduate and graduate students

** AUBMC Family Medicine Clinics- Wassef and Souad Sawwaf Building on Clemenceau Street phone: 01350000 ext.3000.



National Social Security Fund (NSSF) Medical Branch

National Social Security Fund (NSSF) Medical Branch

Membership in the NSSF (National Social Security Fund) is mandatory by law for all Lebanese and French students, excluding freshman and students that are older than 30 years. Non-Lebanese students may not join.

All new students and returning students who have been absent from AUB for a number of terms who are eligible according to the above are URGED to complete, in person, the NSSF declaration form at the Office of the Registrar Window as per deadlines usually circulated to the students.

Please read the following carefully before you fill out the form:

A- Those who benefit from NSSF
1. Students who benefit from one of their parent's NSSF or
2. Students who are working and have their own NSSF number
Must bring a certificate showing their NSSF number or that of their parents so that the fee can be refunded. (N.B.: The fee is non-refundable after the deadline).

B- Those who do not benefit from NSSF
1. Students who do not benefit from one of their parent's NSSF or
2. Students who do not work
Must bring a family registration form إخراج قيد عائلي or copy of their National Identity Card to become enrolled in NSSF and receive their own NSSF number.

AUB staff dependents must also declare.

Health Insurance Plan (HIP)

The Health Insurance Plan (HIP) provides medical and hospital coverage to the AUB community, namely academic and non-academic staff, retirees, students, and IC staff and their families.

- Second-class health care coverage is mandatory for all students during their years of study at AUB. Therefore, a new or continuing student registered for at least 6 credit hours is automatically enrolled under the Health Insurance Plan (HIP). However, a student may be exempted from enrolling in HIP if s/he presents proof that s/he is covered by another healthcare insurance provider.
- HIP members are required to exclusively use the medical services of the AUB Medical Center (AUBMC). HIP coverage of students is limited to medical care inside Lebanon only.
- A 'student' is defined as a person registered for a course of study at the university, whether working or not working towards a degree, on a full-time or part-time basis. Auditors are not considered students.
- PhD students - while registered - are eligible for HIP until they achieve their degree.
- Graduate students registered for a thesis are eligible to continue HIP coverage for a period of two consecutive years only.
- Students who register at the beginning of the first term are covered by HIP for twelve months, provided they do not graduate, withdraw, or become suspended and/or dropped from the university. HIP fee charges per term are announced each year by the AUB Benefits office.
- Students who register at the beginning of the second term are covered until September 30 of the same year, provided they do not graduate, withdraw, or are not suspended and/or dropped from the university.
- Students who register at the beginning of the summer session are covered until September 30 of the same year. Student coverage during the summer is strictly limited to use of the AUB Medical Center (AUBMC) services.
- In case of emergency during the fall and spring terms only, if students are not on campus or within the vicinity of the AUB Medical Center, students can report to the nearest medical service provider and get the needed care. Reimbursement of the bill cannot exceed 80 percent of AUBMC rates.
- Eligible married students may enroll their spouse and children, who are living with them in Lebanon, at the regular second-class rate as long as they remain duly registered at the university and are HIP members.
- Unlike other HIP members, students are not charged co-payment or cost sharing applied by the plan to outpatient services.
- A student will be covered by HIP from the beginning of a specific term provided he/she registers and pays his/her fees. Coverage is up to 48 hours after graduation or leaving the University (due to withdrawal, or being dropped from the University).

These guidelines are meant to be a mere summary of provisions of the plan and are provided solely as a matter of convenience; they in no way define or limit the scope or intent of any provision of the plan.

Fees, Expenses, Tuition, and withdrawal Information

The American University of Beirut is a non-profit institution. Costs to students in tuition and other university fees are kept at a minimum, consistent with the provision of high-quality instruction and adequate facilities and equipment. The university reserves the right to change any or all fees at any time without prior notice. Such changes are applicable to students currently registered at the university as well as to new students.

Payment of Fees

- Each AUB student must pay all her/his tuition and other university fees including health insurance plan, internet fee, social activity fee, and NSSF.
- Statements of fees are available on the AUB website.
- All students must complete registration and the payment of tuition fees and other charges according to the academic calendar on page 5 for the first and second terms. Under special circumstances, late payment is permitted during a period of no more than five working days after the announced deadline and is subject to a late payment fee of $100.
- Students with zero credit balances must notify the Office of the Comptroller—Students Setion via email at compt_sas@aub.edu.lb — to finalize their registration.
- Sponsored students, staff dependents, graduate assistants, and student staff members should contact the Office of the Comptroller—Students Accounts Section— before the payment deadline in order to finalize their registration and confirm their enrollment and attendance.
- Students who demonstrate financial need must formally apply to the Office of the Comptroller for deferred payment arrangements (Installment plan) for tuition fees according to the academic calendar for the first and second terms. Applications for deferrals are not accepted thereafter. Deferred payments are not a right and are only agreed to under specific and special circumstances. Students who arrange for deferred payments are still required to complete all registration formalities within the set deadlines and students must make the initial/first settlement within the set deadline. Deferred payment arrangements are not permitted for the summer session in any faculty.
- Applications for deferred payment arrangements are reviewed by the Office of the Comptroller, which is responsible for administering all deferred payment arrangements.
- All students who apply for deferred payment arrangements must pay at least 50 percent of the net amount of tuition due. All other charges must be paid in full with no deferrals. A student must pay a deferred payment application fee of $33, whether the application is approved or not. Should the student's application be approved, the student must pay the balance of tuition, the deferred application fee of $33, and an interest of 1 percent per month on the deferred amount. All payment must be concluded by the announced deadlines.
- Due dates are not extended nor are late payment fees waived for any reason.
- Students are expected to meet all financial obligations to the university by the appropriate due date. For any student who fails to promptly meet her/his financial obligations, the university reserves the right to place an encumbrance on the student's record that prevents registration for future terms and the release of transcripts and diplomas, and also prevents access to other university services. It is each student's responsibility to be informed of all registration and fee payment dates and deadlines.

Up-to-date schedules for registration and payment of fees are available through the Office of the Registrar. This information, as well as the tuition fee tables, is also on the following website: www.aub.edu.lb/comptroller/Pages/Student.aspx

Office of the Registrar
American University of Beirut
PO Box 11-0236
Riad El Solh 1107 2020
Beirut, Lebanon
Tel: +961-1-374274/374444
Ext: 2570/2571
Fax: +961-1-744469
Email: registrar@aub.edu.lb

Withdrawals

In the event a student withdraws for justifiable reasons after registration, fees are refunded according to the following schedule for the fall and spring terms:

Before the official start of classes	100% of full tuition and other fees
During the first week of classes	75% of tuition
During the second week of classes	50% of tuition
During the third week of classes	25% of tuition

The following schedule is applied in refunding fees for the summer session:

Before the official start of classes	100% of full tuition and other fees
During the first week of classes	75% of tuition
During the second week of classes	25% of tuition

For additional information, contact:
Office of the Comptroller, Student Accounts Section:
www.aub.edu.lb/comptroller/Pages/Student.aspx

During Winter Session and in the event a student withdraws for justifiable reasons after registration, fees are refunded according to the following schedule:

During the first two days of the Winter Session: 50% refund.

Financial Aid

Graduate

AUB offers financial aid to needy and qualified students in the form of need-based financial aid grants.

Need-Based Financial Aid Grants

Prospective Students

Financial aid application is opened for a specific period announced on the Office of Financial Aid website www.aub.edu.lb/faid. During this period, all prospective students who submit an AUB admissions application will receive an email from the Office of Financial Aid with information on the financial aid process, how to access the financial aid application and individual deadlines.

Enrolled Students

Enrolled students wishing to apply for financial aid should send an email to faid@aub.edu.lb during the period which is announced on the Office of Financial Aid website and will receive a reply with all necessary information.

Only complete applications are evaluated and the need based financial aid grant is valid for the normal period of study as long as the student remains in good academic standing.

Governmental Student Aid for North American Students

U.S. Federal Student Loans

Student loans are available for American students pursuing their studies at AUB. These low-interest loans are offered by the U.S. Treasury in the form of Direct Stafford and PLUS loans. Applications are submitted yearly online at https://studentaid.gov/h/apply-for-aid/fafsa. Students who are American citizens or permanent residents, enrolled at AUB in a regular degree program, and maintaining a satisfactory academic progress are eligible for these loans.

The need of eligible students is assessed by the Financial Aid Office based on established criteria by the U.S. Federal Student Aid program. Students must start repaying these loans after graduation following a six-month grace period.

AUB and AUB's Office of Financial Aid have developed a portal for obtaining consumer information about the university and its offered federal student aid loans as part of its response to the Higher Education Act (HEOA) of 1965, as amended. The Act requires institutions receiving Title IV federal financial aid to disclose general information and reports on various policies, procedures and operations, including policies and procedures with information related to academic programs, admissions and financial aid, student outcomes, and health and safety.

The consumer information portal is found at www.aub.edu.lb/faid/Pages/Consumer-Information.aspx

Canadian Grants and Loans

The Government of Canada offers student grants and loans to eligible Canadian students enrolled at AUB.

Students can go to the student grants and loans service of their province to find out if they are eligible for student grants and loans, to know how much they can receive, and to apply for the student grants and/or optional loans in one application.

Provinces and territories may cover one or more of the following: tuition, books, equipment and supplies, mandatory student fees, and living expenses.

A list of provincial and territorial student aid offices with links are found at https://www.canada.ca/en/services/benefits/education/student-aid/grants-loans/province-apply.html

Office of Student Affairs

The Office of Student Affairs oversees student activities, athletics, counseling, student housing, and career and placement services. The office also manages university-wide operations, such as the New Student Orientation and the work-study programs. The Office of Student Affairs provides services to students that enhance their overall well-being and create opportunities for them to enrich and broaden their educational experience.

The website has comprehensive information on all programs:

http://www.aub.edu.lb/SAO/Pages/default.aspx

Contact

West Hall, Ground Floor

Tel: +961-1-374374, ext. 3170

Fax: +961-1-744478

Email: osa@aub.edu.lb

Student Activities

The Department of Student Activities is committed to enhancing the student experience outside the classroom by providing opportunities for student development through co-curricular activities that complement AUB's academic programs. The department of student activities strives to enrich the intellectual, ethical and social development of our students by engaging them in university and community events and by providing leadership opportunities. Our aim is to foster holistic student development. Students can become members in clubs, societies, student government, student publications, or the Outdoors Festival.

The department plays a central role in the organization process for annual events like New Student Orientation and student elections.

The Department of Student Activities and the Dean of Student Affairs must approve all student activities organized on- or off-campus. The department's role is to help in facilitating these activities and ensure that students are applying the event planning process. West Hall building is considered the student hub where most student activities are held, in addition, to various AUB events sponsored by faculties, departments, centers, and alumni.

To learn more about the department of student activities visit our website at

www.aub.edu.lb/SAO/activities/Pages/default.aspx

Contact

West Hall, Ground Floor

Tel: +961-1-374374, ext. 3197

Email: studentactivities@aub.edu.lb

Charles Hostler Student Center (CHSC)

The university offers a wide range of sports, fitness and recreational programs through its Athletics department. The Charles W. Hostler Student Center (CHSC) is the hub of athletics, recreation and wellness on campus.

CHSC is comprised of three buildings. On the second floor of the pool building and overlooking the Corniche is a 6-lane semi-Olympic swimming pool fully equipped for swimming, jumping and water polo competitions.

Flanking the pool building is an official-size Greenfield recently surfaced by artificial turf. Around the field is a 6-lane, 400m track.

The gymnasium building houses three full-size multi-purpose courts where students can play basketball, volleyball, handball, futsal, badminton, and table tennis. We also host two annual engineering competitions in robotics and civil design. Moreover, the building contains two free weights areas, two cardiovascular training areas, a stretching area, an activity room for fitness classes, yoga, dance, and martial arts, and two squash courts. The third building incorporates an auditorium that can seat 280 persons, and a rooftop amphitheater with natural grass terraces. The auditorium hosts student classes, exams, TED talks, conventions and events.

In summer, we open the AUB beach for swimming and recreation for the whole community. It is a nice place to relax and take a dip in the crystal blue waters. There is a shallow pool conceived for kids and a beach volleyball court.

Student-athletes can choose one or more of the 26 varsity teams that constitute the AUB Phoenix. This year more than 1823 students enrolled in the fall tryouts and 2526 in the spring tryouts. 426 were selected in the Fall. From 2023 to the present day, we have been competing in the Federation Sportive Universitaire du Liban, the FSUL, which is the official body that operates under the Lebanese Ministry of Youth and Sports, and which organizes collegial sports competitions for 24 universities across Lebanon's five departments.

This year, the federation has opted to categorize certain sports into two brackets: the Gold Bracket and the Silver Bracket. AUB men's football, handball, basketball, and women's volleyball teams are competing in the Gold Bracket, whereas the men's volleyball, and men & women futsal are participating in the Silver Bracket. The remaining sports follow the two legs system.

The following are the varsity sports a student-athlete can join:

Basketball (Men, Women)	Swimming (Men, Women)
Rugby (Men, Women)	Futsal (Men, Women)
Track and Field (Men, Women)	Ultimate Frisbee (Men, Women)
Football (Men, Women and JV)	Handball (Men, Women)
Archery (Men, Women)	Tennis (Men, Women)
Volleyball (Men, Women)	Table Tennis (Men, Women)
Tennis (Men, Women)	Badminton (Men, Women)
Taekwondo (Men, Women)	Wrestling (Men, Women)
Jujitsu (Men, Women)	Squash (Men, Women)

Contact

Charles Hostler Student Center

Tel: +961-1-374374, ext. 3208 or 3217

Email: chsc@aub.edu.lb

Website: http://website.aub.edu.lb/sao/sports/Pages/index.aspx

Student Housing

As one of the few residential universities in the Middle East offering a beautiful campus where a variety of extracurricular activity prevails, strong and supportive communities flourished giving hundreds of residents the chance to experience the wonders of community living.

The priority is to accommodate undergraduate applicants starting with freshman students (eligibility of assignment criteria available on student housing homepage).

Students need to apply via AUBsis; the steps they need to follow can be found under Dorms Applications on the student-housing website: http://www.aub.edu.lb/sao/housing/Pages/index.aspx. Students are strongly advised to apply as soon as the application is activated.

For each term, the housing charges appear on the statement of fees issued to each student following the completion of the registration process; they vary depending on the type of accommodation selected. The Student Residence Hall Rates are available via the link: https://www.aub.edu.lb/SAO/housing/Pages/Housingrates.aspx.

Student Housing Guests and Guest Rates

For further details (rates, room categories) regarding guests, please follow our link: https://www.aub.edu.lb/SAO/housing/Documents/GUEST%20POLICY-NEW-Aug19.pdf.

Residence Halls

There are eight student residence halls, six for women and two for men. All residence halls have heating, air-conditioning, hot water, washing machines, dryers, irons and wireless Internet. Each room is equipped with a bed, desk, chair and closet.

Women's Residence Hall

Four women's halls are located on lower campus overlooking the Mediterranean, while the fifth is located on upper campus. The off campus dorm is in the heart of Hamra, within short walking distance of campus. The ground floor of each hall houses a reception area, a common kitchen and lobby for socializing, receiving guests and watching television. Each residence offers laundry facilities as well as vending machines with snacks andsoft drinks.

Men's Residence Halls

The two men's residence halls are located in the west part of upper campus, overlooking the splendid Mediterranean and close to Bliss Street, with its abundance of shops. The ground floor of each hall houses a reception area, a common kitchen and lobby for socializing, receiving guests and watching television. Each residence offers laundry facilities as well as vending machines with snacks and soft drinks.

Contact

West Hall, Ground Floor

Tel: +961-1-374374, ext. 3175, 3183

Email: studenthousing@aub.edu.lb

Website: http://www.aub.edu.lb/SAO/housing/Pages/default.aspx

Career Hub

The Career Hub aims at helping AUB students in their transition from being students to becoming workplace professionals by encouraging them to build future career plans and make use of the different services and resources provided to achieve their personal aspirations. The Career Hub strives to promote:

Career exploration and decision making by facilitating the exploration of career options and developing effective career planning skills.

Skill development by helping students develop skills within their academic disciplines to enhance their professional image through different career workshops and one-on-one sessions.

Experiential learning by disseminating employment information and providing resources for students to explore changing trends in the global job market through three main types of experiential learning opportunities (internships, job shadowing, and company visits).

Career placement by helping current and former AUB students to achieve their career goals through the development of lifetime career planning and job search skills and assisting them in finding full-time employment, internships and part-time jobs.

Employer development by building and expanding long-term relationships between the American University of Beirut and key employers.

Major employment events by organizing an Annual Career Fair in April along with other ongoing recruitment events throughout the year to give students the opportunity to network with top employers and get hired.

Contact

West Hall, Ground Floor

Tel: +961-1-374374, ext. 3172

Fax/Direct Phone Number: +961-1-744488

Email: careerhub@aub.edu.lb

Website: http://www.aub.edu.lb/SAO/cps/Pages/default.aspx

Work-Study Program

The Office of Student Affairs coordinates an extensive work-study program that provides work-study opportunities on campus for both undergraduate and graduate eligible full-time students with good academic standing. The program allows students to work with AUB Faculty and Staff to better connect with their university. Students can apply through the AUBsis within deadlines announced for by the Office of Student Affairs. Placement is made on the basis of date of application, demand, capability, and job availability. Students may work a maximum of 80 hours per month in the Fall/Spring semesters and 60 hours per month in the Summer term.

Every year, we have more than 700 students who participate in our program and have the opportunity to contribute to their educational expenses while also developing job skills through working with faculty and administration in various campus offices and the Medical Center.

Contact

West Hall, 3rd floor

Tel: +961-1-374374, ext. 3177

Email: wsp@aub.edu.lb

Website: https://www.aub.edu.lb/SAO/Pages/Work-Study-Program.aspx

Counseling Center

The Counseling Center provides a supportive environment and enhances access to quality counseling services to ensure mental, psychological, and emotional well-being for improved academic success and student self-actualization. The center addresses the mental health needs of the university community and preserves students' right to mental health in an engaging and tolerant environment that fosters lifelong learning, growth, and development.

Counseling is a professional relationship that empowers individuals and groups from diverse backgrounds to accomplish mental health, wellness, education, and other life goals. It requires the establishment of a therapeutic relationship between a student and a trained professional to address their concerns. The overall counseling process aims to establish goals that are unique to each individual and guides students to achieve set goals and realize their full potential. Counseling is designed to be a collaborative endeavor between a student and a trained professional that results in self-discovery and learning.

The Counseling Center offers short-term mental health services that are strictly confidential and free of charge for students.

Contact

West Hall, 2nd floor

Email: counselingcenter@aub.edu.lb

Website: http://www.aub.edu.lb/SAO/Pages/Counseling-Center.aspx

Online Booking System for Appointments: AmericanuniversityofBeirut1@mail.aub.edu/bookings/

Accessible Education Office: Disability Services and Learning Support

AUB strives to foster an inclusive university community that welcomes, respects, and values people of diverse backgrounds and abilities. In concert with this mission, the Accessible Education Office within the Office of Student Affairs exists to facilitate equitable access for students with qualified disabilities to the academic, social and programs at AUB.

To achieve this goal, the Accessible Education Office (AEO) works in collaboration with students, faculty and staff to implement services and reasonable accommodations that remove barriers to participation in a robust and well-rounded student experience, without changing the academic and technical requirements of the program and or activity. The provision of such accommodations is in accordance with the university's commitment to these goals, AUB's non-discrimination policy and practices, as well as relevant US federal law.

The Accessible Education Office works in an individual and confidential manner with students who choose to disclose disabilities. Upon admittance to AUB, students seeking accommodations are encouraged to contact the AEO and set up an appointment in before each semester. See website below for more information.

Contact

Accessible Education Office

Tel. +961-1-350000, ext. 3196

Email: accessibility@aub.edu.lb

Website: http://www.aub.edu.lb/SAO/Pages/Accessible-Education.aspx

Office of International Programs (OIP)

Graduate

The Office of International Programs (OIP) promotes internationalization and diversity at AUB by initiating, developing and administering institutional partnerships that foster both incoming and outgoing student, faculty and staff mobility. Through its Study Abroad Program, OIP promotes exchange opportunities and advises AUB students, faculty and staff wishing to pursue international academic experiences that are academically challenging, professionally relevant and personally engaging. OIP supports all international students at AUB, enabling them to integrate into the community and enjoy a rich academic and cultural experience.

The Office of International Programs is located in West Hall, 3rd floor, Rooms 320, 322, 324.
Telephone: +961-1-374374 ext.3186,3176, 3146.
Email: oip@aub.edu.lb
Website: www.aub.edu.lb/oip

International Student Services

The Office of International Programs provides support to all international students studying at AUB by providing the following services:

- Pre-arrival advice and visa assistance (following admission to AUB).
- On-site orientation, mentoring and intercultural activities. Explanation of public government services, processes, and procedures on campus.
- Assistance in obtaining student residence permits and/or following up on transactions at Immigration authorities.
- Support with reporting theft or loss of legal identification documents at local authorities.
- Forums (both electronic and in-person) for interaction with other AUB student populations.
- For international degree-seekers, advice on studying abroad as part of their AUB degree.

Visas and Residence Permits

International students joining AUB who do not hold a Lebanese passport or Lebanese identity card must have their foreign passports valid for a period of no less than 12 months from the date of joining the university. Non-Lebanese students should also check with the nearest Lebanese Embassy or consulate in their country as to whether they require an entry visa in order to legally enter Lebanon or are eligible to obtain an entry visa at the airport. The OIP may assist students in securing their visas to Lebanon. Students who wish to benefit from OIP visa assistance must indicate this in their Confirmation Letters upon acceptance. Further information can be found on the OIP website.
Once registered at AUB, all students who do not hold Lebanese passports, and wish to stay for longer than the duration of their visas, are required to obtain a residence permit before the expiration of the entry visa they received. Students must apply for this permit within one month of arrival in Beirut and ONLY after registering and paying AUB tuition fees.
The Office of International Programs, in coordination with the Office of the Registrar, helps provide the necessary certificates for registered- non-Lebanese students in obtaining residence permits from the Lebanese authorities.
Information about obtaining a residence permit is communicated at the beginning and throughout each term, and is posted on the OIP website.

Study Abroad and Student Exchange

AUB graduate students may spend a year or a term abroad in an approved program of study without losing their status at AUB. They may apply to an established program at a university that has an exchange agreement with AUB or initiate their own proposal for study abroad at an accredited university of their choice. In both cases, an application (see below), approval of their faculty, as well as clearance from The Office of International Programs (OIP), are required. In cases where students will be taking courses at a host university that are pre-requisite courses for future courses at AUB, departments/faculties will need to make sure that the relevant courses at the host university meet the required learning objectives of the relevant course at AUB. Study abroad and exchange programs provide students with the opportunity to travel to another country, experience a new culture, and build connections with students and faculty members at host institutions. These in-person interactions form an integral part of the experience. As such, only in-person study abroad and exchange programs are approved at AUB.

Definitions

Exchange Students

Students on exchange programs at universities with which AUB has bilateral exchange agreements, pay the usual AUB tuition rate appropriate to a 15-credit course load.

Study Abroad Students

Students on study abroad programs at universities, with which AUB does not have a bilateral exchange agreement will pay the host university fees at the receiving institution. However, they must continue to pay the AUB miscellaneous fees as applicable. Summer abroad students are waived the AUB miscellaneous fees.

Students wishing to go on exchange or study abroad programs must complete the AUB Study Abroad Course Approval Petition and the host university's application. Students are responsible for the completion of both sets of application forms by the assigned deadlines.

Procedures for Study Abroad and Exchange Students

To spend a term or up to a year abroad, all students must meet the following eligibility criteria:

1. Students must have completed 6 credits at AUB to apply for up to a yearlong study abroad program, unless applying for a summer abroad.
2. Students may earn a maximum of 9 credits in an exchange or study abroad coursework and/or perform research work related to their thesis during regular terms or a summer term abroad without losing their status as AUB students.
3. Students must meet the AUB residence requirements as stipulated in the AUB Catalogue.
4. Students may not go on exchange or study abroad during their final term at AUB.
5. To be considered for **exchange and study abroad programs**, students should have a minimum cumulative average of 3.3.

Students will receive credit for all course work completed abroad as long as:

(a) the relevant academic departments at AUB have pre-approved the courses through the study abroad online petition system.
(b) the student has achieved a minimum passing grade equivalent to the required AUB grade in each of the courses as accepted by the student's Faculty.

Credits received on study abroad and exchange programs are considered to be transfer credits and will show as pass/fail on the AUB transcript.

(c) the host university provides an official transcript of record directly to the Office of International Programs. An official transcript from the host institution must be received by AUB in order for credits to be successfully transferred.

(d) All courses taken must be in-person.

(e) Certificate of Physical attendance is required.

Note: Students who decide **to change** one or more of their pre-approved courses once they are at the host university must contact their department chair by email and submit the Study Abroad petition for approval of the replacement or added course(s) within one month of the beginning of the AUB term; otherwise, the student risks not being granted the course transfer upon return to AUB.

Registration Process at AUB for Students who are approved to go on study abroad or exchange programs

To maintain their status as active students at AUB while abroad, students are required to:

- Submit the completed AUB Study Abroad Course Approval Petition by the assigned deadline.
- Attend a mandatory OIP pre-departure meeting.
- Complete the Final Confirmation and Clearance Form and submit it to OIP by the assigned deadline.
- Pay all fees due to AUB by the assigned deadline.
- Not register for classes at AUB or at any other institution of higher learning, either in-person or online where there is an overlap in time.

Residency Requirements

- Master's degree students must register and be in residence as graduate students for at least four regular terms. All requirements for the master's degree must be completed within a period of four years after admission to graduate study.
- PhD students must register for at least four terms beyond the completion of the master's degree. Requirements for the degree of Doctor of Philosophy must be completed within a period of five years after starting graduate work beyond the master's degree.

Thesis Registration

- Master's degree students: Thesis credits can only be registered after the proposal has been accepted and must be registered at AUB (the first thesis registration that carries credit must be registered at AUB). The subsequent zero credit Master thesis registration may be permitted upon approval of appropriate Faculty committees while studying abroad. The thesis defense must take place at AUB according to requirements stipulated in the AUB catalogue.
- PhD students: PhD thesis credit registration can only be done once the proposal has been accepted, must be continuous and sequential, and must beapproved by the department concerned.

Once students complete all of the steps above, their registration status will appear as EXPR (Study Abroad) or EXCH (Exchange) depending on the type of program they wish to be enrolled in. Students will then be able to maintain access to AUBsis and online library

resources. Students will also be able to enjoy early advising and perform early online registration for the term following their study abroad program. Study abroad and exchange students will have the same privileges as continuing students on campus.

Credit Transfer for students upon return from their term or year abroad

- Students should be sure to obtain an official transcript from the host university and request to have it sent directly to the Office of International Programs:
  Hard copy official transcripts should be mailed to the following OIP Mailing Address:
  AUB/ Office of International Programs, West Hall, 3rd Floor, Room 320, 1107 2020, Beirut, Lebanon.
  Electronic Official transcripts : If your host university only issues electronic transcripts, these must be certified by an official of the University with a certificate provided by a recognized security vendor or be encrypted and only accessible to the recipient and should be emailed to aubabroad@aub.edu.lb.
- Submit an Exchange or Study Abroad Testimonial survey.

AUB facilitates several study abroad and exchange programs including Erasmus+ for undergraduate and graduate students. AUB's growing number of international partner institutions include but are not limited to:

- Aarhus University, Denmark
- American University in Cairo, Egypt
- American University of Paris, France
- American University, USA
- Amherst College, USA
- Augsburg University, USA
- Bogazici University, Turkey
- Boston College, USA
- Boston University, USA
- California Institute of the Arts, USA
- Danish School of Media & Journalism, Denmark
- Ecole Polytechnique, France
- Ecole Supérieure des Sciences Commerciales d'Angers, France
- EDHEC Business School, France
- EM Normandie Business School, FranceESADE Law School, Spain
- Freie Universität Berlin, Germany
- FGV Getulio Vargas Foundation, BrazilHanyang University, South Korea
- HEC Montreal, Canada
- Institut d'Etudes Politiques de Paris (Sciences Po), France
- IE University, Spain
- John Cabot University, Italy
- Koç University, Turkey
- Leuphana University of Lüneburg, Germany
- Luigi Bocconi University, Italy
- Lund University, Sweden
- Middle East Technical University, Turkey
- McGill University, Canada
- NEOMA Business School, France
- New York University – Stern School of Business, USA
- Paris School of Business, France
- Open University of Cyprus, Cyprus
- Pitzer College, USA

- Politecnico Di Torino, Italy
- Queen Mary University of London, UK
- Radboud University, Netherlands
- Reed College, USA
- Stanford University International Honors Program, USA
- The University of Sydney, Australia
- Temple University, USA
- Trinity College Dublin, Ireland
- Université de Genève, Switzerland
- Università Cattolica del Sacro Cuore, Italy
- University College Dublin, Ireland
- University College London, UK
- University of Bologna, Italy
- University of Bern, Switzerland
- University of Copenhagen, Denmark
- University of California, Berkeley, USA
- University of Granada, Spain
- University of Kassel, Germany
- University of Montreal, Canada
- University of Pavia, Italy
- Universitat Pompeu Fabra, Spain
- University of Pennsylvania, USA
- University of South-Eastern Norway, Norway
- University of Toronto, Canada
- University of Wisconsin- Platteville, USA
- University of Zurich, Switzerland
- Uppsala University, Sweden
- Virginia Commonwealth University, USA
- Zurich University of Applied Sciences, Switzerland

AUB has a number of Erasmus+ inter-institutional credit mobility agreements with several universities in Europe. Examples include Aarhus University, Danish School of Media & Journalism, University of Copenhagen in Denmark, Institut d'Etudes Politiques de Paris (Sciences Po) in France, Freie Universität Berlin in Germany, Athens University of Economics and Business in Greece, Politecnico Di Torino, University of Bologna in Italy, Amsterdam University of Applied Sciences in Netherlands, Trinity College Dublin in Ireland, University of Granada in Spain, Uppsala University in Sweden, Istanbul Sehir University, Koc University, and Middle East Technical University in Turkey.

Undergraduate students are required to complete at least 24 credits at AUB before beginning a period of study abroad, while graduate students are required to complete at least 6 credits at AUB before studying abroad; additional academic policies and procedures also apply. For a complete list of exchange and other study abroad options at AUB, or to review the guidelines for study abroad, visit www.aub.edu.lb/oip or Room 320 in West Hall.

OIP Resources for Faculty

The Office of International Programs provides information for faculty on international standards of practice for credit transfer and grade transfer upon request. In addition, OIP maintains a current listing of institutions/consortia/universities with which AUB maintains formal institutional agreements for purposes of student, staff and faculty mobility. Please note that exchange agreements cannot be put into effect at AUB without the approval of the Provost. Guidelines for setting up new international academic exchange agreements and other institutional relationships are available by request from the Director.

General University Academic Information

Graduate

Academic Rules and Regulations

The general policies, procedures and minimum requirements for advanced degrees are stated in this section. However, each program has specific degree requirements which are detailed in the respective program descriptions under later sections of this catalogue. Both general and program specific requirements must be fulfilled in order for a graduate student to receive a master's degree or PhD degree.

Academic Advisors

For the master's degree level, refer to Supervision of Master's Thesis or Project on page 83.
For the PhD degree level, refer to Supervision of Doctoral Thesis on page 90.

RCR Requirement

The Responsible Conduct of Research (RCR) Requirement must be completed by all newly admitted degree seeking graduate students, both at the master's and PhD levels. The requirement includes prospective graduates and graduates admitted on probation.
The requirement is fulfilled by completing the CITI Responsible Conduct of Research course determined by the student's respective faculty and department/program. RCR courses "cover core norms, principles, regulations, and rules governing the practice of research." Topics include research misconduct, data management, authorship, peer review, mentoring, using animal subjects in research, conflicts of interest, collaborative research, and research involving human subjects. Additional topics may be included according to research discipline. The requirement must be fulfilled within one month of being notified of the requirement. Failure to fulfill the requirement in a timely manner results in a registration hold that is removed once the student has completed the RCR course.

Academic Dishonesty

Plagiarism, falsification of data, cheating and other forms of academic dishonesty are serious violations of academic integrity and may result in dismissal. Students are expected to be familiar with the various forms of academic dishonesty as explained in the Student Code of Conduct and in the University Policy and Procedures Concerning Research Misconduct.

Plagiarism

Students who fail to properly credit ideas or materials taken from other students and/or outside sources (including Artificial Intelligence) commit plagiarism. Students putting their name on a piece of work - any part of which is not theirs - constitutes plagiarism, unless that piece is clearly marked and the work from which they have borrowed is fully identified.
Plagiarism is a violation of the university's academic regulations and is subject to disciplinary action.

Correct Use of Language

English is the language of instruction at the University. Papers (term papers, essays or examinations) that are poorly written, no matter what the course the student is enrolled in, may receive a lower grade for the quality of writing alone.
The final grade in any course may be lowered for consistent substandard written or oral expression; in extreme cases, a failing grade may be given for this reason alone.

Attendance

Attendance Policy

Students who are absent without excuse for more than one fifth of the number of sessions in any course may be dropped by the instructor of the course.

Classes and Laboratories

- Students are expected to attend all classes, laboratories or required fieldwork. The students are responsible for all course material and for any announcements made during class time, lab time or fieldwork.
- Students who miss more than one fifth of the sessions of any course prior to the withdrawal deadline can be withdrawn from the course by the instructor.
- Students who withdraw or are withdrawn for excessive absence from a course receive a grade of "W."
- An instructor who withdraws a student from the course because of excessive absence must have stated in the syllabus that attendance will be taken.
- Students who do not withdraw or cannot be withdrawn for excessive absence from a course will receive a grade of F.

Examinations and Quizzes

Students who miss a scheduled examination (including midterms and finals), quizzes, or other class assignments must present an excuse considered valid by the course instructor. Make-up exams, quizzes, and class assignments are administered according to the course syllabus and must be completed before the final grade of the course is issued at the end of the term. Only medical reports and/or qualified professional opinions issued by an AUB Medical Center (AUBMC) doctor, or by the University Health Services are accepted. Should there be a question about the validity of any excuse presented by the student, the matter should be referred to the appropriate faculty committee. Instructors will make sure there is no time conflict between an exam and a regularly scheduled course.

Leave of Absence

All graduate students are expected to make steady and satisfactory progress toward the completion of degrees.
Students who are not enrolled for a period of more than one academic year (two consecutive regular terms and one summer) will be considered to have withdrawn from the program unless they apply for a leave of absence and secure approval from the department, faculty/school Graduate Studies Committee, and the Graduate Council.
The leave of absence application can be for up to one academic year at a time. The maximum period of approved leave of absence is for two academic years. An approved leave of absence does not count towards maximum residency. Non-enrollment by the student for one regular term without securing leave of absence will count towards maximum residency.
Students who seek to return without having secured leave of absence approval after a non-enrollment period of more than one academic year must reapply and will be considered for readmission following regular AUB application/admission procedures. If re-admitted into the same graduate program, then their earlier status as graduate student will count towards maximum residency. See section on readmission.

The leaves of absence are approved based on documentation of a justified reason that includes documentation/proof submitted, and the time of submission. Acceptable reasons must prevent students from carrying out their graduate studies. Students are strongly advised to consult with their advisors regarding the validity of their reasons.
Normally, students are expected to submit a leave of absence before the start of the term in which the leave begins. On some occasions and with adequate justification, leave of absence may be approved after the beginning of the term.
Students with an approved Leave of Absence (LOA) are not required to submit a reactivation form.
Students should be granted an automatic reactivation of their academic status through the Graduate Council.

Readmission

Students who are returning from an unauthorized leave of absence or who have exceeded their maximum residency or have been dropped from their program must submit an application for readmission by the admission deadlines through the Office of Admission.

Category of Students

Full-Time Status

Full-time status is defined as the enrollment by the graduate student in the following:

- A minimum of 6 non-thesis credit hours during the fall or spring term or
- Master's student working on thesis or
- PhD degree candidacy status or
- PhD students who are on fellowships that provide monthly stipends and tuition coverage.

Part-Time Status

Any student who does not fulfill any of the above full-time mentioned conditions.

Audit Students

Those who wish to attend individual classes without receiving credit may apply as auditing students.
AUB students can apply to audit a course through the online petitions system (OPFS). Non AUB students must email regist@aub.edu.lb to obtain approval. An applicant is eligible to audit a course if the following requirements are met:
•Baccalaureate II or its equivalent, or a bachelor's degree or its equivalent from a recognized academic institution to audit a graduate course.
•Approval from the instructor of the course.
•Payment of the tuition charge at the Comptroller's Office (student accounts section).
•Registration as an auditor at the Office of the Registrar.
Applicants are not eligible to audit laboratory, studio or seminar courses.
Since permission to audit is on a space-available basis, applicants are not permitted to register until registration of regular students is complete. The university does not grant academic credit for such work.

The Graduate Fellowship and Assistantship Program (GFAP)

The Graduate Fellowship and Assistantship Program (GFAP) at the American University of Beirut provides fellowship support composed of partial or full tuition coverage for students in good standing at the master's level towards the fulfillment of their degree requirements. Awards are allocated on a competitive basis based on merit and qualifications, departmental needs, and availability of funds as per the policy published at https://aub.policytech.eu/dotNet/documents/?docid=1541&public=true. For new students, the application process is part of the online graduate admissions process (https://graduateadmissions.aub.edu.lb/). For continuing students, applications may be obtained from the office of the dean of the faculty to which the student belongs and should be filled out prior to the deadline set by the faculty.

Registration

Requirements

Before registering, new students must ensure that all requirements for registration are met, particularly conditions detailed in the acceptance email and checklist received from the Office of Admissions. Students who do not meet the conditions listed in the checklist cannot register.
A registration guide is available on the webpage of the Office of the Registrar. Subsequent to confirmation that all conditions have been met, students must follow the steps in this guide.
Students may refer to the "Registration Instructional Video" on the webpage of the Office of the Registrar.
Students can introduce final adjustments to their schedules during change of schedule (drop & add) period.

Cross-Registration

Students Enrolled at AUB Taking Courses at Other Universities in Lebanon

Students studying at the American University of Beirut may be allowed to cross-register for a course at other recognized academic institutions if all the following conditions are met:

- the course is a program requirement at AUB,
- the course is not offered at AUB during the graduation term. Official documentation of the grade must be received by AUB two weeks prior to the Senate vote, or graduation will be postponed to the following term,
- the course in which the student intends to cross-register is equivalent to a course that AUB offers (the number and title of each of the two equivalent courses should be clearly indicated),
- the student completes the cross-registration form, secures the chairperson's approval, and sends it to the Office of the Registrar,
- the Office of the Registrar authorizes the student to cross-register; the student submits authorization to the concerned institution and secures their consent.

Students will be registered for the course manually at the Office of the Registrar upon presenting the signed cross-registration form; and must earn a C+ or its equivalent in the cross-registered course in order to transfer the credits.

Students Enrolled at Other Universities Taking Courses at AUB

For purposes of cross-registration, students studying at recognized academic institutions who wish to take courses at AUB must do the following:

- secure permission from their institutions to take specified courses at AUB,
- secure permission from the chairperson of the concerned department at AUB,
- present the above permissions to the AUB Office of Registrar; and
- settle the fees at AUB upon registration by the Office of the Registrar.

Courses and Grades

Courses taken as part of a student's graduate study program fall into one of two categories, which are graduate courses or prerequisites (undergraduate courses). Each category may have different grading systems.

Course Loads

Normally, the maximum number of credits that may be taken in a regular term is 12. The maximum number of credits that may be taken in the summer session is 6. Normally, students who wish to enroll in more than the maximum number of credits must petition the Faculty Graduate Studies Committee to obtain permission.

Graduate Level Courses

- The minimum passing grade for a graduate course is C+ for a master's student and B for a PhD student.
- The minimum grade for a graduate student enrolled in a graduate course is F.
- Results of tutorial courses are reported as Pass (P) or No Pass (NP).
- Results of comprehensive exams, projects, or theses are reported as in Progress (PR) or Pass (P) or NO Pass (NP).

Prerequisite Courses

Prerequisite courses are undergraduate courses taken to make up for deficiencies in the student's academic background in relation to the program they are pursuing.

- Prerequisite courses do not carry graduate credit.
- The minimum passing grade for a prerequisite course is C+. Departments or programs may set higher minimum passing grades.

Change of Grade Policy

After grades are posted on the AUB Student Information System (AUBSIS), a change of grade is not allowed unless a demonstrable mistake was made in the correction of the final examination or in the calculation of the grade. In such a case, the instructor must initiate a Change of Grade petition for approval along with supporting evidence for the mistake warranting the change of grade. The chairperson of the course department and the dean must approve the petition.

No change of grade will be accepted and processed after the lapse of one regular semester. Students have the right to access their corrected exams, including final exams, without penalty, and to request review of their exams in case mistakes have been made in calculating grades or in corrections. The student's request to review the course grade must be made to the course instructor within one week of the posting of course grades. In case the review by the instructor results in a change of course grade, the instructor must initiate the Change of Grade petition.

If a dispute regarding the change of a grade continues, the student must discuss the issue with the chair of the department. If the student is still not satisfied, s/he must submit a petition to the faculty Academic and Curriculum Committee requesting further consideration.

Incompletes

Students who receive an incomplete grade for a course must complete the course work within one month of the start of the next regular term.

Incomplete coursework is reported as "I" followed by a grade reflecting the evaluation of the student based on the grade calculated as per the course syllabus where a grade of zero is computed for all missed work. If the work is not completed within the period specified, the "I" is dropped and the attached grade becomes final.

A grade of "I" may be assigned by the appropriate faculty committee in cases where it extends the incomplete beyond the normal reporting period based on an approved petition.

Credit Transfer

Transfer of Credits into a Master's Degree Program

Graduate courses taken beyond the bachelor's degree requirements at AUB, or at other recognized institutions, are only transferable for credit toward master's degree requirements if the applicant attained a cumulative average of at least GPA: 3.3 in the undergraduate courses taken in the major or related field of study. Only graduate courses in which the applicant earned an equivalent grade of B+ or above can be transferred. For graduate programs of up to 33 credits, no more than 9 credits are transferable provided they are not credits earned by internship, thesis or practicum, and degree minimum residency requirements are maintained. For master's degrees with more than 33 credits, the maximum number of transferable credits is up to 12. Applicants who have completed a Bachelor of Engineering Degree (BE) and are applying for admission to a Master of Engineering program (ME) may apply for a waiver of up to 9 credits of coursework. The total number of transferable credits from BE to ME may not exceed 12 credits for AUB graduates and 9 credits for non AUB graduates. (For more details, refer to the Maroun Semaan Faculty of Engineering and Architecture section). Approval by the faculty/school Graduate Studies Committee is required for all transfer credits.

Transfer of Credits from One Master's Degree to Another

Graduate courses taken at AUB (or at other recognized institutions), in which the applicant earned an equivalent grade of B+ or above may be transferred to another master's degree at AUB. No more than 9 credits are transferable provided they are not credits earned by an internship, thesis or practicum, and degree minimum residency requirements are maintained. For master's degrees with more than 33 credits, the maximum number of transferable credits can be up to 12 credits. Approval by the department or the academic unit concerned and the faculty/school Graduate Studies Committee is required for all transfer credits. Normally, credits counted toward another graduate degree at AUB or another institution cannot be transferred if they have already been used to satisfy requirements for another awarded graduate degree.

Calculation of the GPA

Credits earned at other institutions or at AUB beyond the requirements of the bachelor's degree and transferred into the master's program are not included in the calculation of a student's grade point average while pursuing a master's degree. Such courses are reported as pass (P). Transfers of credit earned at the master's level or while registered as a graduate not working for a degree from AUB are not subject to the above limitations but require the recommendation of the department chair and approval of the faculty/school Graduate Studies Committee.

Transfer of Credits into a PhD Degree Program

Graduate courses taken beyond the master's degree requirements at AUB, or at other recognized institutions, are only transferable for credit toward PhD degree requirements if the applicant attained a cumulative average of at least A- in the graduate courses taken in the major field of study. Only courses taken beyond the master's degree requirements in which the applicant earned an equivalent grade of A- or above can be transferred. No more than 6 credits are transferable provided they are not credits earned by an internship, thesis or practicum, and degree minimum residency requirements are maintained. Approval by the faculty/school Graduate Studies Committee and the Graduate Council is required for all transfer credits.

Transfer of Credits from a Graduate Diploma Program

Transfer of course credits from graduate academic and professional diploma programs at AUB to a graduate degree program is allowed following the academic rules and regulations specified by the university. The number of course credits that can be transferred is up to 12 for graduate academic diplomas and up to 6 for graduate professional diplomas. In addition, only graduate-level courses in which the applicant earned an equivalent grade of B+ or above can be transferred. The approval of the faculty/ school Graduate Studies Committee is required for all transfer credits.

Change of Major Within Faculty and Interfaculty Transfer

Students enrolled in a master's degree program at AUB may apply to transfer to another program according to the following procedure:

- Change of major within the same Faculty: Students may apply, following the set deadlines for graduate admissions process, for change of major within the same Faculty by petitioning the department to which they are planning to join and securing its approval and the approval of the Faculty Graduate Studies Committee.
- Transfer to other Faculties/Schools from within AUB: Students should complete a new application to the desired program following the graduate admissions process and deadlines to be considered for admission into the new major.
- Transfer within an interfaculty program: Students should apply to the relevant interfaculty program committee seeking its approval and the approval of the Faculty Graduate Studies Committee of the Faculty to which the student wishes to transfer.

Academic Standing of Students Working for a Master's Degree

The academic performance of the student is first evaluated by the department upon completion of 9 credits of coursework after initial enrollment towards the degree and then is evaluated every term thereafter.
A graduate student is in good standing when her/his graduate cumulative average is B+ or above. Students must be in good standing in order to be awarded a degree.

Students Admitted on Probation

- Students admitted on probation must complete at least 9 credits of graduate level courses within the first two terms of graduate studies, must pass all courses, and must attain a minimum cumulative average of 3.3 to achieve regular status.
- If students fail to meet any of these conditions, they will be dropped from the program.

Probation and Removal of Probation

Students working for a Master's degree can be placed on academic probation if they fail to make normal progress towards the degree.
The academic performance of the student is first evaluated by the department upon completion of the first 9 credits of coursework towards the degree and then is evaluated every term thereafter:

- Students are placed on probation if they attain a cumulative average below 3.3 or fail any course taken for graduate credit.
- Students placed on probation due to average must remove the probation at the end of the following term by attainment of a cumulative average of at least 3.3.
- Students placed on probation due to course failure should retake the course the next time

it is offered and achieve a minimum passing grade of B. In case this condition cannot be met, students in consultation with the advisor must petition the faculty/school Graduate Studies Committee to retake the course.

The department or program in which the student is enrolled may recommend probation to the Faculty Graduate Studies Committee even though the student has attained an adequate cumulative average.
Changes in probationary status of enrolled graduate students are reviewed at their respective Faculties/School Dean's Offices within one week of the start of the term by the faculty/school. The faculty/school Graduate Studies Committee issues through the Office of the Dean the statement of the change of probation status to the student with copies to the department chair, student advisor and Office of the Registrar.

Dismissal

The Faculty/School Graduate Studies Committee may dismiss a master's student, in consultation with the department/program, from graduate study if any of the following conditions arise:

- Cumulative average based probation status is not removed in the term following the first probation, excluding students admitted on probation (see previous section on probation and removal of probation).
- Students are placed on probation for a second time.
- Students achieve a cumulative average of less than 2.3 after completion of 9 credits.
- Students fail to achieve a passing grade in two courses in one term.
- Outside the first term of study, students achieve a cumulative average of 2.3 or above but less than 3.3 in any term, and fail to achieve a passing grade in one course in that term.
- Students fail the comprehensive examination or the thesis defense twice.

Requirements for the Master's Degree

Course Requirements

There are two types of master's degree programs, namely, thesis and non-thesis. Some programs provide a choice between the two.

- Students following the thesis option are required to complete a minimum of 30 credit hours, of which a minimum of 21 graduate credit hours should be in coursework and a minimum of 6 credit hours in thesis work. Normally, a maximum of 3 credit hours may be tutorial courses. Exceptions for individual students will require approval of the department chair and the faculty Graduate Studies Committee.
- Students following the non-thesis master's program are required to take a minimum of 30 graduate credit hours, 3 credits of which may be a project. Students must follow a course of study approved by the department/program and by the faculty Graduate Studies Committee.
- Students following the Master of Public Health (MPH) are required to complete a minimum of 42 credit hours.
- Students following the Master of Business Administration (MBA) program are required to take 6 credits of foundation courses (or to pass a related exemption test upon approval of the program director). In addition, they must complete a minimum of 42 credit hours, of which a minimum of 39 graduate credit hours in coursework and a minimum of 3 credit hours of MBA project.
- Students holding an MD degree or working on a combined MS-MD degree are required

to complete at least 10 graduate course credits and a thesis, in addition to the MD degree requirements.

Graduate students receive credit for graduate level courses only. Students with deficiencies in their undergraduate preparation in relation to the program they are pursuing may be required to take additional course credits as determined by the department/program concerned.
Some programs may have additional credit requirements for completion of a master's degree.

Additional Language Requirements

Individual departments and programs may set their own non-English language requirements. Examination procedures for these languages should be approved by the faculty Graduate Studies Committee.

Residency Requirements

To meet the minimum residency requirements for the master's degree, a student must register and be in residence as a graduate student for at least two terms, that is, either for one term and two summers or for four summers.
All requirements for the master's degree must be completed within a period of eight regular terms for full time students and 10 regular terms for part time students after admission to graduate study. Extension beyond the maximum allowed period of study requires approval from the faculty Graduate Studies Committee.
Approved leave of absence does not count toward the residency. Please refer to the Leave of absence Section.
Interruption of studies, consecutive or intermittent, shall not exceed three years, starting from the first administrative registration in the program.

Comprehensive Examination

All master's programs require that the student register and pass a 0-credit comprehensive examination course. Timing of the examination is set by the department/program. The examination is graded as Pass (P) or No Pass (NP).
Students who do not pass the comprehensive examination may take it a second time in the following term. Students who fail a program's comprehensive exam twice are dropped from their program. Students who pass the comprehensive exam after one failure will have their initial grade changed from "NP" to "PR".
In place of the comprehensive exam, FHS and OSB follow different requirements. Please refer to the appropriate section.
Students may not register the thesis prior to passing the comprehensive examination.

Supervision of Master's Thesis or Project

Thesis Proposal

When following a graduate program leading to the master's degree with thesis option, students are expected to meet with faculty members in the department to discuss possible

thesis topics and select a thesis advisor. Normally, the thesis advisor is from among the full-time professorial faculty of the department/program or from another department/program in the university. In interdisciplinary programs, the thesis advisor is from one of the concerned programs.
Students are expected to select a research topic in consultation with the thesis advisor and prepare a thesis proposal by the end of the second regular term. The proposal must clearly state the topic addressed and the proposed contributions to the body of knowledge. The thesis proposal should also state the thesis title, objectives, scope of work with relevant literature, research methodology and expected results. A Thesis Committee is formed by the thesis advisor and the student in coordination with the chairperson/director of the unit according to the following conditions:

- The Thesis Committee should normally consist of at least three members of professorial rank chaired by the thesis advisor.
- In case a co-advisor is also a member of the thesis committee, then the thesis committee should consist of at least four members of professorial rank chaired by the thesis advisor.
- In departments/programs, normally at least two members of professorial rank of the Thesis Committee must be members of the student's department. The remaining member(s) can be from other departments at AUB or from an institution recognized by AUB.
- In case the thesis advisor is from another department at AUB, the chairperson will consult with the chairperson of the department to which the thesis advisor belongs.
- In interdisciplinary programs, the members of the Thesis Committee should be drawn from full-time faculty members at AUB. Normally at least two members of professorial rank must be from the departments involved in the program.

The thesis proposal should be approved by the faculty/school Graduate Committee at least four months before the thesis defense.
The Thesis Committee must be approved by the chairperson/director of the student's department/program. The student must submit the thesis proposal to the committee and secure its approval. The committee members will evaluate the proposal in consultation with the thesis advisor.
Students will submit the thesis proposal with a completed Thesis Proposal Form as required by Faculty or Program (see website) to the chairperson of the department, signed by the thesis advisor and all the members of the Thesis Committee, with the proposed dates of the comprehensive examination, thesis defense, and courses taken so far. Students should indicate if the proposed research involves human subject research or animal related research and seek approval/confirmation or exemption of the Institutional Review Board and/or Animal Care Committee.
Once approved, the chairperson forwards the thesis proposal with the names of the Thesis Committee members to the faculty/school Graduate Studies Committee for its approval.
The faculty/school Graduate Studies Committee will then inform the chairperson of the proposal approval or lack thereof, and the chairperson will communicate the decision to the thesis advisor.
It is the student's responsibility, in coordination with the thesis advisor, to keep members of the Thesis Committee informed on the progress of her/his work and seek their input.

Continuous Thesis Registration

Once students register for their thesis, they pay a thesis fee that allow them to register up to three additional terms without paying. Although the additional registrations are paid for, students must still register for the thesis on AUBsis each time in the relevant course number labeled A, B, and C consecutively. In addition, students are expected to register consecutively without skipping any regular term. Not registering for the thesis without an approved Leave

of Absence (hereafter referred to as an "unexcused absence") throughout subsequent terms will cause the student to forfeit the registration due for each term of unexcused absence. Exceptions must be addressed through a petition for approval by the advisor, department chairperson, faculty/school Graduate Studies Committee, and the Graduate Council. The below table shows examples of students who take no leaves and how unexcused absences lead to payment for additional thesis registrations once the three additional terms are exhausted by registrations or unexcused absences.

	1st Thesis term	**3 Additional terms**			**Paying term 1**
Number of Absences	Regular term 1 (Course #)	Regular term 2 (Course # A)	Regular term 3 (Course # B)	Regular term 4 (Course #C)	Regular term 5 (Course # D)
0	Pay & Register	Register (no payment)	Register (no payment)	Register (no payment)	Pay & Register
1	Pay & Register	Unexcused Absence	Register & No Payment	Register & No Payment	Pay & Register
2	Pay & Register	Unexcused Absence	Unexcused Absence	Register & No Payment	Pay & Register
3	Pay & Register	Unexcused Absence	Unexcused Absence	Unexcused Absence	Pay & Register

Thesis Format

An AUB-approved thesis manual is available on the university libraries webpage. The manual provides the style guide for all theses prepared by AUB students, and application of its instructions is mandatory for all theses-dependent degrees. Theses not conforming to the publication style outlined in the thesis manual are not accepted by the university. Students are welcome to visit the Archives and Special Collections, Jafet Library, any time during the term (https://aub.edu.lb.libguides.com/Thesis).

For all matters not discussed in the Thesis Manual, theses must follow the form and style specified by the department or program, provided the style conforms to the Thesis Manual.

Students graduating in the Summer term must be registered during that term (see section below on Thesis Defense). Students who carry out thesis work during the Summer term are expected to register for the thesis. Not registering during the Summer term after having started thesis work should only take place if students will not be using AUB facilities/services for research and will not be receiving thesis advising during that term.

Thesis Defense

Students are not allowed to defend their thesis unless they have passed the comprehensive examination. In order to defend the thesis, students must be registered for the thesis in the session in which they expect to graduate.

The thesis defense is open to the public and must be carried out no later than the dates specified on Graduate Council Website (https://www.aub.edu.lb/graduatecouncil/Pages/thesisdeadlines.aspx).

The final draft of the thesis shall be submitted to each member of the Thesis Committee at least two weeks before the date of the thesis defense. The thesis defense shall be announced

at least two weeks in advance. The total time allocated for the thesis defense should allow for answering all questions and should not normally exceed 120 minutes.
The thesis defense session is normally chaired by the thesis advisor, and the student will be notified of the final decision by the Thesis Committee immediately after completion of the Thesis Committee deliberations.
The last thesis registration is graded with Pass (P) or No Pass (NP) which is reported for the combined thesis and thesis defense. If No Pass (NP) is reported, students may resubmit the thesis and defend it no earlier than the next semester. Failure on the second attempt results in discontinuation of the graduate work. All previous thesis registration grades are reported as PR (in progress). If the thesis work involves human subject research or animal related research, the Thesis Committee must forward to the department chair a copy of the approval/ confirmation or exemption letter of the Institutional Review Board and/or Animal Care Committee.

Project and Project Defense

In partial fulfillment of the requirements for the non-thesis master's degree, students may be required to submit a project. Each student is assigned an advisor who serves as the project advisor. The master's project topic proposal and selection of the advisor and project committee members should be approved by the Faculty Graduate Studies Committee.
The master's project committee should be composed of at least two members recommended by the department/program in addition to the advisor. The project topic proposal, selection of the advisor, and selection of project committee members should be approved by the faculty/ school Graduate Committee at least four months before the project defense.
Students are expected to register and finish the project work within two consecutive regular terms at most. Registering for a project course beyond a second term requires approval of the faculty/school Graduate Studies Committee; this approval must be sought on a per-semester basis prior to registration.
If the project work involves human subject research or animal related research, the Project Committee must forward to the department chair a copy of the approval/confirmation or exemption letter of the Institutional Review Board and/or Animal Care Committee.
The project defense is open to the public and must be carried out no later than the dates specified in the table below.
All previous project registration grades are reported as PR (in progress).
Pass (P) or No Pass (NP) is reported for project defense. If No Pass (NP) is reported, students may resubmit the project and defend it after a period of at least three months. Failure on the second attempt results in discontinuation of the graduate work.

Deposit of the Project/Thesis in the Library

After passing the project/thesis defense examination, students are required to deposit one soft copy of the thesis saved as PDF (Portable Document Format) file into the library (ScholarWorks). Upon successful submission, the Library delivers a receipt to the Office of the Registrar before the students are awarded the degree. The Office of the Registrar shall ensure that all names of students recommended to the Senate for award of the master's degree in the thesis option have submitted their thesis copy to the library. Students should sign a release form indicating whether or not the library is authorized to supply copies of the thesis/project to other libraries or to individuals. The non-authorization option is valid for a period of three years only, after which copies of the project/thesis are supplied upon request.
For deadline, refer to webpage
https://www.aub.edu.lb/graduatecouncil/Pages/thesisdeadlines.aspx

Master's Degree Graduation Requirements

To be eligible for graduation with a master's degree from the American University of Beirut, a graduate student:

- must apply for graduation,
- must have attained a cumulative course average of 3.3 or above,
- must not be on probation by the time the coursework is completed,
- must have completed the minimum credit hours of coursework designated by the specific program,
- must have passed the comprehensive exam,
- must have completed thesis requirements for the thesis option degrees,
- must have completed project requirements for the non-thesis option degrees,
- and must have met the residency requirements specified for the master's degree.

Academic Standing of Student Working for PhD Degree

Good Standing

A PhD student is in good standing when her/his graduate grade cumulative average is 3.7 or higher. Students must be in good standing in order to be awarded a degree.

Probation and Removal of Probation

Students working for a PhD degree who have not yet advanced to candidacy can be placed on academic probation if they fail to make normal progress towards the degree.
The academic performance of the student is first evaluated by the department upon completion of the first 9 credits of coursework towards the degree and then is evaluated every term thereafter:

- Students are placed on probation if they attain a cumulative average of 3.0 or more, but less than 3.7, or fails any course taken for graduate credit.
- Students placed on probation due to average must remove the probation at the end of the following term by attainment of a cumulative average of at least 3.7.
- Students placed on probation due to course failure should retake the course the next time it is offered and achieve a minimum passing grade of B. In case this condition cannot be met, students in consultation with the advisor must petition the faculty/school Graduate Studies Committee to retake the course.

The department or program in which the student is enrolled may recommend probation to the Faculty Graduate Studies Committee even though the student has attained an adequate cumulative average. Probation of a PhD student may be removed by the Graduate Council upon recommendation from the Faculty Graduate Studies Committee.
Changes in probationary status of enrolled graduate students are queried at their respective Faculties/School Dean's Offices within one week of the start of the term by the faculty/school. The faculty/school Graduate Studies Committee issues through the Office of the Dean the statement of the change of probation status to the PhD student with copies to the department chair, student advisor and Office of the Registrar.

Dismissal

The Graduate Council, upon recommendation from the Faculty Graduate Studies Committee and the Chair of Department, may discontinue a PhD student from graduate study if any of the following conditions arise:

- Probation status is not removed in the term following the first probation.
- Students receive probation for a second time during the degree residency.
- Students attain a cumulative average of less than 3.0.
- Students fail to achieve a minimum passing grade of B in two courses in one term.
- Outside the first term of study, students achieve a cumulative average of 3.0 or above but less than 3.7 in any term, and fail to achieve a passing grade of B in one course in that term.
- The work of the student is considered to be unsatisfactory in the opinion of the department or program, regardless of the grades obtained.
- Students fail the Qualifying Examination Part I (Comprehensive Examination) or Part II (Thesis Proposal Defense) twice.
- Students fail the thesis defense twice.

Requirements for the Degree of Doctor of Philosophy

In addition to the particular rules of the various graduate programs as stated in their sections of this catalogue, the following general rules apply to all Doctor of Philosophy programs.
The award of a Doctor of Philosophy degree indicates that a student has attained mastery of a field and has demonstrated the capacity to perform independent scholarly research. The doctoral degree is not awarded solely upon completion of a curriculum of courses, even if the student has done superior work in it. Rather, it is awarded in recognition of independent scholarship as demonstrated by a substantial contribution in the candidate's chosen field.

Program of Study

Each doctoral student is expected to take such courses as may be required for both a strong foundation in the field and the development of a specialization.

Regular PhD Track Course Requirements for Students Holding Master Degrees

Each student, in consultation with her/his advisor, is expected to finalize a program of study and submit it to the department within two terms of starting the PhD degree. The following are main features of this PhD track:

- It must include a minimum of 48 credit hours beyond those required for the master's degree of which a minimum of 18 credit hours must be in graduate-level coursework and a minimum of 24 credit hours of thesis work. Normally, a maximum of 3 credit hours out of the 18 credits of coursework may be tutorial courses. Exceptions for individual students will require approval of the department chair and the Faculty Graduate Studies Committee.
- It will include a 0-credit comprehensive examination preparation course and a 0-credit thesis proposal preparation course.

For all PhD students who joined their program from AY 2020-21, complete the Certificate on

Teaching in Higher Education (see the section below for Certificate on Teaching in Higher Education).

Accelerated PhD Track Course Requirements for Students Holding Bachelor Degrees

Each student, in consultation with her/his advisor, should finalize a program of study and submit it to the department within two terms of starting the PhD degree. The Graduate Council monitors the progress of the student through annual reports on course and thesis work by chairpersons of the department/program. The following are main features of the accelerated PhD track:

- must include a minimum of 78 credit hours beyond those required for the bachelor's degree of which a minimum of 36 credit hours must be in graduate-level coursework and a minimum of 30 credit hours of thesis work. Normally, a maximum of 6 credit hours out of the 36 credits of coursework may be tutorial courses. Exceptions for individual students will require approval of the department chair and the Faculty Graduate Studies Committee.
- It will include a 0-credit comprehensive examination preparation course and a 0-credit thesis proposal preparation course.

Students enrolled in the accelerated PhD track with a cumulative average of (GPA: 3.3) or above are allowed to transfer to the MA/MS/ME degree program upon recommendation by the department and approval of the Faculty Graduate Studies Committee. The Graduate Council is then informed.

Additional Language Requirements

Depending on the research topic, the Thesis Committee and the department may require proficiency in one or more foreign languages. Examination procedures for these languages will be approved by the Faculty Graduate Studies Committee.

Residency Requirements

To fulfill the minimum residency requirements for the PhD degree, students must register for at least six terms beyond the completion of the master's degree or eight terms for the accelerated track beyond the bachelor's degree. Requirements for the PhD degree must be completed within ten regular terms of starting graduate work beyond the master's degree or twelve regular terms for the accelerated track beyond the bachelor's degree. Extension requires Graduate Council approval upon recommendation by the Faculty Graduate Studies Committee.

Interruption of studies, consecutive or intermittent, shall not exceed three years, starting from the first administrative registration in the program.

Certificate in Teaching in Higher Education (C-THE)

The Certificate in Teaching in Higher Education (C-THE) is a graduation requirement for all PhD students. It provides training in teaching for PhD students at AUB. Starting in the fall term that follows their first term of enrollment, PhD students take two 0-credit courses, (EDUC 401 and 402) one in the fall and one in the spring. A full description of these courses can be found in this catalogue under the Department of Education.

PhD Qualifying Exam

All PhD programs require that PhD students pass the qualifying exam. The PhD qualifying exam is two parts. The Qualifying Exam Part I is a written comprehensive exam administered by the department/program or Thesis Committee. The Qualifying Exam Part II is an oral thesis proposal defense exam administered by the Thesis Committee. Each of the qualifying exams consists of a 0-credit course that must be registered and given a grade of pass or fail by the end of the term. The successful completion of Qualifying Exam Part I is a prerequisite for Qualifying Exam Part II; the successful completion of Qualifying Exam Part II is a prerequisite for the Thesis Defense.

Qualifying Exam Part I: Comprehensive Exam

All PhD programs require that PhD students register and pass a 0-credit comprehensive examination course. Comprehensive examinations are written exams taken after completing a minimum of 15 credits of course requirements for the regular degree track and a minimum of 30 credits of course requirements for the accelerated degree track. The comprehensive exam should normally be taken by the fourth term of the PhD student's enrollment in the regular PhD program and by the sixth term of the PhD student's enrollment in the accelerated PhD track.

In general, a comprehensive examination provides assurance that all PhD candidates have acquired sufficient knowledge/background in their major field of study. For more details on the examination, students should refer to their specific department/program requirements. The Thesis Committee or the department/program administers the comprehensive exam.

Students who do not pass the comprehensive exam may take it a second time in the following term. Students who are unable to pass a program's comprehensive exam twice are dropped from the PhD program. Students who pass the comprehensive exam after one failure will have their initial failure reported as "PR" for progress in the first term the course was registered, and the grade of "P" for passing the comprehensive exam will show on their transcript in the second term the course was registered.

Qualifying Exam Part II: Defense of Thesis Proposal

All students must successfully complete a qualifying examination defending their PhD thesis proposal. The second part of the qualifying exam (thesis proposal defense) is conducted by the student Thesis Committee. There should be at least one regular term between the thesis proposal defense term and the thesis defense term.

Admission to Candidacy

Students enter degree candidacy upon successfully passing both parts of the qualifying exam while being in good standing. Students who are enrolled in degree candidacy are considered full-time students. While in degree candidacy, it is the responsibility of both the student and advisor to maintain contact to ensure continuous progress towards the completion of the degree.

For admission to candidacy, students are additionally expected to:

- have completed all graduate coursework requirements beyond the master's degree in the regular PhD track,
- have completed all graduate coursework requirements beyond the bachelor's degree in the accelerated PhD track,

- have attained a cumulative average of at least 3.7 while in the regular or accelerated track doctoral programs,
- have completed all language requirements.

Supervision of Doctoral Thesis

During the first term of graduate study, the department or program assigns an academic advisor to the student. The advisor guides and helps the student plan a course of study. Not all credits need to be in courses offered by the department/program in which the student is enrolled, but all credits must be in courses that, in the judgment of the department/program, are relevant to the field in which the student is specializing.

Normally by the end of the second term, each student enrolled in a PhD program is assigned a thesis advisor who must be a full-time professorial rank faculty member who is normally a member of the student's department/program. In case the thesis advisor is from another department at AUB, the chairperson will consult with the chairperson of the department to which the thesis advisor belongs.
PhD students are required to register for a thesis course continuously and sequentially during each term in which they are carrying out work contributing to their PhD thesis.
The only exception to this policy of continuous enrollment is if the Faculty Graduate Studies Committee and the Graduate Council have granted the student a formal leave of absence.

PhD Thesis Committee

- The thesis committee should be composed of at least five members, with a minimum of three from within AUB and two members should be from outside the university. A maximum of one member with the title of Professor Emeritus can serve on each committee.
- The thesis advisor and at least three of the Thesis Committee members must be of professorial rank.
- All members of the Thesis Committee must hold a doctoral degree in a relevant field.
- The chair of the Thesis Committee must be a full professor who is not the PhD thesis advisor.
- Members of the doctoral Thesis Committee are recommended by the student's thesis advisor in consultation with the student.
- The committee is approved by the department, the Faculty Graduate Studies Committee and the Graduate Council.

The doctoral Thesis Committee approves the thesis topic and research plan, conducts the thesis proposal defense (Part II of the Qualifying Exam) and conducts the thesis defense. The thesis proposal in addition to the selection of the Thesis Committee and the committee's approval of the proposal submission should be approved by the faculty/school Graduate Studies Committee and the Graduate Council before the student can conduct the second part of the qualifying exam (thesis proposal defense). The Graduate Council informs the Office of the Registrar, Dean of the Faculty, Chair of the Department, and Advisor of the approval decision. The student, upon approval, can arrange for the thesis proposal defense date and time as applicable.

PhD Thesis Proposal

When following a graduate program leading to the PhD degree, students are expected to

meet with faculty members in the department to discuss possible thesis topics and select a thesis advisor.
Students are expected to select a research topic in consultation with the thesis advisor and prepare a thesis proposal. The proposal should be prepared by the end of the fourth regular term for a regular track student and by the end of the sixth regular term for an accelerated track student. The proposal must clearly summarize the thesis problem and the planned approach. The purpose of the thesis proposal is to inform the Thesis Committee members and the department, in concise statements, of the candidate's research plan. It should state the thesis objectives, scope of work with relevant literature, research methodology and expected results. The proposal must provide sufficient literature citations to indicate awareness of previous work and enough detail to show how the proposed work is expected to advance knowledge in the field.
Students must submit the thesis proposal to the Thesis Committee and get its preliminary approval to defend the proposal.
Students must indicate if the proposed research involves human subjects and/or animals and seek approval/confirmation or exemption of the Institutional Review Board and/or Animal Care Committee.

Qualifying Exam Part II: Defense of Thesis Proposal

All students must successfully complete a qualifying exam defending their PhD thesis proposal. The second part of the qualifying exam (thesis proposal defense) is to be taken at least two terms prior to the thesis defense and is conducted by the student's Thesis Committee. Students are expected to demonstrate the intellectual capacity to pursue and complete independent research that advances knowledge in the field of study.
Passing the thesis proposal defense requires that the research topic is of PhD standard, original, clear in its contribution to existing knowledge and contains appropriate methodology.
Students who fails the thesis proposal defense (Part II of Qualifying Exam) must repeat it in the following regular term after addressing the comments of the Thesis Committee compiled by the Thesis Committee chair in the examination report.
The chair of the doctoral Thesis Committee, upon satisfactory completion of the proposal defense, will send to the department chair her/his assessment (Pass or Fail) of the 0-credit course "Qualifying Exam Part II" along with a copy of the exam form, signed by all members of the committee.

Human Research Protection Program (HRPP) / Institutional Review Board (IRB)

The Human Research Protection Program (HRPP) at AUB is responsible for safeguarding the rights and welfare of human subjects participating in Biomedical and Social and Behavioral Sciences (SBS) research activities conducted under the auspices of AUB. It is committed to protecting, ensuring respect, and fostering awareness of those rights. This is achieved by governing and authorizing the conduct of research that follows the three ethical principles of the Belmont Report namely: Respect for Persons; Beneficence and Justice; and that abides by the principles of responsible research conduct and scientific integrity.
The IRB, which is the core component of HRPP, is the sole AUB committee formally designated by HRPP to review and approve the conduct of research involving human subjects who are recruited to participate in research activities conducted at AUB (including AUBMC) and by AUB faculty, students and staff, regardless of the funding source or the location of the research.

Human Subject Research:

"Research" is defined as a "systematic investigation, including research development, testing and evaluation, which is designed (in whole or in part) to develop or contribute to generalizable knowledge."
"Human subject" is defined as "a living individual about whom an investigator (whether professional or student) conducting research obtains (1) information or biospecimens through intervention or interaction with the individual; or (2) obtains, uses, studies, analyzes or generates identifiable private information (data) or identifiable biospecimens."
Research that requires IRB review includes any research involving human subjects or their identifiable private information that:

- is conducted by AUB faculty, staff, or students, or
- is performed on the premises of the university, or
- is performed with or involves the use of facilities or resources belonging to the university.

Depending on the associated risk, the IRB categories of review are as below:

- Exempt review which involves less than minimal risk.
- Expedited review which involves minimal risk.
- Full Board review which involves more than minimal risk.

Timeline of Review schedules:

- Exempt research studies take around 8 days to two weeks for review and approval.
- Expedited review requires approximately four to six 6 weeks for review and approval.
- Full Committee review should be submitted at least six weeks prior to the IRB meeting date; review and approval by the IRB may require one or more months after the initial IRB review at a convened meeting.

It is an institutional requirement that all members of the AUB community who plan to conduct research studies involving human subjects complete the designated web-based courses offered through AUB by the Collaborative Institutions Training Initiatives (CITI) Program.
Adherence to all institutional policies, rules, and regulations of the HRPP/IRB is important during the conduct and participation in any research project involving human subjects, as any failure to comply may (a) create an increase in risks to subjects, (b) adversely affect the rights, welfare, and safety of research subjects, and/or (c) adversely affect the integrity of the university's HRPP. Any non-compliance may jeopardize the conduct of the research project, eligibility to be approved by the HRPP/IRB as PI or co-investigator on future projects, and/or may delay fulfillment of the requirements for graduation.
Guidance about the research submission process is available on the IRB website at: www.aub.edu.lb/IRB. Students are also welcome to visit the HRPP/IRB offices at the Halim and Aida Academic and Clinical Center, 3rd floor, or contact the HRPP/IRB at 5445 or irb@aub.edu.lb
Updates and activities can also be followed on the AUB IRB X (previously Twitter) account: @AUB_IRB

Research on animals

Established in 2003, the Institutional Animal Care and Use Committee (IACUC) at the AUB Faculty of Medicine ensures that laboratory animals used in research and teaching comply with the «US Government Principles for the Utilization and Care of Vertebrate Animals used in Testing, Research, and Training.»

1. Proposal Review Process:
   - o All new proposals for animal use and significant changes to existing proposals must undergo review and approval by the IACUC before animal use can commence.

- Experimental procedures, including field studies, pilot studies, breeding, or euthanasia for sample collection, require prior IACUC approval.

2. Oversight and Compliance:
   - The IACUC reviews, approves, requires modifications to, or withholds approval for proposals involving animal use.
   - It suspends any activity not compliant with animal care policies at AUB-FM.
3. Inspections and Record Keeping:
   - The IACUC oversees all areas where animal procedures occur and determines inspection intervals, including research laboratories and spaces for routine procedures.
   - It inspects surgical, drug, and experimental records to monitor protocol adherence.
4. Research Protocol Approval:
   - Researchers must submit a Research Protocol Approval form detailing the need for animals, procedures involved, housing, care, and pain category (C, D, or E).
5. Ethical Considerations:
   - The IACUC promotes the 3 Rs principle (Replacement, Reduction, Refinement) to minimize animal use and discomfort.
6. Personnel Training:
   - Personnel involved in animal research or teaching must undergo mandatory training covering theoretical and practical components.
   - Training consists of an online theoretical module and a 2-hour practical session, ensuring understanding of laboratory animal science and ethical issues.
   - Trainees must pass the online exam with 80% or higher to attend the practical session.
   - Upon completion, trainees receive an Animal Care Facility (ACF) training attendance certificate, granting access to the ACF.

All measures implemented by the ACF and IACUC ensure compliance with NIH guidelines regarding the care and use of animals in research and teaching.

All students conducting human subject research or animal-related research for master's theses or projects must obtain prior written Institutional Review Board and/or Animal Care Committee approval/confirmation or exemption, respectively.

PhD Thesis Format

In partial fulfillment of the requirements for the degree of Doctor of Philosophy, students must submit a thesis based on the results of original, independent research. Except in departments/programs in which the medium of instruction is not English, the thesis must be in English.

An abstract not exceeding 350 words must be submitted with the thesis. If a thesis is in a language other than English, the abstract must be written in both the thesis language and in English.

An AUB-approved thesis manual is available on the university Libraries webpage. The manual provides the style guide for all theses prepared by AUB students, and application of its instructions is mandatory for all PhD degrees. Theses not conforming to the publication style outlined in the thesis manual are not accepted by the university. Students are welcome to visit the Archives and Special Collections at Jafet Library any time during the term (https://www.aub.edu.lb/graduatecouncil/Pages/thesisdeadlines.aspx).

For all matters not discussed in the Thesis Manual, theses must follow the form and style specified by the department or program, provided the style conforms to the Thesis Manual. Copies of the thesis should be submitted by students to the Thesis Committee members at least two weeks before the thesis defense. Copies must be legible and durable. Additional copies may be required as specified by the department or program concerned.

PhD Thesis Defense

The thesis/project defense is open to the public and must be carried out no later than the dates specified on the Graduate Council website (https://www.aub.edu.lb/graduatecouncil/Pages/thesisdeadlines.aspx). In order to defend the thesis, students must be registered for the thesis in the session in which they expect to graduate.

Final doctoral thesis defenses will be announced to the university community so that interested members from the faculty and student body may attend. The date, time and location for the defense must be sent to the Graduate Council at least two weeks in advance. A copy of the thesis abstract must accompany the defense announcement.

Pass (P) or No pass (NP) is reported for the combined thesis and thesis defense. Successful completion of the thesis defense requires at least four affirmative votes and no more than one negative vote. If No pass (NP) is reported, students may resubmit the thesis and defend it no earlier than the next semester. Failure on the second attempt results in dismissal from the program.

If the thesis work involves human subject research and/or animal related research, the Thesis Committee must forward to the department chair a copy of the approval/confirmation or exemption letter of the Institutional Review Board and/or Animal Care Committee.

Deposit of the Thesis in the Library

After passing the thesis defense examination, students are required to deposit one soft copy of the thesis saved as PDF (Portable Document Format) file into the Library (ScholarWorks). Upon successful submission, the Library delivers a receipt to the Office of the Registrar before students are awarded the degree. The Office of the Registrar shall ensure that all names of students recommended to the senate for award of the PhD have submitted their PhD thesis copy to the library. Students should sign a release form indicating whether or not the library is authorized to supply copies of the thesis to other libraries or individuals. The non-authorization option is valid for a period of three years only, after which copies of the thesis are supplied upon request. For deadline refer to webpage https://www.aub.edu.lb/graduatecouncil/Pages/thesisdeadlines.aspx

PhD Degree Graduation Requirements

Students can graduate at the end of any academic term provided they have satisfied the following requirements:

- Applied for graduation.
- Attained a minimum cumulative course average of 3.7, excluding courses taken prior to admission into the program.
- Passed the Doctoral Qualifying Exam Parts I and II (comprehensive and thesis proposal defense examinations) as set by the department.
- Met program-specific requirements for publication of thesis work by the time of graduation. Refer to the catalogue section pertaining to the program. The minimum requirement is two publications according to one of the following options: (1) in two internationally refereed journals, (2) in two international conferences, or (3) in one internationally refereed journal and one international conference. Program specific requirements may be more stringent.
- Successfully completed the Certificate in Teaching in Higher Education (C-THE) by completing the two required courses*

- Successfully defended a thesis of original scholarly work.
- Met the residency requirements and all pertinent AUB regulations.

This requirement applies to students who join the PhD programs at AUB after the Academic Year 2020-21 (inclusive). Students should start C-THE in the fall term that follows their first term of enrollment.

Requirements for the Graduate Diplomas

Graduate diploma programs, regardless of type (academic or professional), require a minimum of 12 and a maximum of 18 course credits. Some programs may allow three credits from undergraduate courses. Graduate academic diplomas can include courses from existing graduate degree programs.

Graduate Diploma Graduation Requirements

To be eligible for graduation with a graduate academic or professional diploma, students must have attained a cumulative course average of 3.3 or above and must have completed the minimum credit hours of coursework designated by the specific diploma with a course passing grade of C+.
Students who receive a graduate diploma that satisfies the requirement of at least 240 lecture hours in total, in at least six courses, will be granted an associate alumnus/a status.
Graduate diploma programs will follow the same maximum residency requirements as for master's degree programs.

Disclosure of Student Records

Information about notification of rights under Family Educational Rights and Privacy Act (FERPA) can be found on the following link:
http://www.aub.edu.lb/Registrar/Documents/ferpa.pdf

Commencement Exercises

Commencement exercises are held once per year at the end of the Spring term. Students who graduate in Spring or in the immediately previous Summer and Fall terms may participate in the commencement exercises.
Students are allowed to march in the commencement exercises only once per degree.

Names on Diplomas and Degrees

Names on diplomas and degrees are spelled exactly as they appear on passports or official identity cards. According to the Lebanese Ministry of Education and Higher Education, names of Lebanese students should include first name, father's name and family name. Names on AUB diplomas and degrees appear both in Arabic and English. If a name on a passport or official identity card does not appear in both languages, then the name that does not appear in one language will be spelled on AUB diplomas and degrees according to the personal

preference of the student.
Once a degree is issued the name cannot be changed. All AUB degrees issued for the same student must have the same spelling in both English and Arabic.

Recognition of AUB Degrees by the Lebanese Ministry of Education and Higher Education

The Lebanese Ministry of Education and Higher Education (MEHE) recognizes degrees awarded by the American University of Beirut provided students are admitted on the basis of the Lebanese Baccalaureate, or its equivalent, as determined by the Lebanese Ministry of Education and Higher Education.
The MEHE does not yet recognize online degrees/diplomas.
It is the responsibility of students to ensure the degrees they receive from AUB are duly evaluated by their respective governments.

Recognition of AUB Degrees by the State of New York

The AUB degrees are registered with the State of New York and will be recognized by it through a process managed by AMIDEAST. For details refer to the website of the Office of the Registrar.

Faculty Of Agricultural And Food Sciences (FAFS)

Graduate Program

Officers of the Faculty

Fadlo R. Khuri	President of the University
Zaher Dawy	Provost
Ammar Olabi	Interim Dean
Yaser Abunnasr	Associate Dean
Bradley Jon Tucker	Registrar
Antoine Sabbagh	Director of Admissions
Lokman Meho	University Librarian

Faculty Administrative Support

Tharwat Haddad	Student Record Officer
Nadine Abdelkhalek	Career Services Officer
Laila Houri	Financial and Facilities Manager
Wafa Khoury	Executive Officer
Alhan Shamseddine	Assistant to the Dean for Operations
Maya Nabhani Zeidan	Director of Continuous Academic Improvement
Caroline Rajeh	Research Support Officer

Coordinator of Graduate Programs

Imad Toufeili	Coordinator of Graduate Studies Program

Historical Background

The MS graduate program at FAFS was initiated in 1956. The program aims to offer specialized training in a variety of fields in food and agriculture and to prepare students for further studies in Europe and North America. The first MS degree in Horticulture was granted in 1958 and the first MS in Food Technology in 1959. Since then, FAFS has continued to adapt its graduate programs to meet the needs of an evolving regional demand. An MS in Nutrition was introduced in 1963, and the first degree was granted in 1965. An MS in Ecosystem Management, a major of the interfaculty MS in Environmental Sciences, has been offered since 1997. FAFS currently offers MS specialization in animal science, poultry science, agricultural economics, irrigation, plant protection, plant science, nutrition, public health nutrition, food technology, food safety, ecosystem management, rural community development, and food security. FAFS also offers a non-degree Food Security Graduate Diploma - Online.

Mission

The mission of FAFS is to foster the sustainable enhancement of the health and well-being of people and nature throughout Lebanon and the region. To achieve its goals, the faculty uses basic and applied research as well as student-centered learning to prepare leaders and agents of change to address issues of local and global relevance at the nexus of human nutrition, food security, and the sustainable use of resources.

Vision

FAFS is a reference academic center specialized in issues of agriculture, food, nutrition, and the environment for the enhancement of livelihoods, human health, and well-being, as related to the Middle East.

Graduate Study

The faculty offers the MS degree, with or without a thesis, in the following majors which include animal science, poultry science, agricultural economics, irrigation, plant protection, plant science, nutrition, food safety, and food technology. The faculty offers an MS in Environmental Sciences (MSES), major: Ecosystem Management (ECOM) as part of an Interfaculty Graduate Environmental Sciences Program (IGESP) and an Interfaculty Graduate Nutrition Program (GNP). The faculty also offers two interdepartmental graduate programs: an MS in Rural Community Development (RCOD) and an MS in Food Security. MS in Public Health Nutrition is a new graduate program offered jointly by the Faculty of Agricultural and Food Sciences (FAFS) and the Faculty of Health Sciences (FHS).

Students following a thesis program are required to take a minimum of 21 graduate-level course credits plus a thesis (equivalent to 9 credits). Exceptionally, students pursuing an MS in Ecosystem Management or Food Security are required to take a minimum of 24 graduate-level course credits plus a thesis (equivalent to 6 credits); students pursuing an MS in Rural Community Development are required to take a minimum of 27 graduate-level course credits plus a thesis (equivalent to 6 credits); students pursuing the MS in Public Health Nutrition are required to take a minimum of 34 graduate-level course credits plus a thesis. The thesis program may include a maximum of 3 tutorial course credits. Core regular courses should constitute a minimum of 12 credits excluding seminars and tutorials and a minimum of 15 credits in the case of Ecosystem Management, with graduate elective courses to be determined under the supervision of an advisor. A student following a non-thesis program is required to take a minimum of 27 graduate-level course credits. The program should include a minimum of 3 credits and a maximum of 6 tutorial credits with at least 12 credits being from core courses in the major. In the case of Ecosystem Management, a minimum of 27 graduate-level course credits are required in addition to a 3-credit project.

By the end of the 1st year, the student would have had ample time to know the various specialties within his or her program and to become familiar with the professors and their concentrations. In addition, the student would have taken the needed foundational courses necessary to make an informed decision about his/her research focus. Rules and regulations for graduate programs are given in the Admissions section of this catalogue and include details about the Environmental Sciences Program. Information is also available in the FAFS Graduate Study Manual. Changes made after the publication of this catalogue will be made available through academic advisors. FAFS also offers a non-degree Food Security Graduate Diploma - Online. Details of this program are provided below

Graduate Research Requirements

Research Plan

- Every graduate student is expected to present his/her research plan and to have a thesis committee meeting by the end of the first year of joining FAFS.
- Thesis students will have to register for FAFS 300 (0 cr.) in the second semester. This course will guide them in their research proposal write-up and plan.
- The proposal defense will allow the student (by the start of the third semester at the latest):
  - To have a clear plan for his/her research journey.
  - To vet the research objectives and methodology with his/her committee members.
  - To take the Proposal Review exam. The grade of a successful exam will be a Pass (P/F).

Thesis Committee Meeting (before the Thesis Defense)

A thesis committee meeting is to be held one semester before graduation. This meeting will outline the up-to-date progress and challenges and the expected outcome of the thesis. This meeting can be combined with the comprehensive exam.

Thesis/Non-Thesis Data Handling

It is expected that the student delivers a data notebook, with an electronic version of the thesis data, to the major professor before graduation. A data notebook is to be examined by the major professor for proper research conduct. The above applies to the project/tutorial data of non-thesis students.

Thesis Format/Manuscript Submission

Every thesis-track graduate student is expected to prepare a manuscript/paper for submission to a peer-reviewed journal. Accordingly, students are expected to prepare their thesis in a manuscript format.
With regards to its length, the whole thesis, excluding references, appendices, and all other supportive material for the thesis will include:

- A shorter literature review compared to the regular, non-manuscript format, thesis.
- A typical manuscript length for the materials and methods, and results and discussion sections.
- A formatting change would be needed to make the thesis/manuscript compatible with the relevant journal formatting requirements.
- By the time of graduation, the student needs to ensure that the manuscript is at least submitted to a peer-reviewed journal of relevance to the research topic/field of studies.

PhD Program

A PhD program in Biomedical Sciences/Nutrition is offered in collaboration with the Faculty of Medicine. For more information, see Faculty of Medicine and Medical Center (FM/AUBMC) page 550.

Food Security Program

Director:	Chalak, Ali
Food Security Program Executive Committee:	Chalak, Ali (Chair); Habib, Rima; Hamadeh, Shady; Iskandar, Christelle; Jaafar, Hadi; Nasreddine, Lara; Tell, Tariq; Zurayk, Rami

Mission

The Food Security Program aims to promote food security through education, research, community action, and policy-oriented professional practice. The program pursues a holistic approach to the many aspects of food security, including nutritional health, agricultural production, economic development, environmental sustainability, and socio-cultural considerations. The program educates a new generation of leaders in the Middle East and North Africa and throughout the Arab world, preparing graduates to address the vital issue of food security in an interdisciplinary and hands-on fashion. Through its Food Security Program, the Faculty of Agricultural and Food Sciences offers a Master of Science in Food Security as well as a non-degree Food Security Graduate Diploma - Online.

Graduate Programs

The Faculty of Agricultural and Food Sciences offers two graduate-level programs of study through the Food Security Program, leading to an MS in Food Security or the Food Security Graduate Diploma - Online. Both programs address the multiple dimensions of food security by drawing on key disciplines including agriculture, nutrition, and development economics.

MS in Food Security

Requirements

The MS in Food Security requires the completion of a total of 30 credits, including six required courses. Candidates for the MS in Food Security have the option of selecting a thesis or non-thesis program of study. Thesis students must complete 15 credits of required core courses, 9 credits from approved elective courses (at least 6 credits within FAFS), and 6 credits of thesis. Non-thesis students must complete 15 credits of required core courses, 12 credits from approved elective courses (at least 6 credits within FAFS), and 3 credits of project. In addition, all students must pass a comprehensive examination.

Students may opt to earn a further specialization in one of the following three areas: rural development; economics and policies; or food production and consumption. For thesis students, specialization is earned through the completion of two FAFS electives in the desired focus area of the thesis. For non-thesis students, specialization is earned through the completion of three FAFS electives in the desired focus area of the project.

Required Courses		Credits
FSEC 300	Food Security: Challenges and Contemporary Debate	3
FSEC 305	Agriculture: Technology, Supply Chains, Sustainability	3
FSEC 310	Nutrition Security: Assessment and Intervention Strategies	3
FSEC 315	Food Policies and Their Planning Process	3
FSEC 320	Graduate Seminar in Food Security	0
AGSC 301	Statistical Methods in Agriculture	3
FSEC 396	Comprehensive Exam	0
FSEC 397 or 399	Project or MS Thesis	3 or 6

Elective Courses:

The following list reflects suggested elective courses that have been offered in recent terms and is illustrative only. An updated list of suggested electives is provided to enrolled students on a term-by-term basis. The listing and availability of elective courses is subject to change based on course offerings.

Approved Electives:		Credits
Rural Development Specialization		
AGSC 384 / NFSC 301	Political Economy of Middle East Development / Statistical Methods for Nutrition and Food Sciences	3
NFSC 306	Community Nutrition: Research and Intervention	3
RCOD 341	Rural Community Development: Theories, Debates and Challenges	3
RCOD 342	Qualitative Methods	4
Economics and Policies Specialization		
AGSC 376	Resource and Environmental Economics	3
AGSC 389	Research Methods in Applied Economics	3

ENSC 630 / LDEM 630	Natural Resource Management	3
FSEC 306	Indicators and Tools for Measuring Food Security	3
PPIA 301	Public Policy	3
PPIA 305	Economics for Public Policy	3
PPIA 309	Evidence, Policy and Communication	3
PSPA 316	International Environmental Policy	3
PSPA 352	Foundations of Public Policy	3
PSPA 361	Public and Non-Profit Program Evaluation	3
Food Production and Consumption Specialization		
AGSC 389	Research Methods in Applied Economics	3
CIVE 648	Climate Change and Water Resources	3
LDEM 635 / ENSC 635 / PSPA 346A	Political Ecology of Water	3
NFSC 351	Food Safety: Contaminants and Toxins	3

Course Descriptions

AGSC 301 Statistical Methods in Agriculture 2.3; 3 cr.
An investigation of the statistical techniques needed to design experiments and analyze and interpret agricultural research data. Prerequisites: STAT 210 or EDUC 227, and CMPS 209. Fall and Spring.

FSEC 300 Food Security: Challenges and Contemporary Debate 3.0; 3 cr.
This course introduces concepts and principles of food security, namely availability, accessibility, utilization and stability of food supply. Students are familiarized with the history of thought on food security, from Malthus to the Green Revolution to Sen and the inclusion of political and social factors in considering food security.

FSEC 305 Agriculture: Technology, Supply Chains, Sustainability 3.0; 3 cr.
This course provides an understanding of sustainable agricultural production through a value chain approach as it relates to production and productivity, water and soil management, technology and post-harvest practices; with special application to the dry lands of the Middle East North Africa region.

FSEC 306 Indicators and Tools for Measuring Food Security 3.0; 3 cr.
This course introduces tools and datasets that are of importance to analyze the different elements (availability, access, utilization and stability) of food and nutrition security. Students are familiarized on how to use and interpret internationally state-of-the-art datasets. Students gain a critical perspective on data availability and gaps that will equip them with applied knowledge for future work in the field. The datasets and tools introduced cover population, agricultural production, economic, environmental, health and nutrition.

FSEC 310 Nutrition Security: Assessment and Intervention Strategies 3.0; 3 cr.
This course introduces students to basic principles of nutrition security, community nutrition and nutritional ecology; and highlights the role that nutrition plays in improving the health and wellbeing of communities. The course aims to equip students with the knowledge and skills required to conduct population-based nutrition research, assess the nutrition needs of a population, to plan, implement and evaluate community nutrition programs and policies based on evidence-based practice and taking into consideration cultural, social and contextual dimensions.

FSEC 315 Food Policies and their Planning Process 3.0; 3 cr.
This course builds knowledge of the food system from local planning, and policy and applied economic perspectives. The course familiarizes students with key players and issues related to the practice of food system planning (the process and practice of creating and implementing food policies), how this practice interfaces with the economy and how to place these issues in a global context.

FSEC 320 Graduate Seminar in Food Security 0 cr.
This course provides a forum for exchange of experiences and knowledge sharing. Students will participate in field trips, complete individual tasks and projects related to food security issues in the Middle East & North Africa and the broader developing country context, and present and discuss findings.

FSEC 396 Comprehensive Exam 0 cr.
Comprehensive Exam.

FSEC 397 Project 3 cr.
Project.

FSEC 399 MS Thesis 6 cr.
MS Thesis.

Food Security Graduate Diploma – Online

The Food Security Graduate Diploma – Online offers a multi-disciplinary perspective and area of study. This program is designed for working professionals and future leaders who are looking for a career-transforming opportunity that explores the areas of food security, agricultural production, nutrition security, and public policy and development programming. The Food Security Graduate Diploma – Online is delivered in a flexible, fully online format.

Those students who wish to extend their course of study can transfer up to 12 credits (four courses) that have been successfully completed under the Food Security Graduate Diploma towards the MS in Food Security degree program.

Requirements

The Food Security Graduate Diploma – Online requires completion of a total of 12 credits, divided across four required courses.

Required Courses		Credits
FSEC 300D	Food Security: Challenges and Contemporary Debate	3
FSEC 305D	Agriculture: Technology, Supply Chains, Sustainability	3
FSEC 310D	Nutrition Security: Assessment and Intervention Strategies	3
FSEC 315D	Food Policies and their Planning Process	3

Course Descriptions

FSEC 300D Food Security: Challenges and Contemporary Debate 3.0; 3 cr.
This course introduces concepts and principles of food security, namely availability, accessibility, utilization and stability of food supply. Students are familiarized with the history of thought on food security, from Malthus to the Green Revolution to Sen and the inclusion of political and social factors in considering food security.

FSEC 305D Agriculture: Technology, Supply Chains, Sustainability 3.0; 3 cr.
This course provides an understanding of sustainable agricultural production through a value chain approach as it relates to production and productivity, water and soil management, technology and post-harvest practices; with special application to the dry lands of the Middle East North Africa region.

FSEC 310D Nutrition Security: Assessment and Intervention Strategies 3.0; 3 cr.
This course introduces students to basic principles of nutrition security, community nutrition and nutritional ecology; and highlights the role that nutrition plays in improving the health and wellbeing of communities. The course aims to equip students with the knowledge and skills required to conduct population-based nutrition research, assess the nutrition needs of a population, to plan, implement and evaluate community nutrition programs and policies based on evidence-based practice and taking into consideration cultural, social and contextual dimensions.

FSEC 315D Food Policies and their Planning Process 3.0; 3 cr.
This course builds knowledge of the food system from local planning, and policy and applied economic perspectives. The course familiarizes students with key players and issues related to the practice of food system planning (the process and practice of creating and implementing food policies), how this practice interfaces with the economy and how to place these issues in a global context.

MS in Rural Community Development (RCODE)

RCODE Coordinator:	Chalak, Ali
Professors:	Hamadeh, Shady; Zurayk, Rami
Associate Professor:	Chalak, Ali

The Faculty of Agricultural and Food Sciences offers an interdepartmental graduate program hosted by the Environment and Sustainable Development Unit, that leads to the degree of Master of Science (MS) in Rural Community Development (RCODE, thesis or non-thesis).

Graduates of the program will gain knowledge to improve prospects of rural development and build their capacities in community development to better design, manage, follow up, evaluate and monitor projects either in the public or private sector, locally, regionally and internationally.

The program combines theoretical and experiential courses from the university at large. The MS in Rural Community Development focuses on the following:

- The major theoretical and conceptual approaches to Rural Development
- The elaboration and implementation of sound rural development policies and projects
- The capacity of conducting research in the social, economic, political and environmental dimensions of Rural Development
- The qualitative and quantitative instruments of social enquiry to effectively pursue studies in Rural Development

The core program emphasizes community and participatory development, sustainable livelihoods, rural and agricultural policies, agrarian change, gender issues, social analysis of communities, environmental transformations, design and planning, program development and non-profit management, and community action research and skills for community change. Elective courses provide the desirable flexibility to enhance the breadth of the program and its multi-disciplined approach from registered programs at the FAFS and other faculties. Such courses allow specialization in environmental and natural resource management, community nutrition and food security, project planning, sustainable agriculture, communication and development, and community health.

Requirements

All relevant requirements and regulations of the University and the Faculty of Agricultural and Food Sciences for the master's degree apply to the MS in RCODE.

Applicants must hold a bachelor's degree from AUB or its equivalent from a recognized institution of higher learning.

Eligibility for admission is the same for both the thesis MS and non-thesis MS options. The students, for reasons commensurate with specific interests and required training, may change from the non-thesis to the thesis track and vice versa, subject to approval by the department supervising the major chosen.

Thesis and Non-Thesis Options

The degree offers both thesis and non-thesis options. The program has six core courses. These cover issues related to the theory, methods and practice of rural community development and offer the opportunity for practical experience as well as research in rural community development. Two or three specialization electives can be selected from a list of approved courses to provide further insight into specific issues in rural community development from registered programs at the FAFS and other AUB faculties.

The successful completion of the degree will require 33 credit hours. At least 27 of the total 33 credits must be earned within the Faculty of Agricultural and Food Sciences (FAFS); among these are 21 credits (for thesis students), and 18 credits (for non-thesis students). Additional 6 credits (for thesis students) and 9 credits (for non-thesis students) must be selected from the list of approved electives within FAFS. The remaining 6 credits are free electives which may be earned from courses in FAFS or AUB at large as per the below table:

	Core Courses	**FAFS Electives**	**Free Electives**	**Project / Thesis**	**Total**
Thesis (cr.)	15	6	6	6	33
Non-Thesis (cr.)	15	9	6	3	33

Core Courses

RCOD 341 Rural Development, Theories, Debates and Challenges 3.0; 3 cr.
This course approaches rural development from a multi-disciplinary perspective blending political economy, political ecology and political sociology. It explores the theories, debates and policies that emerged in the field of rural development. The course will provide tools to analyze key contemporary agricultural and rural development issues and challenges. It places the agricultural and rural development in the context of globally and nationally changing institutions, markets, actors and political structures, focusing on rural and agrarian transformation with particular reference to the Middle East North Africa region.

RCOD 342 Qualitative Research Methods in Rural Development 3.3; 4 cr.
The course introduces students to a variety of qualitative and participatory methodological approaches to the study of rural development. It enables students to think critically about the relationship between theory, method, data and analysis in order to select appropriate qualitative methods in students' own research. It helps students to develop a critical sense of the scope and limits of different research methodologies and consider problems encountered in doing qualitative research (including ethical and political concerns) in Lebanon and the region. If RCOD 342 is not offered, equivalent course is: URPL 630- Research Methods (3 cr.) from the department of Architecture and Design/ Maroun Semaan Faculty of Engineering and Architecture and 1 cr. Tutorial (RCOD 304).

RCOD 343 / AGSC 301 / RCOD 343 / AGSC 301 / NFSC 301 Statistical Methods in Agriculture 2.3; 3 cr.
The course provides an investigation of the statistical techniques needed to design experiments and analyze and interpret agricultural research data. Topics include linear regression, analysis of variance, and analysis of covariance with both continuous and categorically coded variables. Introduction to logistic regression and some nonlinear models. Surveys will be analyzed using programs like SAS and SPSS. Prerequisites: STAT 210 or EDUC 227, and CMPS 209 or consent of instructor. Fall and Spring. If RCOD 343 is not offered, equivalent courses are: AGSC 301 from the department of Agriculture OR NFSC 301 from the department of Nutrition and Food Sciences from the Faculty of Agricultural and Food Sciences.

RCOD 344 Practicum 3.3; 4 cr.
Practicum in rural community development settings, such as projects, development agencies, governmental or non-governmental organizations. Through hands- on experience, this practicum prepares students to assume increasing levels of responsibility with competence in these settings. Students will work with the RCOD program director to find a placement in a development agency or organization in Lebanon or abroad. They will work on mutually agreed-upon projects under the supervision of a professional practitioner. Internships will be flexible both in duration and expected hours per week.

RCOD 304 Project/Tutorial 3.0; 3 cr.
This course provides the framework within which RCOD students develop their degree projects. During weekly class sessions, students will share elements of their projects (the problem or issue addressed, the procedures employed, outlines, drafts, etc.) for critiques by students and the professor before final presentation. The final project will involve in depth investigation of an issue.

RCOD 305 Seminar 0.0; 1 cr.
The course provides a forum for experience exchange and knowledge sharing. Students will present and discuss relevant issues with active and prominent figures in the community development scene in the Middle East North Africa (MENA) region.

RCOD 395 Comprehensive Exam 0 cr.
Comprehensive Exam.

RCOD 399 MS Thesis 6 cr.
MS Thesis.

Specialization Electives: 9 credits for non-thesis option and 6 credits for thesis option

ENSC 630 / LDEM 630 Natural Resources Management 3.0; 3 cr.
This course introduces students to key concepts in ecosystem-based natural resources management (NRM) and to the management of specific terrestrial resources: soils, water, land and biodiversity with examples drawn from drylands and developing nations. A landscape lens is adopted to examine territory-scale resource management options, such as farming, ecotourism, forestry and rangelands. The course also addresses the physical, socio-economic, cultural, political and geographic specificity of NRM by reviewing the status of Arab Natural Resources in a changing environment.

NFSC 306A Community Nutrition 2.0; 2 cr.
In this course, students will be trained on the role of nutrition in improving the health and well-being of communities and will be equipped with skills required to conduct community-based assessment, as well as plan, implement, and evaluate community nutrition programs and policies. The course combines theory and practice where students will discuss, analyze, and experiment with the theories of behavioral change and will apply the principles of nutrition education when tackling specific nutritional problems. Students will be provided with experiential learning opportunities to assess the health and nutrition needs of specific population groups. In addition, this course will give students the opportunity to plan, implement, and evaluate small-scale nutrition interventions to improve the health and well-being of individuals within select communities. Offered Spring.

AGSC 376 Resource and Environmental Economics 3.0; 3 cr.
A course that addresses and analyzes resource and environmental problems facing today's society, with an emphasis on providing the student with an intensive introduction to the qualitative theory necessary for an effective analysis of resource problems.

AGSC 384 Rural Social Change, Development, and the Environment 3.0; 3 cr.
This course provides an understanding of economic development and underdevelopment as it relates to environmental degradation and demographic, social and cultural change with special application to the economies of the Middle East.

Free Electives: 6 credits

AGSC 389 Research Methods in Applied Economics 3.0; 3 cr.
A course that provides an overview of theoretical and applied research methods for the study of agricultural, resource and development economics issues. Prerequisite: AGSC 301.

NFSC 351 Food Safety: Contaminants and Toxins 3.0; 3 cr.
General principles of food toxicology with emphasis on toxic constituents in plant, animal, marine and fungal origin, contaminants and food processing induced toxins. Risk characterization and laws and regulations of food safety. Prerequisite: NFSC 277.

PSPA 343 / ENSC 658 Environmental Conflict Resolution 3.0; 3 cr.
An introduction to contemporary approaches to global environmental negotiation and conflict resolution including the efforts of international organizations at risk communication, mediation and facilitation. This course focuses on procedures to manage negotiations of environmental conflicts and disputes between governments, corporations, ecologists, the media and the general population. Information is also provided on environmental dispute cases successfully resolved. Alternate years.

EPHD 331 Population Change and Health 3.0; 3 cr.
Population change is central to public health. This course provides a broad introduction to the field of population. It identifies core topics in population, discusses their relation to development and health and emphasizes measurement issues. Topics covered include population size and growth as they relate to resources and to population health; components of population change including fertility and mortality, their links to development and consequences for health; population composition by age and gender and by socioeconomic status, and related inequalities; and population movements including forced, internal and international migration as factors of population change and health. Special focus is given to the Arab World and the Middle East Region.

HPCH 332 Community Health Promotion, Mobilization and Development Advocacy 2.0; 2cr.
In this course, students learn about the notion of community health, and the principles of community organizing to identify needs, values and resources in a community setting in order to develop an advocacy plan that will address a priority community health issue Topical areas cover community organizing, types of community assessments, prioritization, community based participatory approaches, advocacy strategies, and community organizing and advocacy ethics. Prerequisite: PBHL 312.

FSEC 300 Food Security: Challenges and Contemporary Debate 3.0; 3 cr.
This course introduces concepts and principles of food security, namely availability, accessibility, utilization and stability of food supply. Students are familiarized with the history of thought on food security, from Malthus to the Green Revolution to Sen and the inclusion of political and social factors in considering food security.

FSEC 305 Agriculture: Technology, Supply Chains, Sustainability 3.0; 3 cr.
This course provides an understanding of sustainable agricultural production through a value chain approach as it relates to production and productivity, water and soil management, technology and post-harvest practices; with special application to the dry lands of the Middle East North Africa region.

FSEC 310 Nutrition Security: Assessment and Intervention Strategies 3.0; 3 cr.
This course introduces students to basic principles of nutrition security, community nutrition and nutritional ecology; and highlights the role that nutrition plays in improving the health and wellbeing of communities. The course aims to equip students with the knowledge and skills required to conduct population-based nutrition research, assess the nutrition needs of a population, to plan, implement and evaluate community nutrition programs and policies based on evidence-based practice and taking into consideration cultural, social and contextual dimensions.

FSEC 315 Food Policies and their Planning Process 3.0; 3 cr.
This course builds knowledge of the food system from local planning and policy and applied economic perspectives. The course familiarizes students with key players and issues related to the practice of food system planning (the process and practice of creating and implementing food policies), how this practice interfaces with the economy and how to place these issues in a global context.

Department of Agriculture (AGRI) Graduate Program

Chairperson:	Jaafar, Hadi
Professor Emeritus:	Kawar, Nasri
Professors:	Abou Jawdah, Yusuf; Farran, Mohamad; Haidar, Mustapha; Hamadeh, Shady
Adjunct Professor:	Mohtar, Rabi
Associate Professors:	Chalak, Ali; Jaafar, Hadi
Adjunct Associate Professors:	Chaaban, Jad; Kassem, Issmat; Martiniello, Giuliano
Assistant Professors:	El Kayal, Walid
Lecturers:	Jaber, Lina; Doughan, Youssef
Instructor:	Sobh, Hana

Graduate Programs

The graduate study program leading to the MS degree with a thesis or non-thesis option is offered with a specialization in the following areas: Agricultural Economics, Animal Science, Irrigation, Plant Science, Plant Protection and Poultry Science; preparing students for a productive career in integrated agricultural technology, livestock and poultry, natural resources management and agribusiness. The graduate programs are designed to prepare students for a successful career in the field by providing them with advanced knowledge and skills in specialized areas such as Agricultural Economics, Animal Science, Irrigation, Plant Science, Plant Protection, and Poultry Science. The programs aim to develop students' abilities in research through the completion of a thesis or non-thesis option, and equip them with the tools to analyze and solve complex problems in agricultural production and management. The programs also focus on enhancing students' understanding of the economic, social, and environmental factors that impact the agricultural industry, fostering critical thinking and decision making skills, as well as developing effective communication with professionals in the field.

The graduates will be capable of serving in Lebanon, the Middle East and other regions around the world.

Graduate students in the department may become candidates for a degree in the interfaculty program in nutrition by meeting the requirements described on page 688 of this catalogue.

MS in Agricultural Economics

Core Courses

AGSC 301/NFSC 301 Statistical Methods in Agriculture/Statistical Methods for Nutrition and Food Sciences 2.3; 3 cr.
An investigation of the statistical techniques needed to design experiments and analyze and interpret agricultural research data. Prerequisites: STAT 210 or EDUC 227, and CMPS 209. Fall and Spring.

AGSC 303 An Introduction to the Lebanese Economy 3.0; 3 cr.
This course provides explanations and analysis of the problems confronting the Lebanese economy with regard to socio-economic development and under-development. Students will be familiarized with how to use, critically analyze and interpret the various national socio-economic indices, and gain an understanding of the political economy context and evolution.

AGSC 325 Production Economics 3.0; 3 cr.
A course that focuses on the organization of farmers for higher income through improved resource use and competitive position.

AGSC 376 Resource and Environmental Economics 3.0; 3 cr.
A course that addresses and analyzes resource and environmental problems facing today's society, with an emphasis on providing the student with an intensive introduction to the qualitative theory necessary for an effective analysis of resource problems.

AGSC 377 Economics of Water Resources 3.0; 3 cr.
This course applies the tools of neo-classical microeconomics to water resource planning and management. The primary focus of the course is on water problems within agriculture, but also examines issues related to the water needs of municipal usage, industry and recreation/environmental purposes.

AGSC 384 Political Economy of Middle East Development 3.0; 3 cr.
A course that provides an understanding of economic development and underdevelopment as it relates to environmental degradation and demographic, social and cultural change, with special application to the economies of the Middle East.

AGSC 389 Research Methods in Applied Economics 3.0; 3 cr.
A course that provides an overview of theoretical and applied research methods for the study of agricultural, resource and development economics issues. Prerequisite: AGSC 301.

AGSC 395 Graduate Seminar in Agricultural Science 1.0; 1 cr.
Graduate Seminar in Agricultural Science.

AGSC 300 Graduate Tutorial 1–3 cr.
Directed study.

AGSC 396 Comprehensive Exam 0 cr.
Comprehensive Exam.

AGSC 399 MS Thesis 9 cr.
MS Thesis.

Students have to take 6 cr. from the above list as core requirements (other than AGSC 301/NFSC 301, AGSC 395 and AGSC 399 for thesis and AGSC 300C for non-thesis), 9 cr. as electives from any of the courses listed for the other AGSC majors, plus 3 cr. as free graduate elective with the advisor's approval.

MS in Animal Science

Core Courses

AGSC 301/NFSC 301 Statistical Methods in Agriculture/Statistical Methods for Nutrition and Food Sciences 2.3; 3 cr.
An investigation of the statistical techniques needed to design experiments and analyze and interpret agricultural research data. Prerequisites: STAT 210 or EDUC 227, and CMPS 209. Fall and Spring.

AVSC 304 Preventive Immunology and Patterns of Animal Diseases 3.0; 3 cr.
Basic aspects of specific and non-specific body defense mechanisms. Introduction to population medicine with emphasis on spatial and temporal pattern of disease occurrence; survey, surveillance and monitoring. Mechanisms of infectious disease transmission, routes of infection and pathogen exit. Methods of disease prevention; increasing animal resistance (genetic, nutritional, immunologic methods). Vaccine and vaccination in herd/flock health management; Prevention of disease entry into a farm (biosecurity); prevention of disease spread within farm and between farms (isolation of sick animals, quarantine, movement restriction, etc.). Prerequisite: AVSC 224.

AVSC 306 Diseases of Livestock 3.0; 3 cr.
The course deals with selected livestock diseases of economic and public health importance. Etiology, clinical characteristics, diagnosis, epidemiology and control of infectious and non-infectious diseases of animals. Concepts of one health approach for Zoonotic diseases and environmental protection. Principle of herd health management for livestock diseases of economic importance.

AVSC 330 Advanced Livestock Production 3.0; 3 cr.
Recent advances in livestock production practices as related to interactions between animal and milieu with reference to the specific nutritional and climatic conditions of the Middle East.

AVSC 336 Ruminant Nutrition 3.0; 3 cr.
Recent advances in the nutrition of cattle, sheep and goats with reference to microbiological aspects of digestion and its relation to practical feeding.

AVSC 388 Animal Production and Environmental Management 3.0; 3 cr.
A course that characterizes the impact of extensive and intensive livestock systems on the environmental sustainability of the two systems in terms of technical constraints and feasible corrective environmental management strategies.

AVSC 395 Graduate Seminar in Animal Science 1.0; 1 cr.
Graduate Seminar in Animal Science.

AVSC 396 Comprehensive Exam 0 cr.
Comprehensive Exam.

AVSC 399 MS Thesis 9 cr.
MS Thesis.

All graduate students in the POSC and ANML programs should take at least 12 credits of AVSC core courses in addition to AGSC 301/NFSC 301.

Elective Courses

AVSC 300 Graduate Tutorial 1–3 cr.
Directed study.

AVSC 305 Poultry Diseases 3.0; 3 cr.
Etiology, clinical characteristics, identification, prevention and control of the major infectious and metabolic diseases of poultry.

AVSC 307 Poultry Production in Warm Regions 3.0; 3 cr.
Recent advances in poultry production practices under high temperature conditions with special emphasis on physiology of heat stress in birds as related to housing, management and feeding. Prerequisite: AVSC 226.

AVSC 325 Core Pathology Mechanisms of Disease 3.0; 3 cr.
This course will entail study of graduate medical pathological mechanisms of disease found in humans and animals. We will initially review the conceptual building blocks of spontaneous disease pathology, followed by a defined literature reading – each week we will read, review and present a research article describing a classical or newly emerging disease in humans or animals, and relate it to underlying pathology disease mechanisms. The course will take the structure of a weekly journal club. This is an advanced course that will be most helpful for students who are interested in the natural, animal and medical sciences at both the basic and clinical levels of expression. Students taking the course should be matriculated into graduate

or postdoctoral study. Under special circumstances, very advanced undergraduates in the natural, or agricultural, health or clinical sciences can matriculate with the permission of the instructor.

AVSC 329 Advanced Animal Physiology 2.3; 3 cr.
Comparative physiology of domestic animals with special emphasis on digestion, reproduction, lactation, and thermo-regulation. Prerequisite: AVSC 275 or equivalent.

AVSC 334 Advanced Poultry Nutrition 2.3; 3 cr.
Recent developments in poultry nutrition; design and implementation of poultry nutrition experiments. Prerequisite: AVSC 271.

MS in Irrigation

Core Courses

AGSC 301/NFSC 301 Statistical Methods in Agriculture/Statistical Methods for Nutrition and Food Sciences 2.3; 3 cr.
An investigation of the statistical techniques needed to design experiments and analyze and interpret agricultural research data. Prerequisites: STAT 210 or EDUC 227, and CMPS 209. Fall and Spring.

AGSC 310 Advanced Soil Physics 3.0; 3 cr.
Physical properties of soils in arid, semi-arid, and sub-humid regions; soil-water-plant-atmosphere relationships, plant water extraction, and evapotranspiration; salt and water flow in soils, soil heat flow, and modeling soil water extraction and evaporation.

AGSC 326 Surface Irrigation Engineering 3.0; 3 cr.
Principles of design, operation, and evaluation of surface irrigation systems; irrigation field design and field measurement techniques. Prerequisite: Consent of instructor.

AGSC 328 Sprinkler and Micro-Irrigation Engineering 3.0; 3 cr.
Fundamentals of design, operation, evaluation, and selection of pressurized irrigation systems; pipeline economics, pump hydraulics, and pumping plant design considerations.

AGSC 330 Integrated Water Resources Management 3.0; 3 cr.
Quantitative methods for analyzing water resource problems. Topics covered include the design and management of facilities for river basin development, flood control, water supply, hydropower and other activities related to water resources. Stochastic and deterministic methods for approaching and analyzing water resource problems, reservoir sizing, simulation, hydrologic time series analysis and optimization methods.

AGSC 317 Surface and Groundwater Hydrology 3.0; 3 cr.
Relevant statistical concepts and extreme event distributions, rainfall frequency analysis, rainfall-runoff relationships, unit hydrograph theory, overland flow routing, and stochastic processes in hydrology. Occurrence, storage, distribution, and movement of ground water; confined and unconfined aquifer properties, well-aquifer hydraulics and relationships and ground water basin management.

AGSC 334 Remote Sensing of the Environment 2.3; 3 cr.
Quantitative methods for analyzing remote sensing datasets from the agricultural and natural resources perspective. The principles of electromagnetic radiation, as well as the interactions of solar radiation with the earth's atmosphere will be explored. The spectral reflectance, transmittance and absorption characteristics of the three main Earth cover types– vegetation,

soil and water– will be stressed. Spatial, spectral, and temporal characteristics of the major low-, medium- and high-resolution multispectral sensor systems and their data products will be studied and compared.

AGSC 300 Graduate Tutorial 1–3 cr.
Directed study.

AGSC 395 Graduate Seminar in Agricultural Science 1.0; 1 cr.
Graduate Seminar in Agricultural Science.

AGSC 396 Comprehensive Exam 0 cr.
Comprehensive Exam.

AGSC 399 MS Thesis 9 cr.
MS Thesis.

Students have to take 6 credits from the above list as core requirements (other than AGSC 301/NFSC 301, AGSC 395 and AGSC 399 for thesis and AGSC 300C for non-thesis), 9 credits as electives from any of the courses listed for other AGSC majors, plus 3 credits in free graduate electives to be approved by the advisor.

MS in Plant Protection

Core Courses

AGSC 301/NFSC 301 Statistical Methods in Agriculture/Statistical Methods for Nutrition and Food Sciences 2.3; 3 cr.
An investigation of the statistical techniques needed to design experiments and analyze and interpret agricultural research data. Prerequisites: STAT 210 or EDUC 227, and CMPS 209. Fall and Spring.

AGSC 311 Advanced Principles and Methods in Plant Pathology 2.3; 3 cr.
Serological and molecular diagnostic techniques, nucleic acids hybridization, PCR, marker assisted selection, brief review of physiology of host-pathogen relationships and current methods of research including cloning and transgenic plants. Prerequisite: AGSC 233 or consent of instructor.

AGSC 322 Plant Parasitic Fungi and Bacteria 2.3; 3 cr.
Morphology, taxonomy, and identification of fungi and bacteria parasitic on plants Prerequisite: AGSC 233. Alternate years.

AGSC 323 Plant Virology 2.3; 3 cr.
Fundamental and practical aspects of plant virology including isolation, characterization, identification replication and management of plant pathogenic viruses, including gene silencing and transgenic plants. Prerequisite: AGSC 233. Alternate years.

AGSC 332 Plant-Pest Interactions 3.0; 3 cr.
Principles and factors involved in interactions between pests and their host plants; application of perspectives in chemical ecology to agricultural systems; effect of biotic and abiotic factors on the physiology, adaptation and survival of pest populations in agroecosystems. Prerequisites: AGSC 233, and AGSC 245.

AGSC 388 Integrated Pest Management 3.0; 3 cr.
Principles and concepts of integrated pest management; monitoring and forecasting of pest population, tactics, strategies, and implementations of IPM in the agricultural ecosystems; and environmental, economic, and social implications of IPM. Prerequisites: AGSC 233, and AGSC 245.

AGSC 300 Graduate Tutorial 1–3 cr.
Directed study.

AGSC 395 Special Topics in Agricultural Science 1.0; 1 cr.
Special Topics in Agricultural Science.

AGSC 396 Comprehensive Exam 0 cr.
Comprehensive Exam.

AGSC 399 MS Thesis 9 cr.
MS Thesis.

Students have to take 6 credits from the above list as core requirements (other than AGSC 301/NFSC 301, AGSC 395 and AGSC 399 for thesis and AGSC 300C for non-thesis), and 9 credits as electives from any of the courses listed for other AGSC majors, plus 3 credits in free graduate electives to be approved by the advisor.

MS in Plant Science

Core Courses

AGSC 301/NFSC 301 Statistical Methods in Agriculture/Statistical Methods for Nutrition and Food Sciences 2.3; 3 cr.
An investigation of the statistical techniques needed to design experiments and analyze and interpret agricultural research data. Prerequisites: STAT 210 or EDUC 227, and CMPS 209. Fall and Spring.

AGSC 307 Advanced Crop Production 3.0; 3 cr.
Theories and principles of plant growth, development and responses to the environment, with an integrated approach to understanding crop productivity. Prerequisites: AGSC 220 and AGSC/AVSC 246.

AGSC 308 Plant Tissue Culture and Crop Improvement 2.3; 3 cr.
This course introduces students in the Agriculture program a sound understanding of the applied and scientific basis of micro propagation and in-vitro plant breeding.

AGSC 312 Fertilizer Technology and Use 2.3; 3 cr.
Fertilizers in agricultural development, current developments in fertilizer technology, fertigation, and special problems associated with fertilizer use and research methodology in soil fertility. Prerequisite: AGSC 265.

AGSC 319 Advanced Vegetable Production 3.0; 3 cr.
Physiological and genetic control of growth and management of vegetable plants and their products; effects of nutrition, irrigation and other variables on crop performance and quality of produce; presentation and interpretation of recent research progress in vegetable production.

AGSC 324 Methods of Soil and Plant Tissue Analysis 2.3; 3 cr.
Analytical techniques, operation of instruments in plant analysis and in physical, chemical and mineralogical analysis of soils.

AGSC 300 Graduate Tutorial 1–3 cr.
Directed study.

AGSC 395 Special Topics in Agricultural Science 1.0; 1 cr.
Special Topics in Agricultural Science.

AGSC 396 Comprehensive Exam 0 cr.
Comprehensive Exam.

AGSC 399 MS Thesis 9 cr.
MS Thesis.

Students have to take 6 credits from the above list as core requirements (other than AGSC 301/NFSC 301, AGSC 395 and AGSC 399 for thesis and AGSC 300C for non-thesis), and 9 credits as electives from any of the courses listed for other AGSC majors, plus 3 credits in free graduate electives to be approved by the advisor.

MS in Poultry Science

Core Courses

AGSC 301/NFSC 301 Statistical Methods in Agriculture/Statistical Methods for Nutrition and Food Sciences 2.3; 3 cr.
An investigation of the statistical techniques needed to design experiments and analyze and interpret agricultural research data. Prerequisites: STAT 210 or EDUC 227, and CMPS 209. Fall and Spring.

AVSC 304 Preventive Immunology and Patterns of Animal Diseases 3.0; 3 cr.
Basic aspects of specific and non-specific body defense mechanisms and the role of vaccination in population protection; study of the patterns of diseases. Prerequisite: BIOL 224 or AVSC 224.

AVSC 305 Poultry Diseases 3.0; 3 cr.
Etiology, clinical characteristics, identification, prevention and control of the major infectious and metabolic diseases of poultry.

AVSC 307 Poultry Production in Warm Regions 3.0; 3 cr.
Recent advances in poultry production practices under high temperature conditions with special emphasis on physiology of heat stress in birds as related to housing, management and feeding. Prerequisite: AVSC 226.

AVSC 334 Advanced Poultry Nutrition 2.3; 3 cr.
Recent developments in poultry nutrition; design and implementation of poultry nutrition experiments. Prerequisite: AVSC 271.

AVSC 388 Animal Production and Environmental Management 3.0; 3 cr.
A course that characterizes the impact of extensive and intensive livestock systems on the environmental sustainability of the two systems in terms of technical constraints and feasible corrective environmental management strategies.

AVSC 395 Graduate Seminar in Animal Science 1.0; 1 cr.
Graduate Seminar in Animal Science.

AVSC 396 Comprehensive Exam 0 cr.
Comprehensive Exam.

AVSC 399 MS Thesis 9 cr.
MS Thesis.

Students in POSC and ANML programs should take at least 12 credits of AVSC core courses in addition to AGSC 301/NFSC 301.

Elective Courses

AVSC 300 Graduate Tutorial 1–3 cr.
Directed study.

AVSC 306 Diseases of Livestock 3.0; 3 cr.
Etiology, clinical characteristics, identification, and control of some selected infectious and metabolic diseases of economic impact on animal production.

AVSC 325 Core Pathology Mechanisms of Disease 3.0; 3 cr.
This course will entail study of graduate medical pathological mechanisms of disease found in humans and animals. We will initially review the conceptual building blocks spontaneous disease pathology, followed by defined literature reading – each week we will read, review and present a research article describing a classical or newly emerging disease in humans or animals, and relate it to underlying pathology disease mechanisms. The course will take the structure of a weekly journal club. This is an advanced course that will be most helpful for students who are interested in the natural and biomedical sciences at both the basic and clinical levels of expression. Students taking the course should be matriculated into graduate or postdoctoral study. Under special circumstances, very advanced undergraduates in the natural or clinical sciences can matriculate with the permission of the instructor.

AVSC 329 Advanced Animal Physiology 2.3; 3 cr.
Comparative physiology of domestic animals with special emphasis on digestion, reproduction, lactation and thermo-regulation. Prerequisite: AVSC 275 or equivalent.

AVSC 330 Advanced Livestock Production 3.0; 3 cr.
Recent advances in livestock production practices as related to interactions between animal and milieu with reference to the specific nutritional and climatic conditions of the Middle East.

AVSC 336 Ruminant Nutrition 3.0; 3 cr.
Recent advances in the nutrition of cattle, sheep and goats with reference to microbiological aspects of digestion and its relation to practical feeding.

Department of Landscape Design and Ecosystem Management (LDEM) Graduate Program

Chairperson:	Abunnasr, Yaser
Professors:	Talhouk, Salma; Zurayk, Rami (ECOM Program Coordinator)
Associate Professor:	Abunnasr, Yaser
Assistant Professors:	Al-Akl, Nayla (Dean of Student Affairs); Dreksler, Beata
Lecturer:	Bacha, Karim
Instructor:	Fabian, Monika
Adjunct Associate Professor	Trovato, Maria Gabriella

Graduate Program

The graduate study program leading to the MSES (Master of Science in Environmental Sciences) degree with a specialization in Ecosystem Management (ECOM) is offered with a thesis or non-thesis option.

The program educates students in ecosystem science and management by integrating instruction in biophysical and human systems. It provides students with sufficient research experience and equips them with the necessary tools for professional practice and/or the pursuit of higher education. Students are prepared to be leaders and agents of change to address issues of local and global relevance at the nexus of human development, ecological integrity and the sustainable use of resources.

Core and elective courses are structured to provide students with a diversified and multi-disciplinary background in environmental sciences including environmental restoration and nature conservation, ecosystem sciences and management, urban greening and natural resources planning and management. The program crosses traditional boundaries by applying an interdisciplinary approach and multiple resource knowledge to ecosystem studies while also emphasizing human-nature interactions.

Effective Fall 2020/21, new ECOM students will need to take a total of 5 core courses equivalent to 15 credits (3 core courses from LDEM in addition to two core courses from ENVT, ENVH or ENVP). The 3 core graduate courses offered at LDEM include LDEM 301 (Urban Greening), LDEM 302 (Green Infrastructure for Resilient Landscapes and Cities), and LDEM 630 (Natural Resources Management). ECOM students will also need to take 3 elective courses equivalent to 9 credits (to be determined after consultation with their advisor). ECOM students will also register for a Comprehensive Exam (ENSC 695; 0 cr.) and an MS Thesis (ENSC 699; 6 cr.) In addition to the above, effective Fall 2023/2024, ECOM students will have to register for LDEM 320 (Graduate Seminar in Ecosystem Management; 0cr.) as a mandatory Seminar every term until graduation.

Natural resources management involves not only the understanding of ecosystem structure and function when used for a variety of purposes, but also the incorporation of social, economic and political considerations into decision-making. Consequently, the discipline involves the collection, analysis, interpretation and integration of information not only from the more traditional areas of science but also from the areas of management.

For full details on the admission requirements for this interfaculty program, see the Admissions section of this catalogue and the Admission Policies for the Interfaculty Graduate Environmental Sciences Program.

For information regarding graduation requirements, refer to the General University Requirements in this catalogue.

Credit requirements are tabulated below:

Course Type	Credits
Core	15 (out of which 9 are from LDEM)
Electives	9
Project/Thesis	3/6
Graduate Seminar	0
Total number of credits required for graduation	**30**

MSES (Major: Ecosystem Management)

Core Courses

LDEM 301 / URDS 674 / ARCH 074 Urban Greening 3 cr.
This course allows students to develop an understanding of nature in cities, present the latest research and concepts on urban nature, describe and conceptually apply urban greening approaches, explore urban residents' relation with nature, and discuss opportunities and limitations of urban greening in restrictive environments. Graduate or senior undergraduate standing (core course).

LDEM 302 / URDS 675 / ARCH 075 Green Infrastructure for Resilient Landscapes and Cities 3 cr.
Green infrastructure is an ecologically based system, naturally occurring or engineered, across urban and rural contexts, that is multi-functional and delivers essential cultural, social, environmental, ecological and economic benefits. It requires a holistic and systems approach to improving ecological function while providing vital ecosystem services for human populations. The course introduces students to the concepts, theories and applications of design, planning and policy of green infrastructure in conjunction with open space planning and design. A particular focus is the relationship and synergy between green infrastructure and climate change adaptation of landscapes and cities. A case study approach is utilized to study green infrastructure across multiple scales, disciplines and applications in the Middle East and North Africa (MENA) region. Green infrastructure is inherently multi-disciplinary and intersects with landscape architecture; urban design and planning; architecture; environmental engineering; public health; urban policy; and environmental policy. Graduate or senior undergraduate standing (Core Course).

LDEM 630 / ENSC 630 Natural Resources Management 3 cr.
This course introduces students to key concepts in ecosystem-based natural resources management (NRM) and to the management of specific terrestrial resources: soils, water, land and biodiversity with examples drawn from drylands and developing nations. A landscape lens is adopted to examine territory-scale resource management options, such as farming, ecotourism, forestry and rangelands. The course also addresses the physical, socio-economic, cultural, political and geographic specificity of NRM by reviewing the status of Arab Natural Resources in a changing environment (Core course).

LDEM 320 Graduate Seminar in Ecosystem Management 0 cr.
This graduate seminar is meant to provide students with a road map towards the completion of their thesis/projects. Students develop an understanding of the graduate program they are engaged in, and are guided to identify their research interests, select a faculty advisor and a thesis/project committee, develop the project concept and the methodology, prepare their proposal, practice their comprehensive exam, and present their research findings (mandatory seminar for ECOM students is offered every term; equivalent to FSEC 320).

ENSC 695 Comprehensive Exam 0 cr.
Comprehensive Exam.

ENSC 697 Project 3 cr.
Students who opt for Project option instead of Thesis need to take one additional elective course.

ENSC 699 MS Thesis 6 cr.
MS Thesis.

Elective Courses

LDEM 632/ URPL 641 Geographic Information System (GIS) 2:3; 3cr.
This course acquaints students with classical and modern methods of landscape analyses as well as assessment and changes in landscape structure using ArcGIS and its extensions. Students will be gradually introduced to the subject both to acquire and integrate geographic data, and to learn how to analyze and interpret the results. All topics are demonstrated on selected tasks. The goal of this course is to explore various approaches to modeling landscape pattern and change. The focus is on the design and use of computerized geographic information systems for land planning and design decisions and on understanding, describing and predicting land-use and land-cover. The course will move between social and ecological processes and applications of the models. Students will learn to evaluate the trade-offs associated with use of a particular modeling approach within a given situation, and to implement (at least minimally) several of the approaches discussed (cross-listed with LDEM 251).

ENSC 633 / LDEM 633 / URDS 664 Ecological Landscape Design and Planning 3 cr.
An introduction to the theory and methodology of ecological landscape design and planning, which aims to introduce the holistic approach of landscape ecology and its application in the sustainable management of natural and cultural landscapes and ecosystems. The course syllabus is planned to prioritize Mediterranean ecosystems and landscapes and equally to promote interdisciplinary collaboration in research and project management.

LDEM 300 Graduate Tutorial 1-3 cr.
Directed Study in Ecosystem Management.

Department of Nutrition and Food Sciences (NFSC) Graduate Program

Chairperson:	Obeid, Omar
Professors:	Abiad, Mohammad; Hwalla, Nahla; Kharroubi, Samer (Associate Dean of Student Affairs); Nasreddine, Lara; Obeid, Omar; Olabi, Ammar; Toufeili, Imad
Adjunct Professor	Naja, Farah
Adjunct Associate Professors:	Jomaa, Lamis
Assistant Professors:	Fares, Elie Jacques; Iskandar, Christelle
Assistant Professor of Practice:	Chamieh, Marie Claire
Visiting Assistant Professor:	Ouaijan, Krystel

Graduate Programs

The Department of Nutrition and Food Sciences offers four graduate programs of study leading to the MS degree in Food Safety, Food Technology, Nutrition, and a joint MS degree in Public Health Nutrition with the Faculty of Health Sciences (FHS). Students can follow either a thesis or a non-thesis program of study. The department also offers a Ph.D. in Biomedical Sciences-Nutrition Track in collaboration with the Faculty of Medicine (FM). The department conducts quality research in the following areas: Community Nutrition, Public Health Nutrition, Clinical Nutrition, Nutritional Biochemistry, Nutrition Epidemiology, Food Chemistry, Food Microbiology, Food Safety, Food Packaging, and Sensory Evaluation of Food.

For more information about the graduate programs, please refer to the NFSC website: www.aub.edu.lb/fafs/nfsc/GRstudies

MS in Nutrition

The MS in Nutrition program offers both thesis (30 cr.) and non-thesis (33 cr.) options and is normally completed over two years on a full-time basis. The program provides students with an advanced understanding of human nutrition at the individual and community levels and applies current research information and methods to nutrition practice.

Master of Science in Nutrition (Thesis Track)

Students on the thesis track are expected to complete a 9-credit thesis under the supervision of a thesis advisor and to defend their thesis as per AUB policies concerning graduate programs. Students should complete a comprehensive exam prior to the thesis defense. After satisfactory defense of the research work, the thesis should be approved by the supervisory committee members and deposited at the AUB Library.

Master of Science in Nutrition (Non-Thesis Track)

Students in the non-thesis track are expected to complete a 3-6 credit project (tutorial). Students can choose elective courses from within or outside FAFS upon the approval of their supervisor.

Credit Requirements for Both the Thesis and Non-Thesis Options:

MS Degree Requirements:

		Non-Thesis Track Credits	**Thesis Track Credits**
NFSC 301	Statistical Methods for Nutrition and Food Sciences	3	3
NFSC 311	Advanced Nutrition: Macronutrients	3	3
NFSC 314	Advanced Nutrition: Minerals	3	3
NFSC 315	Advanced Nutrition: Vitamins	3	3
NFSC 395	Graduate Seminar in Nutrition and Food Science	1	1
Electives (You can substitute Elective courses by taking additional Graduate Tutorial credits.)		**14-17**	**5-8**
NFSC 396	Comprehensive Exam	0	0
NFSC 300	Graduate Tutorial	3-6	0-3
NFSC 399	MS Thesis	-	9
Total year credits		**33**	**30**

Core Courses (Thesis)

NFSC 301 Statistical Methods for Nutrition and Food Science 2.3; 3 cr.
This is an intermediate-level course in statistics. Topics include an introduction to designs in Nutrition and Food Science research; methods of describing data; statistical inference for means and proportions; linear and logistic regression, and an introduction to multiple regression. Prerequisites: NFSC 210, STAT 210 or EDUC 227 and CMPS 209. Fall and Spring.

NFSC 311 Advanced Nutrition: Macronutrients 3.0; 3 cr.
Advances in carbohydrates, protein, lipid, fiber, and energy metabolism. Prerequisite: NFSC 274.

NFSC 314 Advanced Nutrition: Minerals 3.0; 3 cr.
Advanced nutritional, biochemical, and physiological aspects of macro- and micro-mineral elements, and toxic elements in humans. Prerequisite: NFSC 274.

NFSC 315 Advanced Nutrition: Vitamins 3.0; 3 cr.
Advanced nutritional, biochemical, and physiological aspects of vitamins and vitaminlike substances in humans. Prerequisite: NFSC 274.

NFSC 395 Graduate Seminar in Nutrition and Food Science 1.0; 1 cr.
Graduate Seminar in Nutrition and Food Science.

NFSC 396 Comprehensive Exam 0 cr.
Comprehensive Exam.

NFSC 399 MS Thesis 9 cr.
MS Thesis.

Core Courses (Non-Thesis)

NFSC 301 Statistical Methods for Nutrition and Food Science 2.3; 3 cr.
This is an intermediate-level course in statistics. Topics include an introduction to designs in Nutrition and Food Science research; methods of describing data; statistical inference for means and proportions; linear and logistic regression, and an introduction to multiple regression. Prerequisites: NFSC 210, STAT 210 or EDUC 227 and CMPS 209. Fall and Spring.

NFSC 300 Graduate Tutorial 1-3 cr.
Directed study.

NFSC 311 Advanced Nutrition: Macronutrients 3.0; 3 cr.
Advances in carbohydrates, protein, lipid, fiber, and energy metabolism. Prerequisite: NFSC 274.

NFSC 314 Advanced Nutrition: Minerals 3.0; 3 cr.
Advanced nutritional, biochemical, and physiological aspects of macro- and micro-mineral elements, and toxic elements in humans. Prerequisite: NFSC 274.

NFSC 315 Advanced Nutrition: Vitamins 3.0; 3 cr.
Advanced nutritional, biochemical, and physiological aspects of vitamins and vitaminlike substances in humans. Prerequisite: NFSC 274.

NFSC 395 Graduate Seminar in Nutrition and Food Science 1.0; 1 cr.
Graduate Seminar in Nutrition and Food Science.

NFSC 396 Comprehensive Exam 0 cr.
Comprehensive Exam.

Elective Courses for MS in Nutrition

NFSC 300 Graduate Tutorial 1-3 cr.
Directed study.

NFSC 305 Sensory Evaluation of Food 3.0; 3 cr.
Designed to help the food scientist solve typical sensory problems, select appropriate panelists for specific sensory tests, and conduct such tests, analyze and interpret the results, and write a report. Prerequisite: STAT 210 or EDUC 227.

NFSC 306 Community Nutrition: Research and Intervention 3.0; 3 cr.
The role of nutrition in improving the health and well-being of communities. Population nutritional status and needs assessment, as well as planning, implementing and evaluating community nutrition and emergency nutrition programs and policies. Identification and assessment of nutritional status in the community, nutritional surveys, program development, nutritional education planning policies, and nutritional ecology. Prerequisites: NFSC 221 and NFSC 222.

NFSC 307 Nutritional Epidemiology 3.0; 3 cr.
This course deals with the design, conduct, analysis, and interpretation of epidemiologic studies related to nutrition, particularly the relationship between nutritional status, diet and disease. Prerequisites: STAT 210 or EDUC 227 and CMPS 209. Fall and Spring.

NFSC 308 Advanced Therapeutic Nutrition 3.0; 3 cr.
Advances in nutritional care, metabolic changes, and dietary management of nutrition-related diseases. Prerequisites: NFSC 292 and NFSC 293.

NFSC 310 Advanced Food Biochemistry 3.0; 3 cr.
Study of food enzymes, lipid oxidation in foods and biological systems, and genetically modified food. Prerequisite: NFSC 261.

NFSC 312 Sports Nutrition 3.0; 3 cr.
Nutritional needs for the various types of athletic performance, and selected ergogenic and ergolytic supplements as related to physical performance. Prerequisite: NFSC 274.

NFSC 351 Food Safety: Contaminants and Toxins 3.0; 3 cr.
General principles of food toxicology with emphasis on toxic constituents in plant, animal, marine, and fungal origin, contaminants and food processing induced toxins. Risk characterization and laws and regulations of food safety. Prerequisite: NFSC 277.

NFSC 370 Food Product Development 3.0; 3 cr.
Study of the chemical and physical properties of food ingredients. Designed to apply the product development process from idea generation to marketing. Prerequisite: NFSC 287 or NFSC 288.

NFSC 391 Research Techniques 1.6; 3 cr.
Principles of animal experiments, analytical techniques, and instrumentation used in nutrition and food science research studies. Prerequisite: NFSC 267.

MS in Public Health Nutrition

The Master of Science in Public Health Nutrition is a new graduate program offered jointly by the Faculty of Agricultural and Food Sciences (FAFS) and the Faculty of Health Sciences (FHS) at AUB. Students may pursue the Master of Science in Public Health Nutrition in either a thesis or a non-thesis track. The successful completion of the degree will require 40 credit hours for both tracks. Credits must be earned within the Faculty of Agricultural and Food Sciences and the Faculty of Health Sciences.

For the non-thesis track, 38 credits out of the required 40 credits should be earned as core

program courses, including a culminating experience and a practicum. Two credits must be acquired as one or two elective courses either earned within or at both faculties.
For the thesis track, students must complete a total of 34 credits as core courses and must work on a 6-credit thesis under the supervision of a thesis advisor and thesis committee and defend their thesis as per AUB graduate program policies.

Credit requirements for both the thesis and non-thesis options for the Master of Science in Public Health Nutrition are tabulated below:

		Non-Thesis Track Credits	**Thesis Track Credits**
Year 1			
NFSC 301	Statistical Methods for Nutrition and Food Sciences	3	3
NFSC 306A	Community Nutrition	2	2
NFSC 307	Nutritional Epidemiology	3	3
PHNU 300	Fundamentals of Public Health Nutrition	3	3
PBHL 303	Design and Evaluation of Public Health Programs	3	3
PBHL 304	Public Health Policy and Advocacy	3	3
PHNU 304	Nutrition in Emergencies	2	2
HPCH 331	Theories in Health Promotion	2	2
HPCH 334	Qualitative Research in Health Promotion	3	3
Total year credits		**24**	**24**
Year 2			
HPCH 333	Social Marketing in Health Promotion	2	2
FSEC 310	Food and Nutrition Security	3	3
PHNU 301	Nutrition in the Life Cycle	3	3
PHNU 302	Nutrition-related Chronic Disease	3	3
PHNU 390	Practicum	2	0

PHNU 391	Integrative Learning Experience	3	0
PHNU 396	Comprehensive Exam	0	0
PHNU 399	Thesis	0	6
Total year credits		**16**	**16**
Total credits		**40**	**40**

Core Courses

NFSC 301 Statistical Methods for Nutrition and Food Science 2.3; 3 cr.
This is an intermediate-level course in statistics. Topics include an introduction to designs in Nutrition and Food Science research; critical appraisal of literature; methods of describing data; statistical inference for means and proportions; linear and logistic regression, and an introduction to multiple regression. Prerequisites: STAT 210 or EDUC 227 and CMPS 209 or equivalent undergraduate course in statistics. Offered Fall and Spring.

NFSC 306A Community Nutrition 2.0; 2 cr.
In this course, students will be trained on the role of nutrition in improving the health and wellbeing of communities and will be equipped with skills required to conduct community-based assessment, as well as plan, implement, and evaluate community nutrition programs and policies. The course combines theory and practice where students will discuss, analyze, and experiment with the theories of behavioral change and will apply the principles of nutrition education when tackling specific nutritional problems. Students will be provided with experiential learning opportunities to assess the health and nutrition needs of specific population groups. In addition, this course will give students the opportunity to plan, implement, and evaluate small-scale nutrition interventions to improve the health and well-being of individuals within select communities. Offered Spring.

NFSC 307 Nutritional Epidemiology 3.0; 3 cr.
This course deals with the design, conduct, analysis, and interpretation of epidemiologic studies related to nutrition, particularly the relationship between nutritional status, diet and disease. Prerequisites: STAT 210 or EDUC 227 and CMPS 209 or equivalent undergraduate course in statistics. Offered Fall.

PHNU 300 Fundamentals of Public Health Nutrition 3 cr.
This course introduces students to the field of public health nutrition, covering the fundamental pillars of the field; nutrition status and needs assessments and planning, monitoring, and evaluating nutrition interventions. Students will be exposed to the theories and conceptual frameworks behind addressing nutrition-related health issues at a population level. Offered Fall.

HPCH 331 Theories in Health Promotion 2.0; 2 cr.
This course focuses on theories utilized to understand health determinants and outcomes and to promote individual and population health. Students will critically examine perspectives from health promotion and other social science disciplines through theoretical readings and empirical case studies. They will also discuss the merits and challenges of using theory to analyze health and to intervene at multiple levels from the individual to the structural levels. Pre-requisites- PBHL 312 or (PHNU 300 and NFSC 307). Offered Spring.

HPCH 334 Qualitative Research in Health Promotion 3.0; 3 cr.
The course develops learners' qualitative research skills to address a research question relevant to health promotion. Students engage through classroom discussions; role play and assignments to gain hands-on experience in conducting qualitative research beyond class settings. Students learn about qualitative research designs and methods and then apply the research process by generating data and analyzing the data to answer a research question of

their choice. They will also learn how to evaluate the quality or rigor of a qualitative research proposal or manuscript. Topics include in-depth interviews, observations, focus groups, thematic analysis, research rigor and research ethics. Prerequisites: PBHL 310 and PBHL 312 or (PHNU 300 & NFSC 307 & NFSC 301)

PHNU 301 Nutrition in the Life Cycle 3.0; 3 cr.
This course covers the nutritional needs of individuals in different stages of the life cycle, with a focus on maternal and child nutrition and nutrition in the elderly. Offered Fall.

PHNU 302 Nutrition-related Chronic Disease 3.0; 3 cr.
This course covers epidemiology, etiology, and the medical and nutritional management of chronic diseases whose etiologies are nutrition related. Offered Fall.

HPCH 333 Social Marketing in Health Promotion 2.0; 2 cr.
In this course, students will learn the theoretical underpinnings of social marketing, a framework used to develop strategies aimed to address social and public health issues and to design effective, sustainable, and ethically sound public health campaigns. As a service-learning course, students apply concepts acquired into the development of a social marketing plan for a local community partner organization, responding to selected public health issues. This course is offered in a blended learning format and is based on a combination of different modes of delivery (online and face-to-face) and diverse models of teaching and learning styles, providing students with an interactive and meaningful learning environment. Prerequisites: HPCH 331 and PBHL 303. Offered Fall.

FSEC 310 Nutrition Security: Assessment and Intervention Strategies 3.0; 3 cr.
This course introduces students to basic principles of nutrition security, community nutrition, and nutritional ecology, and highlights the role that nutrition plays in improving the health and wellbeing of communities. The course aims to equip students with the knowledge and skills required to conduct population-based nutrition research, assess the nutrition needs of a population, plan, implement and evaluate community nutrition programs and policies based on evidence-based practice and while taking into consideration cultural, social, and contextual dimensions. Offered Spring.

PHNU 304 Nutrition in Emergencies 2.0; 2 cr.
This course covers evidence-based community nutrition interventions in emergency situations that place vulnerable populations at risk of food insecurity and consequent malnutrition. Offered Summer.

PBHL 303 Design and Evaluation of Public Health Programs 2.2; 3 cr.
This course introduces students to the concepts and methods of public health program design and evaluation. Students will develop skills for assessing population needs for the development of health programs. The course then covers public health program design, including developing measurable objectives, identifying evidence-based intervention strategies, and planning for program implementation. Students will learn to select appropriate methods for impact and process evaluation of health programs. Prerequisites: PBHL 310 (waived for PHNU students) and PBHL 312 or (PHNU 300 & NFSC 307 & NFSC 301 & HPCH 334 (concurrently)). Offered Spring.

PBHL 304 Public Health Policy and Advocacy 3.0; 3 cr.
This course introduces students to the relevant concepts and approaches in public health policy and advocacy. It will provide students with a basic understanding of the public health policymaking process as well as the basic elements of advocacy. The aim is to make MPH students informed of the complex nature of public health policy development, be critical consumers of health policy research and evidence, and be analytical of the influence of various actors on the policy process. Students will learn the stages of the policy process (i.e., agenda setting, policy development, policy implementation and policy evaluation). The

field draws upon numerous disciplines. As such, course readings will be drawn from political science, sociology, biomedical sciences and policy studies. Students will also cover the basic elements of an advocacy process, including defining the issue, understanding the audiences and crafting advocacy strategies. Case studies, class discussions, and guest speakers will provide tangible examples of public health policy and advocacy processes at the national, regional and international levels. Ethics and equity considerations will be included in discussions related to concepts and application. Offered Spring.

PHNU 396 Comprehensive Exam 0 cr.
Comprehensive Exam.

For thesis track:
PHNU 399 MS Thesis 6 cr.

For non-thesis track:
PHNU 390 Practicum 2.0; 2 cr.
The practicum is considered an essential part of the curriculum of students. Students gain practical experience working with organizations engaged in developing, implementing and /or evaluating community-based public health nutrition programs. This experience may be purely research-based for students aiming for more academic careers. Offered Spring.

PHNU 391 Integrative Learning Experience 3.0; 3 cr.
This course will allow students to apply knowledge and skills acquired throughout their graduate courses. Through this course, students will develop an understanding of how to conduct a community-based project or a research project beginning with the conception of ideas and concluding with depicting written results and discussing them, along with proper citations and procedures. Part I offered Fall and Part II offered Spring.

List of Elective Courses

HPCH 301 Health Communication 2.0; 2 cr.
Health communication is an area of study that examines how human and mediated communication can influence the outcomes of healthcare and health promotion efforts. This core MPH course introduces the students to the basic concepts of health communication and its scholarship, including the focal areas of health literacy and patient-provider communication, social marketing, health campaigns, risk communication, crisis communication, and health advocacy. In the course, students will discuss the ways communicating about health is influenced by individual, social, and societal factors. The course will provide students with tools to critically evaluate existing health campaigns and to outline strategies to effectively communicate with different audiences about health-related topics. They will also design culturally appropriate, evidence-based health messages, designed for specific publics. Through this course, students will also learn how to effectively communicate scientific information with different audiences (e.g., general population, experts, the media), appropriately choosing oral and written materials and communication channels.

NFSC 395 Graduate Seminar in Nutrition and Food Science 1.0; 1 cr.
Offered Fall and Spring.

MS in Food Safety

Students may pursue a Master of Science in Food Safety with either a thesis track or a non-thesis track. Completion of the M.Sc. degree - Thesis Track requires a total of 31 credit hours. The Non-Thesis Tracks requires a total of 33 credit hours.

Master of Science in Food Safety (Thesis track)

Students in the thesis track are expected to complete a 9-credit thesis under the supervision of a thesis advisor and to defend their thesis as per AUB policies concerning graduate programs. Students should complete a comprehensive exam prior to the thesis defense. After satisfactory defense of the research work, the thesis should be approved by the supervisory committee members and deposited at the AUB Library.

Master of Science in Food Safety (Non-Thesis track)

Students in the non-thesis track are expected to complete a 3-credit project. Students can choose elective courses from within or outside FAFS. Non-thesis students must take at least 2 elective courses (8-credits) from different departments to expand their knowledge or from FAFS to pursue a specific topic in depth.

Credit Requirements for the Thesis and Non-Thesis Options for the Master of Food Safety:

Master of Science in Food Safety courses		Non-Thesis Track Credits	Thesis Track Credits
NFSC 301	Statistical Methods in Nutrition and Food Science	3	3
NFSC 310	Advanced Food Biochemistry	3	3
NFSC 350	Advanced Food Microbiology	3	3
NFSC 351	Food Safety: Contaminants and toxins	3	3
NFSC 352	Food Safety Systems	3	3
ENHL 311	Human Health Risk Assessment	3	3
NFSC 353	Advanced Applied Food Microbiology	3	3
NFSC 394	Internship	0	0
NFSC 395	Graduate Seminar	1	1
NFSC 396	Comprehensive Exam	0	0

NFSC 399	MS Thesis	-	9
NFSC 398/NFSC 300C	Project/Tutorial	3	-
Total Core Credits		**25**	**31**
Electives		**8**	**0**
Total Credits		**33**	**31**

Core Courses (Thesis)

NFSC 301 Statistical Methods for Nutrition and Food Sciences 2.3; 3 cr.
This is an intermediate-level course in statistics. Topics include an introduction to designs in Nutrition and Food Science research; methods of describing data; statistical inference for means and proportions; linear and logistic regression, and an introduction to multiple regression. Prerequisites: STAT 210 or EDUC 227 and CMPS 209. Fall and spring. AGSC 301 is also equivalent to this course.

NFSC 310 Advanced Food Biochemistry 3.0; 3 cr.
Study of food enzymes, lipid oxidation in foods and biological systems, and genetically modified foods. Prerequisite: NFSC 261.

NFSC 350 Advanced Food Microbiology 3.0; 3 cr.
Advanced level food microbiology course examining microbes involved in food spoilage and preservation, foodborne illness (incidences, sources, mechanism of pathogenesis, biology, and ecology of major pathogens, etc...). This course will provide a perspective in advanced topics in food microbiology and describe the essential principles of advanced techniques in food microbiology and safety.

NFSC 351 Food Safety: Contaminants and Toxins 3.0; 3 cr.
The course will provide in-depth knowledge of toxins and allergens in food. It will cover the basic aspects of food and nutritional toxicology with primary emphasis on food components and food toxins. The natural toxins in food plants and animals, cancer modulating substances, mycotoxins, and all groups of contaminants such as pesticides, persistent organic pollutants (POP's), metals, packaging materials, hormones and animal drug residues will be topics stressed in the course. The purpose is to develop an understanding of the nature and properties of toxic substances and the magnitude of the hazards they present along with the biological response of the human body to such hazards.

NFSC 352 Food Safety Systems 3.0; 3 cr.
Students will examine current and emerging food safety concerns and management systems as preventative tools. Various food safety management systems are covered; HACCP, Food Traceability, GMPs, and recall systems. This course provides the knowledge needed in order to assist industries in meeting standards and applying different food safety systems requirements. In the course, students will be prepared to be certified for HACCP and ISO 22000.

NFSC 353 Advanced Applied Food Microbiology 1.6; 3 cr.
This course introduces food safety students to detection techniques for identifying pathogenic microorganisms in food. Through laboratory-based practical exercises, students will learn the principles underlying various analytical tools used in food analysis. The course consists of one-hour lecture sessions weekly, complemented by three-hour laboratory sessions twice a week. Prerequisite: NFSC 350.

NFSC 394 Internship 0 cr.
A one to two month's internship in the food industry that allows students to broaden their experience on field. Weekly reports and work progress assessments should be presented to the advisor in order to follow up with the students and ensure diversity in their work.

NFSC 395 Graduate Seminar in Nutrition and Food Science 1.0; 1 cr.
Graduate Seminar in Nutrition and Food Science.

NFSC 396 Comprehensive Exam 0 cr.
Comprehensive Exam.

NFSC 399 MS Thesis 9 cr.
MS Thesis.

ENHL 311 Human Health Risk Assessment 3 cr.
Human Health Risk Assessment.

Core Courses (Non-Thesis)

NFSC 301 Statistical Methods for Nutrition and Food Sciences 2.3; 3 cr.
This is an intermediate-level course of statistics. Topics include an introduction to designs in Nutrition and Food Science research; methods of describing data; statistical inference for means and proportions; linear and logistic regression, and an introduction to multiple regression. Prerequisites: STAT 210 or EDUC 227 and CMPS 209. Fall and spring. AGSC 301 is also equivalent to this course.

NFSC 310 Advanced Food Biochemistry 3.0; 3 cr.
Study of food enzymes, lipid oxidation in foods and biological systems, and genetically modified foods. Prerequisite: NFSC 261.

NFSC 350 Advanced Food Microbiology 3.0; 3 cr.
Advanced level food microbiology course examining microbes involved in food spoilage and preservation, foodborne illness (incidences, sources, mechanism of pathogenesis, biology, and ecology of major pathogens, etc...). This course will provide a perspective in advanced topics in food microbiology and describe the essential principles of advanced techniques in food microbiology and safety.

NFSC 351 Food Safety: Contaminants and Toxins 3.0; 3 cr.
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NFSC 353 Advanced Applied Food Microbiology 1.6; 3 cr.
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NFSC 394 Internship 0 cr.
A one to two month's internship in the food industry that allows students to broaden their experience on field. Weekly reports and work progress assessments should be presented to the advisor in order to follow up with the students and ensure diversity in their work.

NFSC 300 Graduate Tutorial 1-3 cr.
Directed study.

NFSC 396 Comprehensive Exam 0 cr.
Comprehensive Exam.

NFSC 398 Project 3 cr.
Project.

ENHL 311 Human Health Risk Assessment 3 cr.
Human Health Risk Assessment.

Elective Courses for the MS Degree in Food Safety

FSEC 300 Food Security: Challenges and Contemporary Debate 3 cr.
This course introduces concepts and principles of food security, namely availability, accessibility, utilization, and stability of food supply. Students are familiarized with the history of thought on food security, from Malthus to the Green Revolution to Sen and the inclusion of political and social factors in considering food security.

FSEC 310 Nutrition Security: Assessment and Intervention Strategies 3.0; 3 cr.
This course introduces students to basic principles of nutrition security, community nutrition, and nutritional ecology; and highlights the role that nutrition plays in improving the health and wellbeing of communities. The course aims to equip students with the knowledge and skills required to conduct population-based nutrition research, assess the nutrition needs of a population, to plan, implement and evaluate community nutrition programs and policies based on evidence-based practice and taking into consideration cultural, social, and contextual dimensions.

AGSC 376 Resource and Environmental Economics 3.0; 3 cr.
A course that addresses and analyzes resource and environmental problems facing today's society, with an emphasis on providing the student with an intensive introduction to the qualitative theory necessary for an effective analysis of resource problems.

AGSC 384 Rural Social Change, Development, and the Environment 3.0; 3 cr.
This course provides an understanding of economic development and underdevelopment as it relates to environmental degradation and demographic, social and cultural change with special application to the economies of the Middle East.

AVSC 304 Preventive Immunology and Patterns of Animal Diseases 3.0; 3 cr.
Basic aspects of specific and non-specific body defense mechanisms and the role of vaccination in population protection; study of the patterns of diseases. Prerequisite: BIOL 224 or AVSC 224.

AVSC 305 Poultry Diseases 3.0; 3 cr.
Etiology, clinical characteristics, identification, prevention, and control of the major infectious and metabolic diseases of poultry.

EHCL 317 Ethics and Law 1.5 cr.
This course examines the ethical and legal principles which health leaders in Lebanon and the region need to take into consideration when making systems decisions. The course draws a distinction between public health ethics and medical ethics, and it provides tools for ethical decision-making in healthcare.

ENSC 640 Toxicology & Environmental Health Hazards 3 cr.
The course presents toxicology in three sections. In the first section, the fundamental principles and essentials of toxicology are introduced, particularly dose-response, toxicokinetic, and cellular mechanisms of action. In the second section, the course discusses toxicity of main organ systems. Classic toxicants that adversely affect health, emerging hazardous human exposures, and special topics are discussed in the last section of the course. The course includes lecture style presentations, collective case studies activities and student-led discussions. Topics of local and regional relevance are also introduced through hosting guest speakers.

HMPD 314 Project Management 2 cr.
A course that exposes students to current project management trends, best practices, and strategies that can aid in better management of projects and programs in health care settings.

ENHL 312 Occupational Health 3 cr.
This course overviews the general principles of occupational health, relating work, the work environment, and workers' health and wellbeing to general principles of social equity and justice. The course surveys research on the social, economic, political, environmental, and health elements of a workplace using multidisciplinary approaches. Students who join the course are able to identify occupational hazards and work-related injuries and illnesses in workplaces and propose monitoring, management and prevention strategies to lessen their impact on workers. With its emphasis on social justice, the course discusses the factors that make some workers' groups more vulnerable than others. Its unique approach emphasizes global perspectives and popular imaginations of workers through academic publications, newspaper journalism, cinema, lectures, and class discussions. This course is designed for students of multiple educational and training backgrounds and does not require prerequisite knowledge.

BIOC 317 Special Topics in Biochemistry & Genetics a-J; 1 cr.
A series of special elective courses (a-j), 1 credit each, which will emphasize the basic concepts and introduce recent developments in the fields of (a) Proteomics; (b) Metabolomics; (c) Genomics; (d) Lipidomics; (e) Enzymology; (f) Apoptosis; (g) Biochemistry of Inflammation; (h) Biochemical Toxicology; (i) Congenital Heart Problems; (j) Grant and Proposal Writing. Courses are open to medical doctors who would like to update their knowledge and to MSc/PhD graduates in biomedical and / or related fields. Elective. Prerequisite: Consent of coordinator. First/second /summer semester.

PHRM 315 Principles of Pharmacology 2 cr.
A course that covers the basic principles of drug action including pharmacokinetics, pharmacodynamics, pharmacogenetics, drug resistance, tolerance and toxicity, and pharmacovigilance.

MNGT 306 Leadership and Behavior in Organizations 3 cr.
This course sets the base for proper understanding and micro-level analysis of the role of individual and group behavior in organizations. It is designed as two independent modules; Module One Concerns Organizational Behavior while Module Two Concerns Leadership. The course will help students assimilate the different roles people play in an organization irrespective of their departmental positions or functional affiliations, and recognize the interactions inherent between people, structure, and environment. Particular attention is accorded to leadership as a focal point of group processes and a critical ingredient in successful organizational endeavors and transformations.

MNGT 319 Change Management 3 cr.
Examines in depth the change management process as a central paradigm in modern management theory and practice. The course spans a broad spectrum, including different change models and the various organizational forces that enable and resist change; and change processes at the individual, group, and organizational levels. The course also introduces theories, tools, approaches, and key competencies for managing change as well as practical case studies in the management of change.

MKTG 306 Marketing Management 3 cr.
This course deals with the fundamental aspects of managing and delivering marketing programs within a corporate context. Topics covered include analyzing marketing opportunities and channels; developing marketing strategies; marketing decision making, customer analysis and insight; product, pricing, communication, and promotion; and branding. The major elements of the marketing process and their relationship with each other will be thoroughly examined in local, regional, and international contexts through case examples. Additionally, students will delve into the analytical and research techniques used to make marketing decisions. The application of these techniques to marketing situations in both profit and non-profit organizations will be practiced through the use of case studies and individual assignments.

MKTG 312 Consumer Behavior (Prerequisite MKTG 306) 3 cr.
Uses a behavioral science perspective to describe, understand and predict the behavior of consumers in the marketplace. This course also magnifies the basic decision-making processes followed by consumers when faced with a choice situation.

MS in Food Technology

The M.Sc. in Food Technology program offers both thesis (31 cr.) and non-thesis (33 cr.) options and is normally completed over two years on a full-time basis. The program provides training in food biochemistry, food safety, food engineering and rheology, sensory evolution, and food product development.

Master of Science in Food Technology (Thesis Track)

Students in the thesis track are expected to complete a 9-credit thesis under the supervision of a thesis advisor and to defend their thesis as per AUB policies concerning graduate programs. Students should complete a comprehensive exam prior to the thesis defense. After satisfactory defense of the research work, the thesis should be approved by the supervisory committee members and deposited at the AUB Library.

Master of Science in Food Technology (Non-Thesis Track)

Students in the non-thesis track are expected to complete a 3-6 credit project (tutorial). Students can choose elective courses from within or outside FAFS upon the approval of their supervisor.

Credit Requirements for Both the Thesis and Non-Thesis Options:

Master of Science in Food Technology		**Non-Thesis Track Credits**	**Thesis Track Credits**
NFSC 301	Statistical Methods in Nutrition and Food Science	3	3
NFSC 305	Sensory Evaluation of Food	3	3
NFSC 310	Advanced Food Biochemistry	3	3
NFSC 350	Advanced Food Microbiology	3	3
NFSC 370 or NFSC 377	Food Product Development or Food Packaging	3	3
NFSC 371	Food Engineering	3	3
NFSC 351	Food Safety: Contaminants and Toxins	3	3
NFSC 395	Graduate Seminar	1	1
NFSC 396	Comprehensive Exam	0	0
NFSC 399	MS Thesis	-	9
NFSC 398/NFSC 300C	Project/Tutorial	3	-
Total Core Credits		**25**	**31**
Electives		**8**	**0**
Total Credits		**33**	**31**

Core Courses (Thesis)

NFSC 301 Statistical Methods for Nutrition and Food Sciences 2.3; 3 cr.
This is an intermediate-level course in statistics. Topics include an introduction to designs in Nutrition and Food Science research; methods of describing data; statistical inference for means and proportions; linear and logistic regression, and an introduction to multiple regression. Prerequisites: STAT 210 or EDUC 227 and CMPS 209. Fall and spring. AGSC 301 is also equivalent to this course.

NFSC 305 Sensory Evaluation of Food 3.0; 3 cr.
Designed to help the food scientist solve typical sensory problems; select appropriate panelists for specific sensory tests and conduct such tests, analyze and interpret the results, and write a report. Prerequisite: STAT 210 or EDUC 227.

NFSC 310 Advanced Food Biochemistry 3.0; 3 cr.
Study of food enzymes, lipid oxidation in foods and biological systems, and genetically modified foods. Prerequisite: NFSC 261.

NFSC 350 Advanced Food Microbiology 3.0; 3 cr.
Advanced level food microbiology course examining microbes involved in food spoilage and preservation, foodborne illness (incidences, sources, mechanism of pathogenesis, biology, and ecology of major pathogens, etc...). This course will provide a perspective in advanced topics in food microbiology and describe the essential principles of advanced techniques in food microbiology and safety.

NFSC 351 Food Safety: Contaminants and Toxins 3.0; 3 cr.
The course will provide in-depth knowledge of toxins and allergens in food. It will cover the basic aspects of food and nutritional toxicology with primary emphasis on food components and food toxins. The natural toxins in food plants and animals, mycotoxins, and all groups of contaminants such as pesticides, persistent organic pollutants (POP's), metals, packaging materials, hormones and animal drug residues will be topics stressed in the course. The purpose is to develop an understanding of the nature and properties of toxic substances and the magnitude of the hazards they present.

NFSC 370 Food Product Development 3.0; 3 cr.
Study of the chemical and physical properties of food ingredients. Designed to apply the product development process from idea generation to marketing. Prerequisite: NFSC 287 or NFSC 288.

NFSC 371 Food Engineering 3.0; 3 cr.
Basic concepts and principles of food engineering and their applications; focus on engineering design and analysis of unit operations common to food processing. Prerequisite: NFSC 291.

NFSC 377 Food Packaging 3.0; 3 cr.
This course provides the students with basic knowledge regarding food packaging materials, machinery, and technology. It provides an overview of the elements of packaging science and engineering applied to the presentation, distribution, and marketing of various food products. Prerequisite: NFSC 291.

NFSC 395 Graduate Seminar in Nutrition and Food Science 1.0; 1 cr.
Graduate Seminar in Nutrition and Food Science.

NFSC 396 Comprehensive Exam 0 cr.
Comprehensive Exam.

NFSC 399 MS Thesis 9 cr.
MS Thesis.

Core Courses (Non-Thesis)

NFSC 301 Statistical Methods for Nutrition and Food Sciences 2.3; 3 cr.
This is an intermediate-level course in statistics. Topics include an introduction to designs in Nutrition and Food Science research; methods of describing data; statistical inference for means and proportions; linear and logistic regression, and an introduction to multiple regression. NFSC 210 and CMPS 209. Fall and spring. AGSC 301 is also equivalent to this course.

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Designed to help the food scientist solve typical sensory problems; select appropriate panelists for specific sensory tests and conduct such tests, analyze and interpret the results, and write a report. Prerequisite: STAT 210 or EDUC 227.

NFSC 310 Advanced Food Biochemistry 3.0; 3 cr.
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NFSC 395 Graduate Seminar in Nutrition and Food Science 1.0; 1 cr.
Graduate Seminar in Nutrition and Food Science.

NFSC 396 Comprehensive Exam 0 cr.
Comprehensive Exam.

NFSC 398 Project 3 cr.
Project

NFSC 300C Graduate Tutorial 3 cr.
Directed study.

Elective Courses for the MS Degree in Food Technology

FSEC 300 Food Security: Challenges and Contemporary Debate 3.0; 3 cr.
This course introduces concepts and principles of food security, namely availability, accessibility, utilization, and stability of food supply. Students are familiarized with the history of thought on food security, from Malthus to the Green Revolution to Sen and the inclusion of political and social factors in considering food security.

FSEC 310 Nutrition Security: Assessment and Intervention Strategies 3.0; 3 cr.
This course introduces students to basic principles of nutrition security, community nutrition, and nutritional ecology; and highlights the role that nutrition plays in improving the health and wellbeing of communities. The course aims to equip students with the knowledge and skills required to conduct population-based nutrition research, assess the nutrition needs of a population, to plan, implement and evaluate community nutrition programs and policies based on evidence-based practice and taking into consideration cultural, social, and contextual dimensions.

AGSC 376 Resource and Environmental Economics 3.0; 3 cr.
A course that addresses and analyzes resource and environmental problems facing today's society, with an emphasis on providing the student with an intensive introduction to the qualitative theory necessary for an effective analysis of resource problems.

AGSC 384 Rural Social Change, Development, and the Environment 3.0; 3 cr.
This course provides an understanding of economic development and underdevelopment as it relates to environmental degradation and demographic, social and cultural change with special application to the economies of the Middle East.

AVSC 304 Preventive Immunology and Patterns of Animal Diseases 3.0; 3 cr.
Basic aspects of specific and non-specific body defense mechanisms and the role of vaccination in population protection; study of the patterns of diseases. Prerequisite: BIOL 224 or AVSC 224.

AVSC 305 Poultry Diseases 3.0; 3 cr.
Etiology, clinical characteristics, identification, prevention, and control of the major infectious and metabolic diseases of poultry.

EHCL 317 Ethics and Law 1.5 cr.
This course examines the ethical and legal principles which health leaders in Lebanon and the region need to take into consideration when making systems decisions. The course draws a distinction between public health ethics and medical ethics, and it provides tools for ethical decision-making in healthcare.

ENSC 640 Toxicology & Environmental Health Hazards 3.0; 3 cr.
The course presents toxicology in three sections. In the first section, the fundamental principles and essentials of toxicology are introduced, particularly dose-response, toxicokinetic, and cellular mechanisms of action. In the second section, the course discusses toxicity of main organ systems. Classic toxicants that adversely affect health, emerging hazardous human exposures, and special topics are discussed in the last section of the course. The course includes lecture style presentations, collective case studies activities and student-led discussions. Topics of local and regional relevance are also introduced through hosting guest speakers.

HMPD 314 Project Management 2 cr.
A course that exposes students to current project management trends, best practices, and strategies that can aid in better management of projects and programs in health care settings.

ENHL 312 Occupational Health 3.0; 3 cr.
This course overviews the general principles of occupational health, relating work, the work environment, and workers' health and wellbeing to general principles of social equity and justice. The course surveys research on the social, economic, political, environmental, and health elements of a workplace using multidisciplinary approaches. Students who join the course are able to identify occupational hazards and work-related injuries and illnesses in workplaces and propose monitoring, management and prevention strategies to lessen their impact on workers. With its emphasis on social justice, the course discusses the factors that make some workers' groups more vulnerable than others. Its unique approach emphasizes global perspectives and popular imaginations of workers through academic publications, newspaper journalism, cinema, lectures, and class discussions. This course is designed for students of multiple educational and training backgrounds and does not require prerequisite knowledge.

BIOC 317 Special Topics in Biochemistry & Genetics a-J; 1 cr.
A series of special elective courses (a-j), 1 credit each, which will emphasize the basic concepts and introduce recent developments in the fields of (a) Proteomics; (b) Metabolomics; (c) Genomics; (d) Lipidomics; (e) Enzymology; (f) Apoptosis; (g) Biochemistry of Inflammation; (h) Biochemical Toxicology; (i) Congenital Heart Problems; (j) Grant and Proposal Writing. Courses are open to medical doctors who would like to update their knowledge and to MSc/PhD graduates in biomedical and/or related fields. Elective. Prerequisite: Consent of coordinator. First/second /summer semester.

PHRM 315 Principles of Pharmacology 2 cr.
A course that covers the basic principles of drug action including pharmacokinetics, pharmacodynamics, pharmacogenetics, drug resistance, tolerance and toxicity, and pharmacovigilance.

MNGT 306 Leadership and Behavior in Organizations 3.0; 3 cr.
This course sets the base for proper understanding and micro-level analysis of the role of individual and group behavior in organizations. It is designed as two independent modules; Module One Concerns Organizational Behavior while Module Two Concerns Leadership. The course will help students assimilate the different roles people play in an organization irrespective of their departmental positions or functional affiliations, and recognize the interactions inherent between people, structure, and environment. Particular attention is accorded to leadership as a focal point of group processes and a critical ingredient in successful organizational endeavors and transformations.

MKTG 312 Consumer Behavior (Prerequisite MKTG 306) 3.0; 3 cr.
Uses a behavioral science perspective to describe, understand and predict the behavior of consumers in the marketplace. This course also magnifies the basic decision-making processes followed by consumers when faced with a choice situation.

The Environment and Sustainable Development Unit (ESDU)

Director:	Hamadeh, Shady

ESDU is an interdisciplinary research and development unit specializing in sustainable rural livelihoods. It was established at the Faculty of Agricultural and Food Sciences to promote collaboration on sustainable development initiatives among departments at AUB and with a variety of other institutions and organizations undertaking related activities.

ESDU activities, including research, capacity building, and outreach, aim at the following:

- Providing opportunities for faculty and students to work on real-life rural development projects.
- Fostering partnerships between research, private and public sectors, and local communities in order to develop community-based solutions.
- Networking with national, regional, and international centers and institutes in the areas of integrated natural resource management and sustainable development.

For more information, refer to www.aub.edu.lb/fafs/esdu.

Faculty Of Arts and Sciences (FAS)

Graduate Program

Officers of the Faculty

Fadlo R. Khuri	President of the University
Zaher Dawy	Provost
Farès Dahdah	Dean
Saouma BouJaoude	Special Advisor to the Dean for Faculty Affairs
Pierre Karam	Associate Dean
Izzat El Hajj	Director of Freshman Program
Bradley Jon Tucker	Registrar
Antoine Sabbagh	Director of Admissions
Lokman Meho	University Librarian

Faculty Administrative Support

Bassel Baker	IT Service Desk Manager
Patrick Daou	GIS Technologist/Specialist
Yara El-Hoss	Student Services Administrative Officer
Zeina Halabieh	Director of Student Services and FAS Space Management
Razan Harb	Senior IT Service Delivery Manager
Ghida Itani	Graduate Studies and Career Services Officer
Dima Jamil Ahmad Dit Hakim	Administrative Assistant
Zeina Katergi	Executive Officer for Administrative Affairs
Dina Khattab	Academic Affairs Officer
Abeer Khoury	Financial Operations Manager
Hadi Knaiber	Data Analyst
Stephanie Mesrobian	Undergraduate Student Officer
Nadine Rizk	Faculty and Staff Affairs Manager
Razan Sabbidine	Student Records Administrative Officer
Armine Seferian	Communications Officer

Mohamad Ali Sheikh	Building Operator
Heghnar Tacouhie Yeghiayan	Faculty Affairs and Research Support Officer

Historical Background

The Faculty of Arts and Sciences was established in 1866, the same year in which the Syrian Protestant College, now the American University of Beirut, was established. On December 13, 1866, the first class was held, attended by sixteen students, and in 1870 the first five students graduated. Arabic, which was the language of instruction since the inception of the college, was replaced by English in 1882. AUB, in general, and the Faculty of Arts and Sciences, in particular, have survived many crises since 1866, including two world wars, regional and local wars, student strikes and economic crises. Despite all these hardships, the faculty has continued to develop and maintain its high academic standards.

Mission

The Faculty of Arts and Sciences embodies AUB's core commitment to the liberal arts and sciences. It offers undergraduate and graduate programs in the arts, humanities and social, natural and mathematical sciences, and is dedicated to advanced research in all these domains. Through its freshman and general education programs, it is the University's principal gateway to higher studies and professional education. The faculty, through its teaching and research, promotes free inquiry, critical thinking, academic integrity, and respect for diversity and equality.

Vision

Building upon its rich tradition, the Faculty of Arts and Sciences is determined to position itself at the heart of free inquiry in the Middle East. Liberal and critical thinking is central to the faculty's teaching, its research, its engagements with the wider community and its commitment to the thoughtful transformation of all its activities and structures. The faculty's enhanced undergraduate programs will graduate innovators with a breadth of vision who can be agents of positive change wherever they live and work. The faculty will strategically expand its graduate offerings, especially in areas where it can make a distinctive contribution, and it will educate graduate students who are themselves producers of knowledge. The faculty will be recognized internationally for the quality of its research and creative activities in the humanities, social sciences, natural sciences, mathematical sciences and interdisciplinary areas, whether undertaken in response to regional and global needs or to human curiosity and imagination. The faculty will provide a vital forum for open discussion and engage contemporary issues in ways that resonate far beyond our campus walls.

Graduate Study

Admission to the graduate programs in the Faculty of Arts and Sciences is competitively based on the applicant's academic record, achievements and research interests. All applicants to graduate study need the recommendation of the academic unit concerned. Academic units may add additional requirements that could assist in their admission recommendations, such as a writing sample, GRE (or GMAT, in the case of the Department of Economics) scores and/or interview. The GRE is required from the following departments only: Biology, Economics, History and Archaeology and Psychology. FAS also offers an MS in Environmental Policy Planning (as part of an Interfaculty Graduate Environmental Sciences Program).

The following includes admissions information specific to the Faculty of Arts and Sciences. Additional requirements are described in the General section on Admissions in this catalogue.

RCR Requirement

The Responsible Conduct of Research (RCR) Requirement must be completed by all newly admitted degree-seeking graduate students. The requirement consists of a course that must be completed within the first month and is marked by a passing grade. Failure to fulfill this requirement in a timely manner results in a registration hold that is removed once the requirement has been fulfilled. The specific course/section to be taken is assigned by the student advisor. For more details on the requirement, please refer to General University Academic Information section of this catalogue. Below is the RCR course listing of FAS.

RCRA 300 Responsible Conduct of Research in the Humanities 0 cr.
An online RCR course (Responsible Conduct of Research) from the Collaborative Institutional Training Initiative (CITI Program). Required of all graduate students in the humanities. The course "covers core norms, principles, regulations, and rules governing the practice of research." It consists of the following modules: Research Misconduct, Data Management, Authorship, Peer Review, Mentoring, Using Animal Subjects in Research, Conflicts of Interest, Collaborative Research, Research Involving Human Subjects and Case Study - Data Management. Every term.

RCRA 301 Responsible Conduct of Research in the Sciences 0 cr.
An online RCR course (Responsible Conduct of Research) from the Collaborative Institutional Training Initiative (CITI Program). Required of all graduate students in the sciences. The course "covers core norms, principles, regulations, and rules governing the practice of research." It consists of the following modules: Research Misconduct, Data Management, Authorship, Peer Review, Mentoring, Using Animal Subjects in Research, Conflicts of Interest, Collaborative Research and Research Involving Human Subjects. Every term.

RCRA 302 Responsible Conduct of Research in the Social Sciences 0 cr.
An online RCR course (Responsible Conduct of Research) from the Collaborative Institutional Training Initiative (CITI Program). Required of all graduate students in the social and behavioral sciences. The course "covers core norms, principles, regulations, and rules governing the practice of research." It consists of the following modules: Research Misconduct, Data Management, Authorship, Peer Review, Mentoring, Using Animal Subjects in Research, Conflicts of Interest, Collaborative Research and Research Involving Human Subjects. Every term.

Admission as a Regular Graduate Student

An applicant is considered for admission as a regular student to a graduate program if s/he meets the following minimum admission requirements:

An undergraduate average of at least 3.3 (or standardized equivalent from other institutions of higher learning) in the major field of study and a cumulative average of at least 3.0 (or standardized equivalent) for all work done at the undergraduate level leading to a bachelor's degree or its equivalent from AUB or another recognized institution of higher learning. Applicants to the Environmental Policy Planning specialization in the Master's Degree Program in Environmental Sciences are required to have an average of at least 3.3 in the last two years of undergraduate study or its equivalent at AUB or other universities as determined by the faculty Graduate Studies Committee.
Further requirements for admission to graduate work are found in the General section on Admissions in this catalogue.

Admission as a Graduate Student on Probation

An applicant is considered for admission on probation if s/he meets the following minimum admission requirements:

An undergraduate average of at least 3.0 (or standardized equivalent from other institutions of higher learning) in the major field of study and a cumulative average of at least 3.0 (or standardized equivalent) for all work done at the undergraduate level leading to a bachelor's degree or its equivalent from AUB or another recognized institution of higher learning. Applicants to the Environmental Policy Planning specialization in the Master's Degree Program in Environmental Sciences are required to have an average of 3.0 in the last two years of study or its equivalent at AUB or other universities as determined by the faculty Graduate Studies Committee.

Further requirements for admission to graduate work are found in the General section on Admissions in this catalogue.

Admission as a Prospective Graduate Student

Applicants who hold a bachelor's degree in a major field of study, other than the one to which they are applying, and who do not have sufficient academic preparation in the field may be admitted as prospective graduate students who must complete specified undergraduate course requirements.

To be considered for admission as a prospective graduate student, the applicant must have attained an undergraduate average of 3.0 (or standardized equivalent) in all work done at the undergraduate level leading to a bachelor's degree or its equivalent from AUB or another recognized institution of higher learning.

Further requirements for admission to graduate work are found in the General section on Admissions in this catalogue. For the purpose of change of status (admission after completion of requirements) to regular graduate student, a minimum average of 3.3 will be required in all the supplementary courses. If an average of 3.0-3.3 is attained, the student may have her/his status changed to graduate student on probation pending departmental recommendation and approval of the faculty Graduate Studies Committee. The supplementary courses must be completed within four consecutive regular terms.

Transfer of Credits

Transfer of Credits into a Master's Degree Program

Please refer to the General University Academic Information, section pertaining to "Academic Rules and Regulations".

Transfer of Credits from One Master's Degree to Another

Graduate courses taken at AUB (or at other recognized institutions), in which the applicant has earned an equivalent grade of B+ or above, may be transferred toward another master's degree at AUB. No more than 9 credits are transferable provided they are not credits earned by an internship, thesis or practicum, and degree minimum residency requirement is maintained. Approval by the department or academic unit concerned and by the FAS Graduate Studies Committee is required for all transfers.

Department of Arabic and Near Eastern Languages

Chairperson:	Khansa, Enass
Professors:	Baalbaki, Ramzi M. (Margaret Weyerhaeuser Jewett Professor of Arabic); Jarrar, Maher Z.; Orfali, Bilal W.; (Sheikh Zayed Chair for Arabic & Islamic Studies)
Assistant Professors:	AbdelMegeed, Maha; Khansa, Enass
Senior Lecturers:	Bazzi, Tarif; Fakhreddine, Jawdat
Lecturers:	Atiyyah, Najah; Bou Fadel, Najem; El Daif, Rachid; Ghaddar, Hussein; Korangy, Alireza; Moukaled, Sina; Semaan, Rima; Sultany, Kanawaty Rima; Zein, Raghida M.
Instructors:	El Mallah, Jihad; Malti, Samir

The Department of Arabic and Near Eastern Languages offers graduate programs leading to the MA and PhD degrees. The requirements for both degrees are listed below.

For admission and graduation requirements, refer to the faculty and department web pages.

MA in Arabic Language and Literature

Students registered in the master's program in the Department of Arabic and Near Eastern Languages are required to take a minimum of 21 graduate credit hours and present a thesis based on independent research.

Doctor of Philosophy in Arabic Language and Literature

The Department of Arabic and Near Eastern Languages is steeped in the Arabic philological and literary tradition. Its faculty is also experienced in the use of contemporary western methods of teaching and approaches to language and literature. For this reason, the department is well-positioned to train future leaders in the field.

Academic governance of the department complies with the practices and procedures currently applied by the Faculty of Arts and Sciences. The department seeks to augment its faculty as needed, mainly through exchange and visiting programs as well as through highly selective and rigorously defined recruitment.

Goals and Objectives of the Doctoral Program

The program's objective is to train students to become technically competent in their preferred field of specialization and play a principal role in enhancing education in the region.

PhD candidates will acquire:

- critical, interpretive and analytical skills,
- benchmark methodologies leading to the conduct of advanced research,
- and deeper, more sophisticated and more nuanced understanding of Arabic language and literature.

Curriculum

The offerings of the department fall within three broadly defined fields:

- Arabic language and related fields (phonetics, morphology, syntax, history of grammar, lexicology, stylistics, etc.)
- classical and pre-modern Arabic literature and thought (including poetry, prose, belles lettres and other forms of literary expression)
- modern Arabic literature and thought (including poetry, prose, literary theory, etc.)

Admissions

Admission requirements are in line with those set by the Faculty of Arts and Sciences and may be found in the section entitled 'Admission to PhD Programs' under Admissions. The department necessitates the following three requirements:

- a master's degree in Arabic from a recognized university, or an equivalent considered acceptable by the department, plus three recommendation letters and an interview (when considered necessary by the department). Students of exceptional promise may be admitted after finishing their BA.
- proven unimpaired Arabic.
- English proficiency. For the required level of proficiency, see the section entitled English Language Proficiency Requirement under Admissions.

Financial Support

The department offers, on a selective basis, substantial support which fully covers tuition and includes a monthly stipend. In return, PhD students are expected to teach courses and perform other tasks assigned by the department. Students may also apply for support to carry out research in archives and libraries outside Lebanon and to attend international scholarly conferences.

Requirements for the Completion of the PhD

- Credits: A minimum of 18 credits is required beyond the MA. These are comprised of six graduate courses (including a 3-credit tutorial) in the following required and optional fields.
- Required fields:
  - Arabic language and linguistics
  - Classical Arabic literature
  - Modern Arabic literature
- Optional fields:
  - Arab cultural history (Qur'an, Hadith, kalam, tasawwuf, heresiography, etc.)
  - Literary theory (comparative: Arab/Western)

In addition, the following is required: a 3-credit tutorial to be conducted by the candidate's advisor, leading to the production of the candidate's doctoral proposal.

- The distribution of the above requirements over the said fields will be decided by the department in each case on its own merit.
- **Language Requirements**: A working reading knowledge of a second European language, preferably French or German, must be shown before candidacy status is achieved.
- **Residence Requirements**: See Residence Requirements under General University Academic Information.
- **PhD Publication Requirements**: See PhD Publication Requirements under General University Academic Information.

- **Supervision**: During the first term of graduate study, the department will appoint an academic committee to draw up a program of study for the student and to follow up on her/his progress. At a later stage, the department, in consultation with the student, will assign the student an academic advisor.
- **Candidacy Status**: See Admission to Candidacy under General University Academic Information. The student must achieve candidacy status no later than three years from the date of admission and at least one year before graduation. Achieving candidacy is conditional upon completion of 18 credits, i.e. five courses plus the required tutorial for students with a master's degree or 39 credits and the equivalent of an MA thesis for students with a BA while also satisfying the proposal and language requirements. To achieve candidacy, a student must sit for a written comprehensive examination (PhD Qualification Exam Part I) comprising at least three different papers. The proto-examining committee, consisting of four AUB faculty members of professorial rank, will be in charge of writing questions and correcting answers. Within two weeks from the date of the written comprehensive, the student shall appear before the proto-examining committee to defend her/his answers.
- **Doctoral Proposal**: A detailed proposal defining the thesis problem, describing the pertinent literature and suggesting the proposed approach to solving it must be defended before and approved by the thesis examining committee (PhD Qualification Exam Part II). The committee membership must be approved by the Graduate Studies Committee of the Faculty of Arts and Sciences, and a copy of the proposal must be sent to the Graduate Council.
- **Thesis Examining Committee**: For the composition of the committee, refer to PhD Thesis Committee under General University Academic Information.
- **Thesis Defense**: Six copies of the pre-defense final manuscript must be submitted to the advisor at least eight weeks prior to the date of the defense session. This session shall be public. Candidates may, if they so elect, write their theses in English, provided members of the proto-examining committee expressly state their satisfaction with the candidate's capacity for acquisition of knowledge in Arabic.
- **Awarding/Withholding the Degree**: The decision of the thesis examining committee may be one of the following four:
  - Award: with or without demanding minor corrections
  - Award: provided certain specific and restricted alterations are implemented within three months and approved by the proto-committee
  - Suspend: major alterations are required and must be implemented within 6-12 months, after which the whole committee shall reconvene
  - Withhold: without further recourse

Course Descriptions

ARAB 301 Seminar in Classical Arabic Literature (Poetry or Prose) 3.0; 3 cr.
An overview of the formative elements (geographic, linguistic, ethnic, religious and cultural) and defining issues (identity, nature and economic drives), with selective focus on major trends and figures in classical Arabic literature before the year 1258/657. The language of instruction in this course is Arabic.

ARAB 303 Graduate Seminar in an Epoch, a Trend or a Book in Classical Arabic Literature 3.0; 3 cr.
Negotiating classical Arabic literature through the historical method, the thematic approach or direct textual engagement. The selective focuses of this course cover a wide spectrum of Arabic literary production before the year 1258/657. The language of instruction in this course is Arabic.

ARAB 305 Graduate Seminar in Qur'anic Studies 3.0; 3 cr.
A survey of the different problems in Qur'anic studies, such as compilation of the Qur'an, al-nasikh wal-mansukh, al-muhkam wal-mutashabih, the secret letters, and the different schools of tafsir. The language of instruction in this course is Arabic.

ARAB 309 Graduate Seminar in Arabic Sources 3.0; 3 cr.
A systematic survey of the major sources of Arabic literary and linguistic study. The different genres represented by these sources are emphasized. The language of instruction in this course is Arabic.

ARAB 311 Graduate Seminar in an Epoch, a Trend or a Book in Modern Arab Literature 3.0; 3 cr.
Focusing on a period, a trend, a particular author or book, this course is an in-depth study using modern, critical and comparative approaches to literature. The language of instruction in this course is Arabic.

ARAB 313 Graduate Seminar in Folk Literature 3.0; 3 cr.
An analytic study of Arabic folk literature and its development. Study includes the different influences on folk literature and folk literature's impact on Arabic literature during later centuries. The language of instruction in this course is Arabic.

ARAB 315 Graduate Seminar in Comparative Literature 3.0; 3 cr.
This course deals with the theories and methods current in comparative literature in Arabic and global literature, encouraging research on transcultural aspects of literary production, theory and criticism. The language of instruction in this course is Arabic.

ARAB 317 Graduate Seminar in Advanced Semitics or Linguistics 3.0; 3 cr.
A study of the Arabic grammatical tradition, with special emphasis on the development of the grammarians' analytic methods. Alternatively, and according to need, the course could offer a survey of comparative Semitic philology. The language of instruction in this course is Arabic.

ARAB 319 Graduate Seminar in Arabic Literary Theory 3.0; 3 cr.
A survey of schools of literary criticism, genres and issues pertaining to 20th century Arabic literature. Annually.

ARAB 351 Special Topics in Arabic Language and Literature 1–3 cr.
A course that varies in content and focuses on selected topics in language and literature. The language of instruction in this course is Arabic.

ARAB 390 Tutorial in Arabic Language or Literature 1–3 cr.
May not be repeated for credit.

ARAB 395A/B Comprehensive Exam 0 cr.
Prerequisite: Consent of advisor.

ARAB 399 MA Thesis 9 cr.
MA Thesis.

ARAB 401 Tutorial in Arabic Language or Literature 3 cr.
May not be repeated for credit.

ARAB 480 Qualifying Exam Part I: Comprehensive Exam 0 cr.
Every term.

ARAB 481 Qualifying Exam Part II: Defense of Thesis Proposal 0 cr.
Every term.

ARAB 484 PhD Thesis 30 cr.
To be taken only by regular track PhD students. Taken at first thesis registration, then registered for every subsequent term with sequential letter annotations (A-L; 0 credits) until completion of thesis work. Every term.

The choice to register for ARAB 488 should be done in consultation with the thesis advisor to ensure that the total number of PhD thesis credits and PhD course credits are met as per AUB rules and regulations.

ARAB 488 PhD Thesis 42 cr.
To be taken only by accelerated track PhD students. Taken at first thesis registration, then registered for every subsequent term with sequential letter annotations (A-L; 0 credits) until completion of thesis work. Every term.

Department of Biology

Chairperson:	Kambris, Zakaria S.
Professors:	Bariche, Michel J.; Baydoun, Elias H.; Gali-Muhtasib, Hala U.; Knio, Khouzama M.; Kreydiyyeh, Sawsan I.; Osta, Mike A.; Saoud, Imad P.; Smith, Colin A.; Talhouk, Rabih S.
Associate Professors:	Ghanem, Noel D.; Jaalouk, Diana E.; Kambris, Zakaria S.
Assistant Professor:	Sadek, Riyad A.
Lecturers:	Rizkallah, Hind D.; Sinno-Saoud, Nada
Instructors:	Hajjar, Layane A.M.; Al-Zein, Mohammad S.
Adjunct Faculty:	Dohna, Heinrich; Parker, Bruce; Skinner, Margaret

MS in Biology

The Master's program in Biology aims at providing students with a good foundation in biological sciences and training them to conduct scientific investigations. Students are expected to acquire technical skills needed to answer scientific questions through hypothesis-driven research work. This is achieved through engaging them in hands-on activities at the bench and in the field, in addition to analyzing generated and existing biological data. The program also fosters analytical and critical thinking, and trains students on the use of appropriate scientific language and oral and written communication skills necessary for proper dissemination of scientific information.

The Graduate Record Examination (GRE) is required of all applicants for graduate work. Requirements for an MS degree in biology consist of a minimum of 21 credit hours in biology courses numbered 300 or above and a 9-credit thesis.

The following courses are core courses and should be taken by all master's students:

BIOL 310 (3 cr.), BIOL 315 (3 cr.) and BIOL 393 (1 cr.)
Unless otherwise stated, only senior undergraduate biology majors with an average of 3.3 or above can register in biology graduate courses with the consent of the instructor.

PhD in Cell and Molecular Biology

Mission Statement

The doctoral program in Cell and Molecular Biology aims to provide the best training to students for their careers as research scientists in Cell and Molecular Biology. It provides students with the opportunity to develop their capacity for scholarly and independent work, critical analytical thinking, and the ability to communicate knowledge and ideas. It is intended to produce scientists who will make significant, original contributions to the biological sciences. The program exposes students to theoretical foundations and practical training in current laboratory techniques. It serves the AUB mission by providing Lebanon and the region with qualified researchers and preparing students for careers in research, teaching, and public service.

Admission Requirements

The PhD program is a five-year program. Admission to the program will be on a competitive basis. To be eligible for admission, applicants should have a good academic record, demonstrate genuine interest in Cell and Molecular Biology research and must:

- hold a bachelor's (BS) or master's (MS) degree in biological sciences or related fields from a recognized institution,
- present three letters of recommendation from previous tutors or employers,
- submit scores from the general Graduate Record Examination (GRE). This exam is required of both BS and MS holders,
- meet Readiness for University Studies in English (RUSE),
- present a statement of purpose,
- be interviewed by a select group of department faculty members (who may require the student to give a seminar presentation),
- and be recommended for admission by the Biology Department.

Program Requirements

The program requirements for BS holders consist of a minimum of 36 credit hours of graduate level coursework and a minimum of 42 credit hours of thesis work. The requirements for MS holders are a minimum of 18 credit hours of graduate level coursework in addition to 30 credit hours of thesis work.

Upon admission into the program, each student will be assisted by the department head who will act as an academic advisor and help the student in the selection of courses. Each student's course of study is designed individually in light of her/his interests and career goals. All duties of the head are transferred to the thesis advisor once selected.

The program incorporates the existing master's program and consists of core courses that address basic principles of cell and protein function, gene expression, bioinformatics and biostatistics.

Required Core Courses

All students are required to take the following six core courses and the seminar (plus tutorial if applicable):
BIOL 310 Biostatistics 3 cr.
BIOL 315 Research Methods in Biology 3 cr.
BIOL 322 Advanced Biochemistry 3 cr.
BIOL 330 Molecular Genetics 3 cr.
BIOL 332 Advanced Cell Biology 3 cr.
BIOL 370 Bioinformatics 3 cr.
BIOL 491 CMBL Tutorial (required only by students holding a BS) 2 or 3 cr.
BIOL 493 CMBL Seminar 1 cr.

If these courses have already been taken as part of the master's program, they may be replaced by others upon departmental approval to complete the 18-credit requirement.

Elective Courses

Elective courses are taken to meet the credit requirements and emphasize the student's research work and field of specialty. These courses may be chosen from the Biology Department, graduate course offerings or from course offerings of other departments that fall within the student's field of interest and scope of the program.

Laboratory Rotations

During the first year of study, students may take the laboratory rotation course (BIOL 494), conducting research in two different faculty laboratories within the Biology Department or the university. The department considers exposure to different research environments an essential part of training. Students entering with only a BS must also register for an additional 2- or 3-credit laboratory tutorial in their first year.

Seminars

Students are required to attend and participate in seminars and journal clubs every term. Academic credit (1 credit) will be received only once during the first year. Subsequent terms will not be credited. Graded: Pass/No Pass (or Fail).

PhD Thesis Committee

Refer to PhD Thesis Committee (refer to the General University Academic Information section of this catalogue).

PhD Qualification Exams Part I and Part II

Refer to PhD Qualification Exam under the General University Academic Information section of this catalogue.

Candidacy and Residency

Refer to General University Academic Information, Requirements for the Degree of Doctor of Philosophy section that has clearly defined candidacy and residency requirements.

PhD Thesis and Thesis Defense

Refer to PhD Thesis Format and PhD Thesis Defense under General University Academic Information section of this catalogue.

Residence Requirements

For Residence Requirements, refer to Residence Requirements under the General University Academic Information section of this catalogue.

Graduation Requirements

The following is a list of graduation requirements:

- completion and successful defense of a thesis
- teaching experience (theory or lab) equivalent to a 3-credit course at minimum
- yearly presentation, during candidacy, of research progress to the department
- acceptance or publication of at least two internationally refereed papers or one internationally refereed paper and one internationally refereed abstract or proceeding

In all other respects, the graduation requirements set forth in the catalogue for the PhD program will apply.

Financial Support

The department offers, on a selective basis, substantial support which fully covers tuition and includes a monthly stipend. There are also some funds available to support participation in international conferences; these funds are awarded on a competitive basis. In return, students are expected to help in teaching undergraduate labs, with presentations of introductory courses, and in proctoring and correcting exams.

Course Descriptions

BIOL 310 Biostatistics 2.3; 3 cr.

This course covers methods of statistical analysis of research data in a wide range of biological fields. It starts from elementary concepts and descriptive statistics to concentrate on hypothesis-testing for one, two and several samples including non-parametric methods. It covers correlation, regression and curve-fitting as well as goodness-of-fit tests applied to various distributions. Appropriate computer applications are used for all statistical analysis procedures. Prerequisite: Graduate standing.

BIOL 315 Research Methods in Biology 1.5; 3 cr.

A core course that provides practical experience in a variety of techniques currently employed in biological research, providing an understanding of their application and result interpretation. Prerequisite: Graduate standing.

BIOL 322 Advanced Biochemistry 3.0; 3 cr.

This course presents the relationship of biomolecular structure to function, enzyme catalysis, regulation and selected examples of current biochemical research.

BIOL 328 Plant Biochemistry 3.0; 3 cr.

A course that provides information in areas of biochemistry unique to plants, including the cell wall, photosynthesis, assimilation of mineral nutrients, natural products and growth substances.

BIOL 330 Molecular Genetics 3.0; 3 cr.

A discussion of recent developments in molecular genetics that provides an understanding of the molecular mechanisms underlying gene regulation and tissue-specific gene expression.

BIOL 332 Advanced Cell Biology 3.0; 3 cr.

A discussion of recent findings in cell biology, emphasizing understanding of the research approaches used to elucidate major processes that regulate the normal function of the cell.

BIOL 333 Signal Transduction 3.0; 3 cr.

A study of the common signal transduction pathways mediating the effect of different first messengers. Prerequisite: Graduate standing.

BIOL 335 Molecular Biology of Cancer 3.0; 3 cr.

A course that deals with the regulatory mechanisms of neoplastic cell growth and cancer cell metastasis. This course includes a discussion of recent developments in molecular genetics of the intra- and/or inter-cellular mechanisms involved in tumor formation, cellular proliferation, apoptosis, invasion and metastasis. Prerequisite: Graduate standing.

BIOL 338 Cancer and Natural Products 3.0; 3 cr.

This course is designed to introduce students to the numerous natural compounds that show promise in the treatment of cancer and the mechanism-based approaches to this treatment using these compounds. In addition, the course provides information on the research designs, protocols and assays involving natural compounds.

BIOL 341 Advanced Microbiology 3.0; 3 cr

A study of energy metabolism of various microbial groups emphasizing degradation of organic compounds under aerobic and anaerobic conditions. This course also deals with applications of microorganisms in industrial, medical and environmental fields.

BIOL 362 Advanced Ecology 2.3; 3 cr.

A discussion and analysis of topics of current interest in ecology with emphasis on population and community dynamics, and methods of ecological investigation and analysis; includes field work.

BIOL 363 Population and Community Ecology 3.0; 3 cr.

A course that introduces the various models and theories of population dynamics and community structure, and their applications in assessing the complex interactions that occur in natural plant-animal systems as a result of long co-evolution, with an emphasis on chemical ecology.

BIOL 364 Conservation and Restoration Ecology 3.0; 3 cr.

A course that introduces various concepts and applications in the field of conservation and landscape ecology. Degradation processes, principles of restoration ecology, and models of conservation biology are discussed. Part of this course concentrates on the use of remote sensing, GIS and GPS as tools in landscape ecology.

BIOL 370 Bioinformatics 2.3; 3 cr.

A project-based course that teaches computer and statistics skills to handle biological data efficiently and creatively. Projects can involve the analysis of any type of biological data, such as image data, survival data, microarray data, sequence data, next-generation sequencing data, etc. Students can either analyze data from their own work or recapitulate parts of a published analysis. During the course, each student writes analysis scripts in R that automatize an entire workflow from data pre-processing to analysis, output of results and plotting.

BIOL 390 Special Topics in Biology 1, 2, 3 or 4 cr.

Prerequisites: Graduate standing and consent of instructor. May be repeated for credit.

BIOL 391 Tutorial 2 cr.

Every term. Prerequisites: Graduate standing and consent of instructor. Cannot be repeated for credit. Graded: Pass/No Pass (or Fail).

BIOL 392 Tutorial 3 cr.

Every term. Prerequisites: Graduate standing and consent of instructor. Cannot be repeated for credit. Graded: Pass/No Pass (or Fail)

BIOL 393 Seminar 1 cr.

This course trains students on how to present research findings. Prerequisite: Graduate standing.

BIOL 395A Comprehensive Exam 0 cr.

Prerequisite: Consent of advisor.

BIOL 399 Thesis 9 cr.

Thesis

BIOL 480 Qualifying Exam Part I: Comprehensive Exam 0 cr.

Every term. Prerequisite: Completion of a minimum of 18 credit hours of coursework.

BIOL 481 Qualifying Exam Part II: Defense of Thesis Proposal 0 cr.

Every term. Pre- or corequisite: BIOL 480.

BIOL 484 PhD Thesis 30 cr.

Every term. To be taken only by regular track PhD students. Taken at first thesis registration, then registered for every subsequent term with sequential letter annotations (A-L; 0 credits) until completion of thesis work.

BIOL 488 PhD Thesis 42 cr.

Every term. To be taken only by accelerated track PhD students. Taken at first thesis registration, then registered for every subsequent term with sequential letter annotations (A-L; 0 credits) until completion of thesis work.

The choice to register for BIOL 484 or BIOL 488 should be done in consultation with the thesis advisor to ensure that the total number of PhD thesis credits and PhD course credits are met as per AUB rules and regulations.

BIOL 491 Tutorial 2 cr.

Every term. Prerequisite: Consent of instructor. Students with an MS are exempted. Cannot be repeated for credit. Graded: Pass/No Pass (or Fail).

BIOL 492 Tutorial 3 cr.

Every term. Prerequisite: Consent of instructor. Students with an MS are exempted. Cannot be repeated for credit. Graded: Pass/No Pass (or Fail).

BIOL 493/493A CMBL Seminar 1 cr./0 cr.

Students enrolled in the CMBL program present research findings. Prerequisite: Enrollment in CMBL program. Academic credit will be received only once during the first year; subsequent terms will be recorded but not credited. Graded: Pass/No Pass (or Fail).

BIOL 494 CMBL Laboratory Rotation 3 cr.

Students taking this course will be conducting a small research project in any area pertinent to the field of Cell and Molecular Biology. The research has to be conducted in two different laboratories under the supervision of a faculty member from the Biology Department. The supervisor should ensure that the student receives the necessary training in safety and technical issues required for the successful progress of the project and that the work involved meets the ethical criteria set by AUB Human Research Protection Program and Institutional Animal Care and Use Committee (IACUC). Graded: Pass/No Pass (or Fail).

Sample Student Programs of Study

BS holder working for MS (21 cr.)		**BS holder working for PhD (36 cr.)**	
First term		**First term**	
BIOL 315	3 cr.	BIOL 315	3 cr.
BIOL elective	3 cr.	BIOL 330	3 cr.
BIOL 393	1 cr.	BIOL 494	3 cr.
BIOL 391A	2 cr.	BIOL 493	0 cr.
	9 cr.		9 cr.
Second term		**Second term**	
BIOL 310	3 cr.	BIOL 310	3 cr.
BIOL elective	3 cr.	BIOL 332	3 cr.
BIOL elective	3 cr.	BIOL 491	2 cr.
		BIOL 493	1 cr.
	9 cr.		9 cr.

Third term		**Third term**	
BIOL elective	3 cr.	BIOL 370	3 cr.
		BIOL 322	3 cr.
		BIOL elective	3 cr.
		BIOL 493A	0 cr.
	3 cr.		9 cr.
Fourth term		**Fourth term**	
		BIOL elective	3 cr.
		BIOL elective	3 cr.
		BIOL elective	3 cr.
		BIOL 493A	0 cr.
			9 cr.

AUB MS holder working for PhD (18 cr.)		**Non-AUB MS holder working for PhD (22 cr.)**	
First term		**First term**	
BIOL 330	3 cr.	BIOL 310	3 cr.
BIOL 332	3 cr.	BIOL 493	1 cr.
BIOL 494	3 cr.	BIOL 494	3 cr.
BIOL 493	0 cr.		
	9 cr.		7 cr.
Second term		**Second term**	
BIOL 322	3 cr.	BIOL 315	3 cr.
BIOL 370	3 cr.	BIOL 322	3 cr.
BIOL 493	1 cr.	BIOL 370	3 cr.
Elective	2 or 3 cr.	BIOL 493A	0 cr.
	9 or 10 cr.		9 cr.
Third term		**Third term**	
		BIOL 330	3 cr.
		BIOL 332	3 cr.
		BIOL 493A	0 cr.
			6 cr.

Department of Chemistry

Chairperson:	El-Rassy, Houssam T.
Professors:	Al-Ghoul, Mazen H.; Bouhadir, Kamal H.; El-Rassy, Houssam T.; Ghaddar, Tarek H.; Ghauch, Antoine R.; Halaoui, Lara I.; Hasanayn, Faraj A.; Kaafarani, Bilal R.; Patra, Digambara J.; Sultan, Rabih F.
Associate Professors:	Karam, Pierre M.; Hmadeh, Mohamad A.
Instructors:	Abi Rafii, Randa A.; Deeb, Hana H.; Sadek, Samar A.

MS in Chemistry

The department offers the MS degree in Chemistry. Graduate students may specialize in analytical, inorganic, organic or physical chemistry. Of the minimum 21 graduate course credits required for the MS degree, a minimum of 6 credits must be graduate courses in the concentration field of chemistry, and 6 credits must be graduate courses in chemistry outside the student's field of specialization. CHEM 361 is a requirement for all graduate students. A 9-credit thesis, CHEM 399, is required.

The research interests of the chemistry faculty include synthetic heterocyclic chemistry, synthesis of biomaterials for drug delivery and synthesis of carbocyclic DNA analogs; reactive intermediates; cage compounds; coordination and organometallic chemistry; supramolecular chemistry; photocatalysis; photo-electrochemistry of semiconductors; synthesis, assembly and physical properties of nanostructured materials; surface chemistry; irreversible nonequilibrium thermodynamics and statistical mechanics; nonlinear dynamics in chemistry; generalized hydrodynamics; chemical waves; patterns and fractals in precipitate and metal electro-deposition systems; laboratory and field investigations of atmospheric chemistry processes; design and synthesis of dyes for dye sensitized solar cells; self-assembled mono-layers (SAMs) of bioactive material and poly-peptides on metal surfaces; study of electronic structure of unsaturated transition metal complexes and their reactions; discotic liquid crystals; synthesis of electron-deficient materials for organic electronics and opto-electronics applications; organic light emitting diodes (OLEDs); organic field effect transistors (OFETs); organic solar cells; molecular recognition; solid-state stacking of organic materials; biocatalysis; control of inorganic phase growth; developing new probe molecules based on nanocapsules, nanocrystals, curcurmin and PAHs for physical and biophysical studies; fluorescence sensing and spectroscopic investigation on multi-component analysis and biosensor development; fluorescence spectroscopy, imaging and applications; hybrid solid materials; luminescence, solid surface room temperature phosphorescence (SS-RTP) and diffuse reflectance spectrometry (DRS); monitoring of organic and inorganic pollutants in industrial effluent under rigorous conditions; nanoscopy and single molecule studies in physical and biophysical chemistry; new methods for depollution of water contaminated by organic pollutants; photophysical and biophysical chemistry; probe chemistry; use of the reductive properties of Zero Valent Iron for the degradation of pesticides and chlorinated organic compounds in water; renewable energy, biosensing and photochemistry at the single molecule level.

Course Descriptions

CHEM 301 Structure of Inorganic Compounds 3.0; 3 cr.
Electronic absorption spectra of complex inorganic molecules; vibrational, NMR, NQR, EPR and Mössbauer spectroscopy; physical methods of determination of the structure of inorganic molecules. Annually.

CHEM 303 Chemistry of the Coordination Compounds 3.0; 3 cr.
Applications of Orgel and Tanabe-Sugano diagrams; factors affecting stability of coordination compounds; stereochemistry; trans-effect; stabilization of oxidation states; mechanisms of the reactions of coordination compounds; catalysis by coordination compounds. Annually.

CHEM 304 Mechanisms of Inorganic Reactions 3.0; 3 cr.
Mechanisms of substitution reactions in octahedral and square planar metal complexes; mechanisms of oxidation-reduction, metal ion catalysis and photochemistry; application of symmetry rules to inorganic reactions; fluxional molecules. Alternate years.

CHEM 311 Advanced Organic Chemistry 3.0; 3 cr.
Electronic interpretation of organic reactions; correlation of inductive, resonance and steric effects with reactivity of molecules; chemistry of carbocations, carbanions, carbenes, carbenoids and radicals as intermediates in characteristic organic reaction mechanisms. Annually.

CHEM 313 Physical Organic Chemistry 3.0; 3 cr.
Organic reactions mechanisms, linear free energy relationships, solvent and reagent correlations, isotope effects, catalysis in weak and strong acid and base medium, organic photochemistry and pericyclic reactions. Alternate years.

CHEM 314 Heterocyclic Chemistry 3.0; 3 cr.
A general survey of the synthesis and reactions of selected classes of heterocyclic compounds; spectroscopic properties and structural relationships. Alternate years.

CHEM 315 Chemistry and Technology of High Polymers 3.0; 3 cr.
An introduction to the chemistry of high polymers; types, mechanisms and kinetics of polymerization; structure, characterization and properties of macromolecules; preparation, processing and uses of the more common condensation and addition polymers used in plastics, elastomers and fibers. Alternate years.

CHEM 316 Chemistry of Synthetic Polymers for Biomedical Applications 3.0; 3 cr.
An introduction to the chemistry of synthetic polymers and their applications in the biomedical field; nomenclature, preparations, reactions, synthesis, mechanisms, characterization, biocompatibility and biodegradability. A general presentation of biomedical applications of synthetic polymers in bones, joints, teeth, artificial organs, synthetic skin, contact lenses, time-release drug delivery and gene delivery. Alternate years.

CHEM 317 Synthetic Organic Chemistry 3.0; 3 cr.
A survey of new reagents and synthetic procedures used in advanced organic synthesis; oxidation and reduction reagents in organic synthesis; protecting groups; carbon-carbon bond formation; functional groups inter-conversions. Alternate years.

CHEM 321 Quantum Chemistry 3.0; 3 cr.
Wave mechanics, solutions of time-independent Schrödinger equation, particle in a box, harmonic oscillator, angular momentum, H-atom, atomic orbitals, variational theorem, perturbation theory, polyelectronic atoms, Slater determinants, term symbols, Hückel MO theory, electronic wave functions, SCF and CI calculations. Alternate years.

CHEM 322 Statistical Thermodynamics 3.0; 3 cr.
General statistical mechanics of independent particles; partition functions for atoms and molecules, and simple chemical equilibria; heat capacities of solids, configuration of polymers, ensembles, theory of imperfect gases and mixtures, lattice statistics, irreversible processes. Alternate years.

CHEM 323 Chemical Kinetics 3.0; 3 cr.
Rate analysis, modern experimental techniques, theories of chemical kinetics, selected topics in gas phase and solution kinetics, characterization of transition states by ab- initio methods. Alternate years.

CHEM 324 Electrochemistry 3.0; 3 cr.
Fundamentals and applications of electrochemistry. Overview of electrode processes, potentials and thermodynamics of cells; kinetics of electrode reactions; Marcus microscopic theory for charge transfer; treatment of mass transfer by migration and diffusion; electrochemical techniques including potential step methods, potential sweep methods, and hydrodynamic methods; electrode reactions with coupled homogeneous chemical reactions; instrumentation. Alternate years.
CHEM 325 Molecular Spectroscopy 3.0; 3 cr.
Review of basic quantum mechanics; fundamental features of spectroscopy and experimental methods; atomic spectra; diatomic molecules; rotational spectroscopy; vibrational spectroscopy; electronic spectroscopy; polyatomic molecules; direct product representations and selection rules; re-emission of energy by excited molecules; fluorescence; fluorescence spectra; molecular beams and lasers. Alternate years.

CHEM 327 Electrochemistry: Fundamentals and Applications in Sustainable Energy Systems 3.0; 3 cr.
This course introduces the fundamental principles and techniques of electrochemistry and its applications in renewable energy technologies. The course covers the fundamentals of electrochemical cells, electrochemical thermodynamics, and kinetics of electrode reactions, essential electrochemical methods, and the principles and processes of applications in energy conversion and storage, such as photoelectrochemical solar cells, photocatalysis, electrocatalysis, fuel cells, batteries, supercapacitors, and artificial photosynthesis. Credits cannot be given for both chem 227 and chem 327.

CHEM 331 Chemical Instrumentation for Environmental Analysis 3.0; 3 cr.
Qualitative and quantitative analytical methods; ultraviolet (UV) and infrared (IR) spectroscopy; atomic absorption (AA) and emission spectroscopy; introduction to chromatographic separations. Designed for the Master's Degree Programs in Environmental Sciences. Annually.

CHEM 332 Chemical Separations in Environmental Analysis 3.0; 3 cr.
Fundamentals of analytical separations; distribution methods in discrete stages; methods in continuous stages; chromatographic methods: GC, HPLC, SFC; non- chromatographic methods: electrophoresis, field-flow fractionation, size exclusion; recent innovations. Designed for the Master's Degree Programs in Environmental Sciences. Annually.

CHEM 351 Special Topics 3 cr.
May be repeated for credit with consent of the department.

CHEM 361 Tutorial 3 cr.
A tutorial that should be taken during a student's second or third term of graduate studies, but not during a summer session. Students taking CHEM 361 are required to submit written reports to their advisors and to present a seminar to the students and faculty of the department. CHEM 361 is required of all graduate students in the department.

CHEM 395A Comprehensive Exam 0 cr.
Prerequisite: Consent of advisor.

CHEM 399 Thesis 9 cr.
Thesis

Department of Computer Science

Chairperson:	Safa, Haidar H.
Professors:	El-Hajj, Wassim; Safa, Haidar H.
Associate Professors:	Abu Salem, Fatima K.; Elbassuoni, Shady; Khabbaz, Maurice
Assistant Professors:	Assaf, Rida; El Hajj, Izzat; Mouawad, Amer
Senior Lecturer:	Jureidini, Wadi' N.
Lecturers:	Kobeissi, Mohamed A.; Raheel, Saeed
Instructors:	Aoude, Loa; Fatairi, Nour

The Department of Computer Science offers a program leading to the degree of Master of Science (MS) in Computer Science. For more information about the department, visit https://website.aub.edu.lb/fas/cs/Pages/index.aspx.

Mission Statement

The Department of Computer Science at the American University of Beirut prepares students for advanced studies and professional careers in the dynamically changing world of computing and information technology. Our programs combine the theoretical foundations of computing with the practical knowledge of software development vital to industry, to provide broad and integrated curriculums.

The department offers a Bachelor of Science (BS) degree in computer science, designed to be completed typically in three years after the freshman year. It also offers a Master of Science (MS) program designed to provide advanced and specialized education in computing, offered in formats that meet the needs of both working professionals and full-time students.

The department has vigorous research programs in theoretical computer science, systems, machine learning and data science, and software engineering. Our faculty members are committed to contributing to the advancement of the field of computing through scholarly activities, in which our students play a vital role.

MS in Computer Science

In addition to the university requirements for graduate study in the Faculty of Arts and Sciences, students must complete: (1) 21 credits of coursework and a thesis (thesis option), (2) 27 credits of coursework and a project (project option), or (3) 30 credits of course work (course-based option). For all options, the student must take 3 credits of coursework from each of the following 3 categories (9 credits in total): theory, systems, and applications. The remaining credits (12 for the thesis option, 18 for the project option, and 21 for the course-based option) are normally CMPS courses numbered 310 and above to be taken in coordination with the student's advisor. For more information about the program, visit https://website.aub.edu.lb/fas/cs/Pages/index.aspx.

Course Descriptions

CMPS 301 Programming and Computational Thinking 3.0; 3 cr.
This course provides students with a brief introduction to many topics in computer science and prepares them to teach programming and computational thinking in schools. The class will use the Python programming language.

CMPS 302 Computing Systems 3.0; 3 cr.
This is a computer science course that introduces students to computers and to their role in society. Topics covered include the principles of computer operations from both the hardware and software perspectives, basic networking concepts, web authoring concepts including HTML, cascading style sheets, and data manipulation using spreadsheets and databases.

CMPS 303 Gaming and Robotics 3.0; 3 cr.
The objective of this course is to use proven research-based best practices to improve the integration of science, technology, engineering, and mathematics to help students master rigorous, real-world learning experiences including gaming, robotics, and design technology.

CMPS 314 Design and Analysis of Algorithms 3.0; 3 cr.
A course that studies advanced data structures and algorithms, with an emphasis on the design of algorithms. Topics include advanced graph and search algorithms, dynamic programming, amortized analysis, parallelism, greedy and approximate algorithms, string and pattern matching, computational geometry and an introduction to the class of NP-complete problems. This course was previously numbered CMPS 356. Annually.

CMPS 315 Complexity Theory 3.0; 3 cr.
Complexity theory studies the power and limitations of efficient computation. It addresses questions related to what can be computed when we bound resources such as time, memory, randomness, communication, and parallelism. These questions are generally widely open and many surprising connections exist between them. Topics include randomized algorithms, bounded-space algorithms, Savitch's Theorem, Immerman-Szelepcsényi's Theorem, the PCP Theorem and its connections to hardness of approximation, interactive proofs and IP = PSPACE, hardness vs. randomness, hardness amplification, introduction to parameterized complexity, circuit complexity, and hardness within P. Prerequisite: Consent of Instructor.

CMPS 316 Algorithmic Graph Theory 3.0; 3 cr.
Algorithmic graph theory is a central area that lies at the intersection of mathematics and computer science. At the heart of it are graphs, which are mathematical structures that are used to model relations between objects, together with algorithms used to manipulate these models. Algorithmic graph theory is used to model many types of relations and dynamics in physical, biological, and even social systems. This course helps students develop the mathematical underpinnings of the theory of graphs and graph algorithms by providing an introduction to an exciting area having applications in many fields including mathematics, computer science, engineering, physics, biology, economics, and many others. Prerequisite: Consent of Instructor.

CMPS 317 Parameterized Complexity 3.0; 3 cr.
This course is designed to provide students with an understanding of the principles and techniques used in the design and analysis of parameterized/kernelization algorithms. Topics include kernelization, bounded search trees, iterative compression, randomization, and graph minors. The course is primarily theoretical and does not require programming, but it does require understanding of the notion of a mathematical proof, knowledge of discrete mathematics and graphs, and mathematical problem-solving skills. We shall discuss and analyze a variety of algorithms chosen for their importance and their illustration of fundamental concepts. If time permits, we shall also spend some time exploring the boundary between

feasible computations and infeasible computations beyond P vs NP (e.g., W-hardness, ETH, and SETH). Prerequisite: Consent of Instructor.

CMPS 323 Parallel Computing 3.0; 3 cr.
A course that discusses the design, analysis and implementation of algorithms for parallel computers. Topics include selection, merging, sorting, searching, matrix computations, numerical problems and fast Fourier transforms. Students develop skills in designing parallel algorithms and analyzing their asymptotic running time and memory requirements, and develop medium-sized parallel codes using modern languages and libraries. This course was previously numbered CMPS 373. Annually.

CMPS 332 Compiler Construction 3.0; 3 cr.
Graduate students may be required to do extra reading, a term paper and/or an additional project. Same as CMPS 232. This course was previously numbered CMPS 374. Annually.

CMPS 342 Advanced Computer Networks 3.0; 3 cr.
This course enhances students' knowledge about up-to-date networking topics and improves their research skills in the field. It reviews the major protocols of TCP/IP stack then introduces modern Internet routing, IP multicasting, quality of service, Internet telephony, IPv6, MPLS, etc. The course also covers the architectures of wireless local area networks (IEEE 802.11), mobile IP networks, Mobile Ad hoc Networks (MANETS), GSM and its evolution to UMTS then LTE, Internet of Things and Wireless Sensor Networks. Although the course is a lecture-based course, discussions are always encouraged. To prepare you to conduct independent research, the course contains a term research project in which students working in small groups select a related research topic to survey, identify existing problems, and try to propose solutions. This course was previously numbered CMPS 384. Annually.

CMPS 345 Distributed Systems 3.0; 3 cr.
A distributed system consists of a set of nodes located at networked computers and communicates only by passing messages. This course provides techniques to abstract, design and implement efficient, scalable and fault-tolerant distributed systems. Topics include, but are not limited to, inter-process communication, distributed synchronization and consensus (e.g., paxos, blockchain), fault-tolerance, distributed file systems (e.g., HDFS), and Hadoop ecosystem. This course was previously numbered CMPS 375. Annually.

CMPS 350 Discrete Models for Differential Equations 3.1; 3 cr.
A detailed study of methods and tools used in deriving discrete algebraic systems of equations for ordinary and partial differential equations: finite difference and finite element discretization procedures; generation and decomposition of sparse matrices, finite-precision arithmetic, ill-conditioning and pre-conditioning, Scalar, vector and parallelized versions of the algorithms. The course includes tutorial "immersion" sessions in which students become acquainted with state-of-the-art scientific software tools on standard computational platforms. Prerequisites: Linear algebra and the equivalent of MATH/CMPS 251 (which can be taken concurrently) or upon consent of the instructor. Same as MATH 350. Occasionally.

CMPS 351 Optimization and Nonlinear Problems 3.1; 3 cr.
A study of practical methods for formulating and solving numerical optimization problems that arise in science, engineering and business applications. Newton's method for nonlinear equations and unconstrained optimization. Simplex and interior-point methods for linear programming. Equality and inequality-constrained optimization. Sequential quadratic programming. Emphasis is on algorithmic description and analysis. The course includes an implementation component where students develop software and use state-of-the-art numerical libraries. Same as MATH 351. Annually.

CMPS 354 The Finite Element Method 3.0; 3 cr.
A course that presents the theoretical foundations of the finite element method and some of its applications to partial differential equations. Topics include Sobolev spaces, existence and uniqueness of weak solutions and the Lax-Milgram lemma, regularity of weak solutions and a priori estimates, the Galerkin method, piecewise polynomial approximations, approximating solutions of boundary value problems for elliptic equations, and initial value problems for parabolic and hyperbolic equations. Occasionally.

CMPS 358 Introduction to Symbolic Computing 3.0; 3 cr.
Introductory topics in computer algebra and algorithmic number theory that include fast multiplication of polynomials and integers, fast fourier transforms, primality testing and integers factorization. Applications to cryptography and pseudo-random number generation. Linear algebra and polynomial factorization over finite fields. Applications to error-correcting codes. Introduction to Grobner bases. Same as MATH 358. Occasionally.

CMPS 359 Special Topics in Computational Science 3.0; 3 cr.
A course on selected topics in computational science, which change according to the interests of visiting faculty, instructors and students. Selected topics cover state-of-the-art tools and applications in computational science. Prerequisite: Consent of instructor. Same as MATH 360. This course was previously numbered CMPS 360. Occasionally.

CMPS 364 Advanced Machine Learning 3.0; 3 cr.
This course focuses on Deep Learning and its applications. Deep Learning has revolutionized the field of Machine Learning and has turned Artificial Intelligence from a research endeavor into an actual reality. In this course, students will learn about the fundamentals of Deep learning, and how to build Deep Learning models for various real-world applications, particularly in Computer Vision and Natural Language Processing. This course was previously numbered CMPS 392. Annually.

CMPS 365 Information Retrieval and Web Search 3.0; 3 cr.
This course introduces graduate-level students to the basics of information retrieval, and the models and algorithms underlying modern search engines. Topics covered include: crawling; indexing; Boolean and vector space retrieval models; probabilistic information retrieval models; language models; top-k query processing; evaluation of information retrieval systems; relevance feedback; link analysis; latent semantic analysis; and information extraction. This course was previously numbered CMPS 391 Occasionally.

CMPS 371 Advanced Software Engineering 3.0; 3 cr.
A course on state-of-the-art software engineering for large distributed and concurrent systems. Fundamental principles and concepts for specifying, designing, analyzing, implementing and testing such systems; Concurrent object-oriented paradigms; Design patterns; Use of tools; Documentation using both formal and informal descriptions. Students will develop at least one large software system as part of the course. This course was previously numbered CMPS 363. Annually.

CMPS 385 Advanced Computer Graphics 3.0; 3 cr.
A course that presents the basic concepts of 3D computer graphics. Topics include 3D object representations and manipulations, 3D transformation and viewing, hidden-surface and hidden-line removal, shading models, rendering, texture mapping, raytracing and animation techniques. Occasionally.

CMPS 386 Computer-Aided Geometric Design 3.0; 3 cr.
Graduate students taking the course are assigned extra work in the form of outside reading, a term paper and/or an additional project. Same as CMPS 286. Occasionally.

CMPS 388 Computer Animation 3.0; 3 cr.
A course that introduces the basic techniques and algorithms in computer animation. Topics include: history and applications of computer animation, modeling, interpolation, key framing, morphing, deformation, forward and inverse kinematics, particle systems and rigid body dynamics. Occasionally.

CMPS 395A Comprehensive Exam 0 cr.
Prerequisite: Consent of advisor.

CMPS 396 Special Topics in Computer Science 1 - 3 cr.
A course in which topics may vary each term and are expected to be in areas of active research. Students may register for this course twice (or more) on condition that course content differs. Prerequisite: Consent of instructor. Annually.

CMPS 397 Computer Science Tutorial 1 - 3 cr.
May not be repeated for a credit.

CMPS 398 Project 3 cr.
Project

CMPS 399 Thesis 9 cr.
Thesis

Department of Earth Sciences

Chairperson:	Doummar, Joanna J.
Professor:	Abdel-Rahman, Abdel-Fattah M.
Associate Professors:	Doummar, Joanna J.; Salah, Mohamed K.
Assistant Professors:	Haidar, Ali T; Nemer, Tony.
Instructors:	Khadra, Wisam M.; Oueida, Raghida S.

MS in Geology

Candidates pursuing the Master of Science program in Geology must complete seven graduate courses (21 cr.) and a thesis (9 cr.). Students may select courses from the graduate courses offered in the department according to their fields of interest.

Course Descriptions

GEOL 303 Geochemistry 3.0; 3 cr.
An application of chemical concepts to the evolution of the Earth, particularly its weathering, magmatic and metamorphic cycles, and the distribution of elements; cosmochemistry, crystal chemistry and aqueous geo-chemistry. Prerequisite: GEOL 211.

GEOL 304 Geophysics I 3.0; 3 cr.
An introduction to seismic, gravitational and magnetic methods and their interpretation procedures and applications in the exploration of petroleum and other natural resources.

GEOL 305 Geophysics II 3.0; 3 cr.
A course on electrical, radiometric and thermal geophysical methods, in addition to well logging for general geophysical applications and their methods of interpretation. Pre- or corequisites: GEOL 221 and GEOL 222.

GEOL 306 Economic Minerals Geology 3.0; 3 cr.
A course on the occurrence and classification of mineral ore deposits and theories of their formation; ore forming processes and ore deposit models; advanced techniques to evaluate ore genesis; and mineral exploration techniques. Prerequisite: GEOL 211.

GEOL 307 Advanced Petroleum Geology 3.0; 3 cr.
A course that covers the origin, migration and accumulation of petroleum; applications of surface and subsurface geological and geophysical exploration methods, production, and development processes; and Middle East hydrocarbon exploration and development.

GEOL 308 Alternate Energy Sources 3.0; 3 cr.
A course on energy and energy use, including a detailed treatment of non-fossil fuel energy options including nuclear, biomass, hydro, wind, solar and geothermal methods, with practical applications.

GEOL 310 Global Tectonics 3.0; 3 cr.
A course on large-scale processes of rock deformation within the Earth, the theory of plate tectonics, and the origins and modes of deformation of major tectonic features. These include ocean ridges and continental rifts, transform and transcurrent faults, subduction zones and mountain ranges. Prerequisite: GEOL 213.

GEOL 313 Photogeology 2.2; 3 cr.
A course on the principles of air photo interpretation and remote sensing; the construction of planimetric geological maps, profiles and mosaics from vertical photographs using pocket and mirror stereoscopes, and an introduction to the analysis of satellite imagery.

GEOL 317 Micropaleontology 2.2; 3 cr.
An introduction to the study of the main groups of microfossils, with emphasis on the foraminifera, and their application and techniques in preparation for examination.

GEOL 318 Hydrogeology 3.0; 3 cr.
A course on the fundamentals of hydrogeology; groundwater occurrence, movement, development and management; pumping tests; and groundwater chemistry, quality and contamination.

GEOL 319 Geostatistics 2.2; 3 cr.
This course deals with the study and application of different statistical techniques of interest to the geological sciences. Topics to be covered include analysis of sequences of data, map analysis and analysis of multivariate data. Prerequisite: GEOL 213 or consent of instructor.

GEOL 320 Graduate Seminar 3.0; 3 cr.
Seminar given by the department. Graduate students attending the course are required to cover a particular theme on one of the various aspects of the geology of the Middle East, such as earthquakes, tectonism and stratigraphy of the region, magmatism in the Nubian shield.

GEOL 321 Diagenesis I: Advanced Petrography of Sedimentary Rocks 3.0; 3 cr.
A course that covers some advanced petrographic techniques used in the study of sedimentary rocks (e.g., conventional and cathodoluminescence microscopy, scanning electron microscopy), major diagenetic processes and the resultant products in sedimentary environments. Prerequisites: GEOL 212, GEOL 214 and GEOL 222; or consent of instructor. Biannually.

GEOL 322 Diagenesis II: Advanced Techniques in Geochemistry of Sedimentary Rocks 3.0; 3 cr.
A course on the various geochemical methods (e.g., trace elements, stable isotopes, radiogenic isotopes, fluid inclusions and micro-thermometry) commonly used in the study of diagenesis of both carbonate and clastic reservoirs. Prerequisites: GEOL 212 and GEOL 222; corequisites: GEOL 214 and GEOL 222; or consent of instructor. Biannually.

GEOL 323 Geological Oceanography 3.0; 3 cr.
A general introduction to climatic and oceanographic interactions, characteristics of oceans, and a detailed analysis of near shore and coastal environments.

GEOL 324 Engineering Geology I 2.2; 3 cr.
A course on engineering geology and earth materials that focuses on the interaction between engineering and geology in relation to the geotechnical properties of soil and rock mechanics and site investigations.

GEOL 325 Engineering Geology II 3.0; 3 cr.
A course on environmental and applied engineering geology that deals with environmental planning, natural disasters and terrain evaluation, with special applications to mass movements, geology of man-made structures and the urban environment.

GEOL 330 Selected Topics in Advanced Geology 3 cr.
May be repeated for credit.

GEOL 395A/B Comprehensive Exam 0 cr.
Prerequisite: Consent of advisor.

GEOL 399 MS Thesis 9 cr.
Prerequisite: Consent of advisor.

Department of Economics

Chairperson:	Neaime Simon E.
Professor Emeritus:	Makdisi, Samir
Professor:	Neaime, Simon E.
Associate Professor:	Salti, Nisreen I.
Assistant Professors:	Abboud, Ali; Tuncay, Muhammed Alparslan; Yamout, Nadine
Lecturers:	Bou Nassar, Makram; Ramadan, Usamah H.
Instructors:	El Baba, Nora; El-Khalil, Iyad A.; Hamdan, Dana; Kanaan, Maya Z.; Makki, Ghina; Makki, Malak, Z.; Nader, Pamela; Rbeiz, Sylvia; Sabra, Raja

The department offers two master's degree programs, which include a Master of Arts in Economics and a Master of Arts in Financial Economics.

Candidates for both master's degrees should hold a BA in economics. For holders of other bachelor's degrees (or their equivalent), candidates should complete the following undergraduate courses or their equivalent: ECON 214, ECON 217, ECON 227, MATH 201 and MATH 202. Moreover, all applicants must submit an official GRE or GMAT score with the application.

MA in Economics

Students wishing to obtain a Master of Arts in Economics (MAE) are required to complete at least 24 credits, all of which should be at the graduate level, including ECON 305, ECON 317 and ECON 327, plus a 6-credit thesis. Of the remaining 15 graduate credits, at least 9 credits should be chosen from the available graduate courses in the department, and up to 6 credits may be chosen from available graduate courses at the university with the advisor's approval. In case of deficiencies in the student's undergraduate record, the department may require additional credits. Students are also required to pass the comprehensive exam.

Faculty in the Department have a wide range of research interests covering, among others, labor economics, theory-based and applied macroeconomics, financial economics, behavioral economics and economic methodology, public economics and the political economy of development.

ECON 301 Graduate Tutorial 3.0; 3 cr.
May not be repeated for credit. Occasionally.

ECON 303 Graduate Seminar 3.0; 3 cr. (each)
Occasionally.

ECON 305 Econometrics I 3.0; 3 cr.
Parameter estimation and hypothesis testing within the framework of the classical linear regression model. Subjects covered include general least squares and its applications (e.g. heteroskedasticity, autocorrelation, multivariate regression), GMM estimation, simultaneous equation models and panel data models. Annually.

ECON 306 Econometrics II 3.0; 3 cr.
Dynamic models, structural VARs (impulse response, variance decomposition), cointegration and error correction models, ARCH models, and forecasting methods. The course has a strong empirical component. Prerequisite: ECON 305. Annually.

ECON 307 Urban Economics 3.0; 3 cr.
A study of the development and growth of urban areas and analysis of specific urban issues such as pollution, housing, land use and public transportation. Occasionally.

ECON 317 Microeconomic Theory I 3.0; 3 cr.
Theory of demand and theory of consumer's choice: choice under uncertainty, theory of production and theory of costs, market equilibrium and market failure, externalities and the public good. Annually.

ECON 318 Topics in Behavioral Economics 3.0; 3 cr.
An introduction to behavioral and experimental methods; description of evidence collected in the laboratory and in the field; a comparison of the assumptions and predictions of the benchmark neoclassical model to the more recent and complex behavioral models. One of the following three areas will be covered: behavioral finance, behavioral game theory, or experimental markets. Occasionally.

ECON 326 Public Economics 3.0; 3 cr.
A study of the theories of governmental taxation and spending, budgetary policies and their effects on the level of economic activity, welfare effects of taxation and expenditure policies. Occasionally.

ECON 327 Macroeconomics 3.0; 3 cr.
A study of macroeconomic theory including the classical and New Keynesian macroeconomic models, theories of intertemporal consumption and saving, investment dynamics, business cycle analysis and economic growth, inflation and unemployment trade-offs, monetary and fiscal policy, and macroeconomic stabilization. Annually.

ECON 328 Monetary Economics 3.0; 3 cr.
This is an advanced course on monetary economics based on a general equilibrium approach. Topics include models of money demand such as money-in-the-utility function and cash-in-advance models, New Keynesian monetary economics, and public finance and inflation. Annually.

ECON 332 Political Economy of Development 3.0; 3 cr.
Studies the role of factors such as geography, historical path dependence, institutions and culture in determining economic growth; introduces the basic tools of political economics; studies models of governance and mis-governance and the role of institutional failure; examines empirical issues in validating the effect of institutions and culture on economic outcomes. Occasionally.

ECON 333 Energy Economics and Policy 3.0; 3 cr.
A study of the theories related to energy economics, such as economics of natural and energy resources, and the interrelationship between energy, economics and the environment, as well as some important issues in energy policy. Students cannot receive credit for both ECON 333 and MECH 674. Occasionally.

ECON 335 International Trade Theory 3.0; 3 cr.
An intensive examination of the theory of comparative advantage: the classical and Heckscher-Ohlin statements, trade and welfare, tariffs, recent contributions to trade theory. Occasionally.

ECON 336 International Monetary Economics 3.0; 3 cr.
An intensive examination of the theories of balance of payments adjustment, the international monetary system and the position of the developing countries in it. Occasionally.

ECON 338 Economics of Natural Resources and the Environment 3.0; 3 cr.
An analysis of economic issues regarding the efficient use of natural resources and the management of environmental quality. Occasionally.

ECON 339 Mathematical Economics 3.0; 3 cr.
General equilibrium theory, linear programming and dynamic optimization, economic dynamics, difference and differential equations, and the economics of uncertainty and information. Prerequisites: ECON 239 and either MATH 218 or MATH 219. Occasionally.

ECON 395A Comprehensive Exam 0 cr.
Prerequisite: Consent of advisor.

ECON 390 Special Topics in Economics 3.0; 3 cr.
May be repeated for credit. Occasionally.

ECON 399 Thesis 6 cr.
Thesis.

MA in Financial Economics

Students wishing to obtain a Master of Arts in Financial Economics (MAFE) are required to complete at least 27 credits, all of which should be at the graduate level, plus a 3-credit project. The coursework includes eight required courses (listed below) and one elective. In case of deficiencies in the student's undergraduate record, the department may require additional credits. Students are also required to pass the comprehensive exam.
The research interests of the faculty include macro-finance, industrial organization, international economics, applied econometrics, financial economics, financial econometrics, macroeconomics, monetary economics, energy economics and time-series econometrics.

ECON 305 Econometrics I 3.0; 3 cr.
Parameter estimation and hypothesis testing within the framework of the classical linear regression model. Subjects covered include general least squares and its application (e.g. heteroskedasticity, autocorrelation, multivariate regression), GMM estimation, simultaneous equation models and panel data models. Annually.

ECON 317 Price Theory I 3.0; 3 cr.
Theory of demand and theory of consumer's choice: choice under uncertainty, theory of production and theory of costs, market equilibrium and market failure, externalities and the public good. Annually.

ECON 327 Macroeconomics 3.0; 3 cr.
A study of macroeconomic theory including the classical and New Keynesian macroeconomic models, theories of intertemporal consumption and saving, investment dynamics, business cycle analysis and economic growth, inflation and unemployment trade-offs, monetary and fiscal policy, and macroeconomic stabilization. Annually.

ECON 328 Monetary Economics 3.0; 3 cr.
This is an advanced course on monetary economics based on a general equilibrium approach. Topics include models of money demand such as money-in-the-utility function and cash-in-advance models, New Keynesian monetary economics, and public finance and inflation. Annually.

ECON 340 Asset Pricing I 3.0; 3 cr.
A primer in asset pricing emphasizing the underlying economic theory and recent empirical results; surveys the major asset pricing theories, tools, and results and portfolio choice. The course presents a general framework for pricing (financial) assets, and the economic foundations for how individual preferences impact these prices. The course also covers the role of financial markets in sharing risk in the economy and presents recent empirical evidence on the determinants of asset returns. Topics include pricing of stocks and bonds, portfolio theory, and the operation and efficiency of financial markets. Occasionally.

ECON 341 Corporate Finance I 3.0; 3 cr.
This course provides strong foundations in the principles of corporate finance. Theoretical and empirical models dealing with economic aspects of corporate finance and the financial decisions of firms are examined. Topics covered include debt and equity financing, the bankruptcy process, the costs of financial distress, and firm financing constraints and business cycles. Occasionally.

ECON 342 Asset Pricing II: Options and Derivatives Instruments 3.0; 3 cr.
An analysis of basic derivative contracts such as forwards, futures, options and swaps; contract characteristics, payoffs from various strategies, as well as hedging arbitrage; and speculation activities using derivatives are analyzed. Annually.

ECON 395A Comprehensive Exam 6 cr.
Prerequisite: Consent of advisor.

Electives (one course: 3 credits)

One elective course is chosen from the following list in consultation with the faculty advisor. Other electives may alternatively be chosen from available graduate courses at the university with the advisor's approval.

ECON 336 International Monetary Economics 3.0; 3 cr.
An intensive examination of the theories of balance of payments adjustment, the international monetary system and the position of the developing countries in it. Occasionally.

ECON 344 Financial Markets and Institutions 3.0; 3 cr.
An analysis of the institutional features of the international financial markets, instruments and application of financial economic theory, and analytical tools to achieve effective and efficient risk management in international environments. Occasionally.

ECON 345 International and Arab Emerging Financial Markets 3.0; 3 cr.
Case studies and exercises of portfolio selection and management in selected Middle Eastern countries. Occasionally.

ECON 346 Advanced Futures and Options 3.0; 3 cr.
An analysis of pricing in continuous-time of contingent claims securities and a broad category of derivative instruments and investment strategies. Prerequisite: ECON 342. Occasionally.

ECON 347 Economic Forecasting 3.0; 3 cr.
A course that provides training in methods of forecasting used in commercial enterprises. This course also introduces the methods of macroeconomic forecasting. Occasionally.

ECON 348 Advanced Monetary Economics 3.0; 3 cr.
An examination of recent monetary economic developments intended to equip students with the technical details and workings of monetary economic models. Prerequisite: ECON 328. Occasionally.

ECON 355 Corporate Finance II 3.0; 3 cr.
This course selects topics in corporate finance. The financial landscape is rapidly evolving in the wake of the global financial crisis. Many of the themes of Corporate Finance II have special relevance today: the pros and cons of debt financing, the bankruptcy process, the costs of bankruptcy, and the role of private equity. Examining these issues will provide a holistic view of finance, capital markets, and the role of financial intermediaries.

ECON 356 Special Topics in Financial Economics 3.0; 3 cr.
May be repeated for credit. Occasionally.

ECON 357 Special Topics in Monetary Economics 3.0; 3 cr.
May be repeated for credit. Occasionally.

ECON 398 Project 3 cr.
Project.

Transfers Between the Two Programs

Students wishing to transfer from one program to another can do so after obtaining departmental approval and can be given credit for courses already passed that fall within the requirements of the other program.

Transfers between the two programs are permitted subject to the following:

Students enrolled in the MAE program who wish to transfer to the MAFE program are given credit for ECON 305, ECON 317, ECON 327 and ECON 328 if completed prior to the transfer. The four courses are required under the MAFE program.

Credit may be given for two other graduate courses completed under the MAE program.

With the above courses completed, this leaves 15 credits of additional required coursework (plus the project) to be completed to graduate with an MAFE. Any incomplete courses among the above-mentioned need to be completed. The remaining elective course(s) are chosen in consultation with the student advisor.

Students enrolled in the MAFE program who wish to transfer to the MAE program must complete ECON 317, ECON 327 and ECON 305. If completed prior to the transfer, these classes constitute part of the course requirements toward the MAE. With the completion of these three courses, the transferring student needs to complete an additional 15 credits of coursework, plus the thesis.

Department of Education

Chairperson:	Karami-Akkary, Rima R.
Professors:	BouJaoude, Saouma B.; Ghaith, Ghazi M.; Khamis, Vivian E.
Professors Emeritus	Bashshur, Munir
Associate Professors:	Al-Hroub, Anies M.; Amin, Tamer G.; Baytiyeh, Hoda M.; El Hassan, Karma; El-Mouhayar, Rabih R.; Karami-Akkary, Rima R.; Khishfe, Rola F.
Assistant Professor:	Khalil, Lina
Lecturers:	BouZeineddine, Amal R.; El Khatib, Lara; Hout, Hanin; Karameh, Jinan; Mouawad, Rim; Osman, Enja; Shukri Balaa, Rola
Instructor:	Jouni, Nidal

The Department of Education offers programs at both the undergraduate and graduate levels. The undergraduate level program leads to a Bachelor of Arts degree. The post-BA Diploma Program leads to a Teaching Diploma, Diploma in Special Education, or Diploma in Educational Management and Leadership. The graduate program leads to a Master of Arts degree in Education.

MA in Education

The MA in Education aims to prepare students for further graduate study as well as to improve their professional practice. The program addresses the needs and interests of beginning and experienced teachers and other interested persons whose objective is to advance their knowledge of educational practice in schools. The MA program also prepares students for admission to doctoral study in a variety of related fields, such as educational psychology, research methodology, administrative and policy studies, and instruction and learning of subject matter in a variety of content areas.

The MA program comprises the following areas of concentration:

- Educational Foundations and Policy Studies (not offered at present)
- Educational Psychology (Tests and Measurement or School Guidance and Counseling)
- Educational Administration and Policy Studies
- Elementary Education
- Mathematics Education
- Science Education
- Teaching of English as a Foreign Language (TEFL)

Prerequisites

Students may pursue their studies toward the MA in Education in any one of the areas of concentration above provided they meet the department and university requirements for admission to graduate work. The department prerequisites include a teaching diploma or equivalent professional certification. For Educational Administration and Policy Studies, a minimum of one year of relevant professional experience is required. However, and at the discretion of the department, students may be exempt from all or part of the teaching diploma requirements based on professional experience and/or previously completed graduate

coursework. In case of deficiencies in undergraduate preparation, a student may be required to complete other prerequisite courses, such as courses in the relevant subject matter before full admission to the program. For university admission requirements for all graduate students, refer to the Admissions section in this catalogue.

Requirements

The program includes a minimum of 21 credits and a thesis. A non-thesis option, which includes a minimum of 27 credits of course-work plus a 3-credit project, is also available. All MA candidates are required to complete the following two courses as a core program: EDUC 315; EDUC 321; and two graduate education electives or graduate courses relevant to the area of specialization as approved by the academic advisors. The balance of the program comprises primarily specialized courses related to the student's chosen area of concentration.

Course Descriptions

EDUC 301 Seminar in the History and Philosophy of Education 3.0; 3 cr.
A course on the development of educational thought and practice through primary sources. Systems of educational theory are examined from the age of Pericles to post-World War II, with special emphasis on contemporary educational practice. Annually.

EDUC 302 Seminar in the History and Philosophy of Arab Education 3.0; 3 cr.
A study of the development of Arab educational thought and practice through primary sources. Selected problems and representative thinkers from various periods are examined, beginning with Islam and ending in the early twentieth century. Alternate years.

EDUC 303 Determinants of Educational Policy 3.0; 3 cr.
An examination of forces underlying policy making in education based on a theoretical and case study approach; developing scenarios for improvements. Annually.

EDUC 305 Foundations of Science Education 3.0; 3 cr.
A study of the nature of science and its philosophical and sociological foundations with an emphasis on educational implications; psychological bases of concept-learning in science and the contributions of research to science education. Alternate years.

EDUC 306 Recent Developments in Science Education 3.0; 3 cr.
A study of recent developments in science curricula, methods of teaching, utilization of facilities, evaluation, and teacher education and supervision. Alternate years.

EDUC 307 Seminar: Problems and Innovations in Elementary Education 3.0; 3 cr.
A review and analysis of contemporary problems, innovations and trends in elementary education, organizational structures, teaching competencies, classroom logistics, student discipline and instructional improvement strategies. Alternate years.

EDUC 308 Educational Planning and Policy Studies 3.0; 3 cr.
Planning models at the micro level and applications in various countries; policy formulation, change and implementation issues as they relate to educational institutions and public and private educational systems. Annually.

EDUC 309 Foundations of Mathematics Education 3.0; 3 cr.
A study of the nature of mathematics and its philosophical, historical and sociological foundations, with emphasis on educational implications; psychological bases of concept learning in mathematics and the contributions of research in mathematics teaching. Alternate years.

EDUC 310 Recent Developments in Mathematics Education 3.0; 3 cr.
A study of recent developments in mathematics curricula, methods of teaching, utilization of instructional media, evaluation techniques, and teacher education and supervision. This course includes tryouts of some of these innovations in actual school situations. Alternate years.

EDUC 311 Seminar in Supervision of Instruction 3.0; 3 cr.
A seminar on the role of the supervisor as s/he works with teachers to improve instruction, and an examination of theoretical and practical aspects with special attention given to research in the field. Annually.

EDUC 313 Management and Organization Theories in Education 3.0; 3 cr.
An advanced theoretical study focusing on concepts of leadership, decision-making, group dynamics, and organizational behavior and change, with particular emphasis on research in the field. Annually.

EDUC 314 Comparative Education 3.0; 3 cr.
A study of theory and methods of comparative education, with an examination of schooling in a number of leading Western educational systems. This study concerns itself with historical, social, political and economic forces influencing and underlying these systems. Alternate years.

EDUC 315 Psychology of Education (Advanced) 3.0; 3 cr.
A comprehensive analysis of instructional theory, measurement skills, cognitive development, learning theory and methods of applying behavior modification in the classroom. Annually.

EDUC 316 Comparative Study of Education in Arab Countries 3.0; 3 cr.
A study of Arab educational systems, with a focus on their major problems in light of changing situations. Annually.

EDUC 317 Theory and Methods of Testing 3.0; 3 cr.
A study of theory and practice of test construction and use. The goal of this course is to build a broad background of information and skill for the proper evaluation of psychological tests and the correct interpretation and use of test results. A wide variety of tests are examined, with emphasis on major tests of intelligence and aptitude, achievement and personality. Alternate years.

EDUC 318 Test Construction in Education 3.0; 3 cr.
Development of testing techniques and skills for appraisal of the cognitive and affective objectives of instruction. Alternate years.

EDUC 319 Issues, Trends, and Applications in Measurement 3.0; 3 cr.
The course provides an overview of issues, both methodological and conceptual, in the field of measurement and evaluation, and current perspectives and future directions in both test theory and practice. It includes a practicum that focuses on developing students' skills in standardized test administrations, test scoring and score reporting. Alternate years.

EDUC 321 General Research Methodology in Education 3.0; 3 cr.
A course that aims at the development of a scientific orientation in the solution of educational problems. This course develops students' skills in identifying and developing research problems dealing with a variety of research designs. Basic statistical concepts are included. Annually.

EDUC 322 Applied Behavior Analysis 3.0; 3 cr.
An analysis of respondent, instrumental and social learning theory as well as the application of experimentally derived principles of learning to problems of educational and social significance. Annually.

EDUC 324 Principles and Practices of Teaching Reading and Literature 3.0; 3 cr.
Models of the reading process, research and pedagogical implications, and issues of comprehension and appreciation of literature. Annually.

EDUC 325 Principles and Practices of Teaching Writing and Composition 3.0; 3 cr.
A consideration of various current approaches to teaching writing and the relationship of language, logic, rhetoric and culture. Annually.

EDUC 326 Theory and Design of Curriculum 3.0; 3 cr.
An examination of the organization, scope and sequence of curricula, with special emphasis on various approaches to curriculum development. Annually.

EDUC 328 Seminar in TEFL 3.0; 3 cr.
A seminar on selected topics in linguistics, psychology, or instructional aids and technology, and the application to classroom problems of teaching and evaluation. Annually.

EDUC 329 Seminar in Education and Social Change 3.0; 3 cr.
A seminar on the different theories of social change, followed by an examination of the school system and the teacher as an agent of social change. Annually.

EDUC 330 Theories in Guidance and Counseling 3.0; 3 cr.
A survey of various theories and approaches to the study and practice of guidance and counseling. Annually.

EDUC 331 Field Experience in Guidance and Counseling 1.4; 3 cr.
Supervised experience in counseling in the school setting; observing, interviewing and testing as needed for educational and vocational objectives to meet pupil needs. Prerequisite: EDUC 330 or EDUC 322. Annually.

EDUC 332 Seminar in Educational Planning for Social and Economic Development 3.0; 3 cr.
Theory and practice of educational planning for social and economic development; techniques of assessing manpower needs and translating these into educational strategies and plans. Alternate years.

EDUC 333 Professional Development in Education 2.2; 3 cr.
Survey of major models of professional development used primarily in schools and other educational settings. Students gain experience designing, conducting and evaluating professional development for education practitioners. Includes a field-based experience and should be taken late in the program. Alternate years.

EDUC 334 Qualitative Research Methods in Education 3.0; 3 cr.
Aims primarily at developing students' skills in conducting cyclic, participative, qualitative and reflective research, with an emphasis on data collection and analysis methods. Alternate years.

EDUC 335 Curricula and Methodologies in Elementary Education Language Arts 3.0; 3 cr.
Recent research, curricular and methodological developments in elementary language arts education. Alternate years.

EDUC 336 Curricula and Methodologies in Elementary Education: Science and Math 3.0; 3 cr.
Recent research as well as curricular and methodological developments in elementary science and mathematics education. Alternate years.

EDUC 380 Graduate Tutorial in Education 3.0; 3 cr.
A course offered to students on an individual basis. The topic can include any aspect of educational studies which may vary from term to term. May not be repeated for credit. Occasionally.

EDUC 390 Special Topics 3.0; 1-3 cr.
A course that deals with special issues and concerns that are not included in regular courses. Topics offered during the last few years include the economics of education in Lebanon.

EDUC 398 Project 3 cr.
Project.

EDUC 395A Comprehensive Exam 0 cr.
Prerequisite: Consent of advisor.

EDUC 399 Thesis 9 cr.
Thesis.

Online Graduate Diploma in Online Education

The Graduate Diploma in Online Education is a unique program that delivers world-class AUB education in an online asynchronous format providing students with the flexibility to learn the foundations of online teaching and instructional design at their own pace. It is designed for working educators and aspiring instructional designers in the MENA region who want to learn how to design and develop active, collaborative, and engaging learning experiences catered to this digital age, while using the latest tools, techniques, and technologies.

As the first program of its kind in the region, the Graduate Diploma in Online Education delivers an innovative learning experience that will accelerate students' career growth and offer them a competitive edge in several high-demand fields by preparing them for roles in education, business, as well as non-profit and governmental organizations.

Candidates from all backgrounds are encouraged to apply as no previous experience is required for this diploma.

Admission Requirements:

This program is open to students from all backgrounds. Since this is a graduate diploma, applicants must possess a bachelor's degree in any field of study. The admission requirements are the same as the Faculty of Arts and Sciences' requirements for a Master's degree admission:

- An undergraduate GPA of at 3.3 (or standardized equivalent) in the major field of study and a cumulative GPA of at least 3.0 (or standardized equivalent) for all work done at the undergraduate level.
- Applicants other than AUB graduates and graduates of recognized colleges or universities in North America, Great Britain, Australia, and New Zealand, must demonstrate proficiency in the English language through standardized tests.

Program Requirements:

The Graduate Diploma in Online Education follows an online asynchronous format delivered through a set of engaging self-paced modules within a structured learning path to provide students with the flexibility of balancing their learning experience with their busy schedules. Pre-scheduled live office hours allow students to interact with professors and peers in real-time.

This 12-credit diploma is composed of four courses. Participants may join this program during either the fall or the spring term and can complete the diploma over one year (i.e., two academic terms).

Course Descriptions

EDUC 371 Digital Citizenship 3.0; 3 cr.
This course introduces the ethics of technology related to responsible behavior when accessing, managing, exchanging, and disseminating information electronically. Topics covered include fair information practices as well as various ethical, legal, privacy, and security issues across disciplines.

EDUC 372 Foundations in Distance Education 3.0; 3 cr.
This course provides participants with the academic and practical fundamentals of online learning. It focuses on distance education in formal and informal settings, particularly for students in K-12 settings and adult learners in higher education.

EDUC 373 Instructional Design and Development 3.0; 3 cr.
This course introduces the basic principles, tools, and techniques required for instructional design and development while focusing on strategies at the curricular and classroom levels.

EDUC 374 Technology and Information Systems for Teachers and Administrators 3.0; 3 cr.
This course explores the use of technology and information systems in schools at the administrative level, addressing how different information systems' tools and applications are used in the educational environment for decision-making, planning, and communication.

Additional Relevant Information

Graduates of this program may have all 12 diploma credits transferred towards the MA in Computing in Education.

Online MA in Computing in Education

The MA in Computing in Education is an exclusive program that delivers world-class AUB education in an online asynchronous format, providing students with the flexibility to learn at their own pace. It is tailored for aspiring instructional designers in the MENA region interested in building a strong foundation in the field of educational technology.

This MA is an interdisciplinary degree bringing together education and computer science to produce graduates who will act as key players in innovating teaching and learning practices and advancing core computer science curricula in schools.

As the first program of its kind in the region, this MA will train students to become highly-skilled instructional designers with exposure to career opportunities in several high-demand fields. By using the latest research theories and emerging educational technologies, students will develop the computational thinking skills required to design and deliver computer science courses in K-12 settings, while also working in diverse fields including higher education, educational administration, non-governmental institutions, and international organizations.

Candidates from all backgrounds are encouraged to apply as no previous experience is required for this MA.

Admission Requirements:

This program is open to students from all backgrounds. Applicants must possess a bachelor's degree in any field of study. The admission requirements are the same as the Faculty of Arts and Sciences' requirements for a Master's degree admission:

- An undergraduate GPA of at least 3.3 (or standardized equivalent) in the major field of study and a cumulative GPA of at least 3.0 (or standardized equivalent) for all work done at the undergraduate level.
- Applicants other than AUB graduates and graduates of recognized colleges or universities in North America, Great Britain, Australia, and New Zealand, must demonstrate proficiency in the English language through standardized tests.

Program Requirements:

The MA in Computing in Education follows an online asynchronous format delivered through a set of engaging self-paced modules within a structured learning path to provide students with the flexibility of balancing their learning experience with their busy schedule. Pre-scheduled live office hours allow students to interact with professors and peers in real-time. This program is composed of 11 courses and Master's project. However, students with backgrounds in education or computer science can be exempt from specific courses enabling them to earn this degree by completing 30 credits.

Course Descriptions:

EDUC 300 Introduction to Educational Foundations and Practice 3.0; 3 cr.
This course introduces students to the theoretical and practical underpinnings of organizational structures, curriculum delivery, external examinations, and ethical and legal aspects of the teaching profession.

EDUC 315 Psychology of Education 3.0; 3 cr.
This course presents a comprehensive analysis of instructional theories, measurement skills, cognitive development, learning theory, and the methods of applying behavior modification in classrooms.

EDUC 321 General Research Methodologies in Education 3.0; 3 cr.
This course aims to develop a scientific approach to solve educational problems. Students will acquire the skills needed to identify and develop research problems while dealing with a variety of research designs. Basic statistical concepts are included in this course.

EDUC 371 Digital Citizenship 3.0; 3 cr.
This course introduces the ethics of technology related to responsible behavior when accessing, managing, exchanging, and disseminating information electronically. Topics covered include fair information practices as well as various ethical, legal, privacy, and security issues across disciplines.

EDUC 372 Foundations in Distance Education 3.0; 3 cr.
This course provides participants with the academic and practical fundamentals of online learning. It focuses on distance education in formal and informal settings, particularly for students in K-12 settings and adult learners in higher education.

EDUC 373 Instructional Design and Development 3.0; 3 cr.
This course introduces the basic principles, tools, and techniques required for instructional design and development while focusing on strategies at the curricular and classroom levels.

EDUC 374 Technology and Information Systems for Teachers and Administrators 3.0; 3 cr.
This course explores the use of technology and information systems in schools at the administrative level, addressing how different information systems' tools and applications are used in the educational environment for decision-making, planning, and communication.

EDUC 375 Trends and Issues in Educational Technology 3.0; 3 cr.
This course allows students to reflect on the roles various forms of digital technology play in the teaching and learning processes and highlights how instructors can engage these processes in classroom settings. Students will be able to critically analyze the implications of past, current, and future developments in educational technology.

CMPS 301 Programming and Computational Thinking 3.0; 3 cr.
This course provides students with a brief introduction to many topics in computer science and prepares them to teach programming and computational thinking in schools. The class will use the Python programming language.

CMPS 302 Computing Systems 3.0; 3 cr.
This is a computer science course that introduces students to computers and to their role in society. Topics covered include the principles of computer operations from both the hardware and software perspectives, basic networking concepts, web authoring concepts including HTML, cascading style sheets, and data manipulation using spreadsheets and databases.

CMPS 303 Gaming and Robotics 3.0; 3 cr.
The objective of this course is to use proven research-based best practices to improve the integration of science, technology, engineering, and mathematics to help students master rigorous, real-world learning experiences including gaming, robotics, and design technology.

Additional Relevant Information:

Students who have already completed the Graduate Diploma in Online Education can have all 12 diploma credits transferred towards this MA.

The Certificate in Teaching in Higher Education (C-THE)

The Certificate in Teaching in Higher Education (C-THE) provides training in teaching for Ph.D. students at AUB. The certificate aims at equipping students with best practices and professional skills in teaching in higher education. It consists of two courses, one taken in the fall term (C-THE I) and the other taken in the spring term (C-THE II). PhD students are required to enroll in the C-THE in the Fall term that follows their first term of enrollment.

Course Descriptions

EDUC 401 C-THE I: Teaching in Higher Education – Theory I 0 cr.
This course is an introduction to teaching in higher education, face-to-face and online. The course covers topics such as course syllabus design, learning outcomes, and teaching methodologies such as transformative learning, learner-centered classes and flipped classrooms. Annually in the Fall term.

EDUC 402 C-THE II: Teaching in Higher Education – Theory II & Practicum 0 cr.
This course is a combination of in-class sessions and teaching field experience. The first part covers topics such as assessment, presentation skills, and teaching portfolio. The second part consists of practical observations and practice teaching under the supervision of designated mentors. Annually in Spring term. Pre-requisite: EDUC 401.

Department of English

Chairperson:	Currell, David
Professors:	Choueiri, Lina G.; Hout, Syrine C.; Mejcher-Atassi, Sonja; Myers, Robert E.; Shaaban, Kassim A.
Associate Professors:	Currell, David; Gonsalves, Joshua D.; Harb, Sirène H.; Mehmood Ali, Tariq
Assistant Professors:	Avant, Doyle R.; Dasgupta, Sreemoyee

The Department of English offers one writing course, ENGL 300, to all graduate students in the university who did not meet the RUSE.

ENGL 300 Writing in the Disciplines 3.0; 0 cr.
A course that prepares students for graduate-level academic writing, and covers such topics as academic writing in different disciplines, the writing process, argumentation and working with sources. Prerequisite: 500-529 on the AUB EEE (new EEE: 32-39) or 573-582 on the TOEFL (PBT) or 88-96 on the TOEFL (IBT). Each term.

The Department of English offers two graduate degree programs: the MA in English Literature and the MA in English Language.

Mission Statement

The Department of English at AUB offers two graduate degree programs, which include an MA in English Literature and an MA in English Language. These graduate programs aim to ground students in literature and language studies. They provide students with opportunities to pursue advanced study in multiple linguistic, literary and cultural traditions through engagement with texts in English, in translation, between languages and across media. The programs provide a solid academic basis for those who wish to continue toward a PhD in literature or language studies, as well as for those who wish to pursue a career in writing, publishing, editing, teaching and related areas. Through an ongoing process of critical self-reflection, students will attain experience and abilities in linguistic and textual analysis, critical thought, writing and aesthetic appreciation that will contribute to their personal, academic and professional growth.

The requirements for an MA degree in English consist of 21 credit hours in courses numbered 300 or above, successful completion of a comprehensive examination, and a thesis along with any additional prerequisite courses determined by the department to make up for deficiencies in undergraduate preparation. General requirements for graduate study are found in the Admissions section of this catalogue and on the departmental website.

MA in English Literature

Students working for an MA degree in English Literature must complete ENGL 301A. Other literature courses are listed using one of the course numbers below (ENGL 302-315), with an additional letter suffix and course title reflecting the specific themes and readings of that course. Up to two courses with the same number but different letter suffixes and titles reflecting different themes and readings may be taken for credit.

In addition to ENGL 301A, students must take a minimum of one course in each of the following three categories: Literary History (courses in the range ENGL 302-305), Comparative Literature (courses in the range ENGL 306-309) and Literary and Cultural Studies (courses

in the range ENGL 310-13). The remaining three courses may comprise any course in English Literature with the additional provision that up to two may be taken in other programs or departments, subject to approval by the Department of English.

All students must complete the general requirements for graduate study detailed in the General University Academic Information section of this catalogue. Further details about the format of the comprehensive examination and the requirements of the thesis can be found on the departmental website.

Literature Course Descriptions

ENGL 301A Introduction to Bibliography and Research Methods 3.0; 3 cr.
An introduction to bibliography and research methodologies in the study of literature, as well as elements of advanced literary theory. Annually.

Literary History

ENGL 302 (A, B, C, D, E...) Literatures of the Middle Ages 3.0; 3 cr.
A course that covers major works of medieval literature, with attention to both form and cultural context. Some attention may be given to texts' original languages. Themes and readings may vary from term to term. Occasionally. May be repeated for credit for a maximum of 6 credits.

ENGL 303 (A, B, C, D, E...) Early Modern Literatures 3.0; 3 cr.
A course that covers major works of Renaissance literature, including theatre, with attention to both form and cultural context. Themes and readings may vary from term to term. Occasionally. May be repeated for credit for a maximum of 6 credits.

ENGL 304 (A, B, C, D, E...) British Literatures 3.0; 3 cr.
A course that covers major works of British literature, including theatre, from the 18th century to the contemporary period. Themes and readings may vary from term to term. Occasionally. May be repeated for credit for a maximum of 6 credits.
ENGL 305 (A, B, C, D, E...) American Literatures 3.0; 3 cr.
A course that covers major works of American literature, including theatre and film, with some emphasis given to relations among the wide array of American literary traditions. Themes and readings may vary from term to term. Occasionally. May be repeated for credit for a maximum of 6 credits.

Comparative Literature

ENGL 306 (A, B, C, D, E...) Transnational Literatures 3.0; 3 cr.
A course exploring relationships among texts, including theatre, film, and other narrative and visual forms, emerging from a range of different locales, with an emphasis on historical contexts of migration, diaspora and crisis. Themes and readings may vary from term to term. Occasionally. May be repeated for credit for a maximum of 6 credits.

ENGL 307 (A, B, C, D, E...) Colonial and Postcolonial Literatures 3.0; 3 cr.
A course exploring relationships among texts that circulate between the colonized and formerly colonized world, and sites of imperial and neo-imperial power. Themes and readings may vary from term to term. Occasionally. May be repeated for credit for a maximum of 6 credits.

ENGL 308 (A, B, C, D, E...) Literatures of the Global South 3.0; 3 cr.
A course exploring relationships among texts that circulate through networks that link different sites of the colonized and formerly colonized world. Themes and readings may vary from term to term. Occasionally. May be repeated for credit for a maximum of 6 credits.

ENGL 309 (A, B, C, D, E...) World Literatures 3.0; 3 cr.
A course exploring relationships among significant texts from different origins, time periods and genres, as well as their resonance in global contexts via translation, adaptation and re-writing. Themes and readings may vary from term to term. Occasionally. May be repeated for credit for a maximum of 6 credits.

Literary and Cultural Studies

ENGL 310 (A, B, C, D, E...) Literature, Technology and Media 3.0; 3 cr.
A course exploring relationships between established (e.g. theatre, print, film and visual media) and emergent media, and the changing conventions of genre, period and form. Themes and readings may vary from term to term, and might include interrogations of the histories of cinematic, theatrical and literary culture. Occasionally. May be repeated for credit for a maximum of 6 credits.

ENGL 311 (A, B, C, D, E...) Literature and Material Culture 3.0; 3 cr.
A course exploring relationships between literary culture and the physical manifestations of culture in made objects. Themes and readings may vary from term to term, and might include examinations of capitalism and consumer culture as manifest in the representation of the domestic interior, or relations between the visual arts and literary, theatrical or cinematic representation. Occasionally. May be repeated for credit for a maximum of 6 credits.

ENGL 312 (A, B, C, D, E...) Literature, Gender and Sexuality 3.0; 3 cr.
A course exploring literary cultures from the perspectives of gender and sexuality as interpretive frameworks and representational strategies. Themes and readings may vary from term to term, and might include considerations of third world feminisms, gender and performance theory, queer and post-queer theory. Occasionally. May be repeated for credit for a maximum of 6 credits.

ENGL 313 (A, B, C, D, E...) Literature and Translation 3.0; 3 cr.
A course exploring translation as a technology of literary production and meaning-making. Works in translation will be considered through the lens of theories of translation and their practical applications. Themes and readings may vary from term to term. Occasionally. May be repeated for credit for a maximum of 6 credits.

Additional Course Options

ENGL 314 (A, B, C, D, E...) Special Topics in Literature 3.0; 3 cr.
A course offered to students on an individual basis. The topic can include any aspect of literary study. Themes and readings may vary from term to term. Occasionally. May be repeated for credit for a maximum of 6 credits.

ENGL 315 (A, B, C, D, E...) Graduate Tutorial in Literature 3.0; 3 cr.
A course offered to students on an individual basis. The topic can include any aspect of literary study. Themes and readings may vary from term to term. Occasionally.

ENGL 395A Comprehensive Exam 0 cr.
Prerequisite: Consent of advisor.

ENGL 399 Thesis 9 cr.
Thesis.

MA in English Language

Students working for an MA degree in English Language must take ENGL 301B, ENGL 327, ENGL 341 or ENGL 342; and ENGL 345. Two additional elective English Language graduate courses from among those offered in the department must be taken. Students must take a

further graduate course, which may be from outside the English language course offerings, subject to approval by the Department of English. Students working for the degree of MA in the Teaching of English as a Foreign Language (TEFL) should refer to the Department of Education catalogue section.

All students must complete the general requirements for graduate study detailed in the General University Academic Information section of this catalogue. Further details about the format of the comprehensive examination and the requirements of the thesis can be found on the departmental website.

Language Course Descriptions

ENGL 301B Introduction to Bibliography and Research Methods 3.0; 3 cr.
An introduction to bibliography and research methodologies in the study of language. Annually.

ENGL 326 Advanced Translation Theory and Practice 3.0; 3 cr.
A close examination of major translation theories, both traditional and linguistic, and an application of these theories to the practice of translation, both literary and technical, in Arabic and English. Annually.

ENGL 327 Sociolinguistics 3.0; 3 cr.
A course intended to provide in-depth analysis of issues related to the study of the interaction between language and society. This course covers such topics as geographical and social dialects, multilingualism, language and gender, ethnography of speaking, discourse analysis, language planning and language attitudes. Annually.

ENGL 329 Grammatical Studies in Old and Middle English Literature 3.0; 3 cr.
A close reading and grammatical examination of selected texts in the original. Exact content to be determined by the instructor. May not be repeated for credit. Occasionally.
ENGL 341 Phonology 3.0; 3 cr.
A survey of theories of phonological description including phonemics, distinctive features and generative phonology; an application of these theories to actual linguistic data from various languages with concentration by each student on one specific problem. Annually.

ENGL 342 Theoretical Linguistics 3.0; 3 cr.
A study of readings in advanced grammar that have contributed to the formulation of theories of language description; e.g. transformational grammar, stratificational grammar, generative semantics, pragmatics, government and binding. Annually.

ENGL 344 (A, B, C, D, E...) Graduate Tutorial in Linguistics 3.0; 3 cr.
A tutorial offered to students on an individual basis. The topics can include any aspect of the study of linguistics that both instructor and student agree upon. Occasionally.

ENGL 345 Language Acquisition 3.0; 3 cr.
A survey of studies in first and second language acquisition. Emphasis is placed on stages of acquisition and the strategies used by children in acquiring their native language. Comparisons between first and second language acquisition are drawn with implications for language teaching. Annually.

ENGL 346 (A, B, C, D, E...) Issues in Applied Linguistics 3.0; 3 cr.
A course whose topic varies from term to term. The course deals with major topics and issues in language study such as multilingualism and multiculturalism, assessment and evaluation, language and education, and intercultural communication. Annually.

ENGL 395A Comprehensive Exam 0 cr.
Prerequisite: Consent of advisor.

ENGL 399 Thesis 9 cr.
Thesis.

Department of Fine Arts and Art History

Chairperson:	Sadek, Walid
Professor:	Dahdah, Farès; Sadek, Walid
Associate Professor:	Esanu, Octavian
Assistant Professors:	Hammond, Joseph; Youssef, Jad
Lecturers:	Garo El Khoury, Joelle; Raad, Joanna; Schell, Sarah Elizabeth
Instructors:	Abrahamian, Panos; Al-Amine, Gheith; Bou Rjeily, Lucien; Dib, Mansour; Gorra, Paul; Harb, Nazha; Hassoun, Lina; Khcheich, Rima; Maalouf, Maya; Sabbah, Yasmina; Youssef, Shawki
Artist in Residence:	Kahwagi, Bassam

MA in Art History and Curating

The general requirements for graduate study can be found in the Admissions section of the catalogue.

Students are required to successfully complete 30 credit hours for graduation: 12 credits of core concentration in AHIS (AHIS 301, AHIS 311, AHIS 302, AHIS 325); 6 credits of core electives in AHIS; 6 credits of general electives; and 6 credits for the graduation thesis or exhibition.

Students who choose to specialize in Art History are required to submit a research-based argumentative art history or theory thesis for graduation. Students who specialize in Curating are required to submit a curatorial research paper and organize an exhibition in collaboration with art institutions and art spaces in Lebanon of the student's choosing.

Course Descriptions

AHIS 301 Seminar in Practices of Art History (Research Methods, Theories, Historiography) 3.0; 3 cr.
The seminar acquaints students with the main methods, theories and practices of art historical research. Bi-annually.

AHIS 302 Seminar Critical Art History 2.2;3 cr.
The seminar discusses the critical turn in Art History since the 1970s informed by linguistic formalism, structuralism, psychoanalysis and Marxism. Bi-annually.

AHIS 311 Issues in Contemporary Art and Theory 2.2; 3 cr.
The course is about the relationship of contemporary art (artistic and institutional practices) to theory. Annually.

AHIS 312 Seminar: Issues in Modern and Contemp. Art in the Middle East and the Arab World 3.0; 3 cr.
The seminar offers a topical treatment of issues related to modern and contemporary art in the Middle East and the Arab World. Occasionally.

AHIS 315 Seminar: Issues in Global Art History 2.2; 3 cr.
The seminar situates the art historiographical canon and exhibition-making practices in the wake of the global turn. Occasionally.

AHIS 318 Modernism and Its Discontents 3.0; 3 cr.
The course investigates 19th and 20th century canonical modernism from a comparative perspective, in relation to other modernisms and avant-gardes. Occasionally.

AHIS 323 European Collections, Exhibitions and Institutions 2.2, 3 cr.
This course introduces students to collecting practices and to the history of institutionalization of collections in various historical contexts in the Western tradition. Occasionally.

AHIS 324 Collecting and Exhibition Practices in the Islamic and Arab World 2.2, 3 cr.
This course offers a historiographical and theoretical approach to representations of art in museums, collections and expositions/fairs across various historical and geographic contexts pertaining to the Islamic and Arab world. Occasionally.

AHIS 325 Issues in Curating: Practicum 3.0; 3 cr.
The course is a practicum in curating exhibitions. It offers a hands-on experience in organizing art exhibitions and related events. Students conduct curatorial research and implement their ideas practically, from writing curatorial concepts to selecting artworks and designing exhibitions at the AUB Art Galleries. Annually.

AHIS 331 Workshop in Modalities of Art Writing (curatorial, critical, creative) 3.0; 3 cr.
The course is based on active participation and engagement in art writing practices.Occasionally.

AHIS 335 Materials, Techniques, Technologies of Exhibition-Making 2.2; 3 cr.
Students will learn to work with spaces, design exhibitions and install art works, amongst other relevant technical skills. Occasionally.

AHIS 313 Graduate Tutorial in Art History and Curating 1-3 cr.
May not be repeated for credits.

AHIS 349 Special Topics in Art History 3.0; 3 cr.
The course focuses on specific topics of art historical significance and is framed around a key debate or discussion in the discipline.

AHIS 350 Special Topics in Art Theory and Aesthetics 3.0; 3 cr.
The course deals with key concepts of aesthetics and theories of art from the epoch of Enlightenment to the present. Introduction to concepts and aesthetic theories is examined in the context of specific debates.

AHIS 385 Special Topics in Curating 3.0; 3 cr.
The course offers a close study of curatorial practices framed around particular art historical and art institutional constellations, both historically and in contemporary times. The course includes methodological, theoretical and practical components.

AHIS 390 Internship 0 cr.
Students are required to take a minimum of 40 hours of internship in an art and cultural institution. The internship program should be approved by the student's advisor and the Graduate Program Director.

AHIS 395A Comprehensive Exam 0 cr.
Prerequisite: Consent of advisor.

AHIS 399 Thesis 6 cr.
Thesis.

Department of History and Archaeology

Chairperson:	Sader, Helene S.
Professor Emerita:	Seeden, Helga
Professor Emeritus:	Seikaly, Samir
Professors:	Genz, Hermann P.; Sader, Helene S.; Saliba, George; Sheikh, Nadia
Associate Professors:	Armstrong, Lyall; Newson, Paul G.
Associate Professor of Practice:	Panayot, Nadine
Assistant Professors:	Abou Hussein, Tarek A.; Ketsemanian, Varak; Kitlas, Peter; Malleson, Claire; Rabah, Makram

The department offers programs leading to the BA, MA and PhD in Arab and Middle Eastern History. The department also offers programs leading to the BA and MA in Archaeology. For admission and graduation requirements, refer to the faculty and department web pages.

MA in History

Mission Statement

By means of a broad and diversified curriculum, our graduate program introduces students to the richness and complexity of Arab and Middle Eastern history. That program is intended to develop not only essential knowledge of the past, but also awareness of the methodological and theoretical complexities involved in the study of history as a discipline in the humanities. Students are motivated to be reflexive, to read, research and write critically, analytically and without prejudice or preconceptions.

Requirements

Students registered in the master's program in history are required to take a minimum of 21 graduate credit hours and to present a thesis based on independent research.

Doctor of Philosophy in Arab and Middle Eastern History

Mission Statement

The doctoral program in Arab and Middle Eastern History aims to create top-rank professional historians. Students in this program will acquire critical, interpretive and research skills, which will enable them to achieve excellence in their chosen field of specialization.

Learning Outcomes

Upon receiving their degree, graduates of the program will be equipped with the methodological, language and research skills that will qualify them to serve as academicians or professional researchers in local, regional and international universities; in other advanced

centers of higher learning in their fields of specialization; or in related cultural and inter-disciplinary studies. Their training will enable them to become eligible for administrative, journalistic, diplomatic and non-governmental posts as well.

Admission Requirements

Admission to the doctoral program is competitive and selective and is dependent upon the recommendation of the Department of History and Archaeology and the approval of the faculty Graduate Studies Committee. Applicants normally hold an MA and have demonstrated outstanding academic ability (minimum average grade of 3.3 or its equivalent) and the potential to conduct scholarly research. In certain cases, BA recipients whose academic performance is superior (minimum average grade of 3.7 or its equivalent) will be considered for admission into the program. Depending on their point of entry, the completion of the program will extend between 3 to 5 years.

Financial Assistance

The university will cover the cost of tuition and will provide stipends to PhD candidates in the form of Graduate Assistantship support on a merit or need basis. In addition to a housing subsidy, it will also assist in covering the cost of language education and research should this be sought outside the AUB campus. Student participation in scholarly conferences, which can lead to publications, is encouraged and will be supported financially.

Study and Course Requirements

18 credits of graduate level courses are required for MA holders. 36 credits of graduate level courses are required for BA holders admitted directly into the program. The department may require students to take additional graduate or undergraduate courses if necessary. The language of instruction is English. Arabic, however, may be substituted for English depending on the area of specialization. Additionally, all students are required to attain working knowledge of either French or German and any other language required by their field of specialization. All students must submit a thesis.

Admission to Candidacy

See section entitled Admission to Candidacy under the general University Academic Information section in this catalogue.

Graduate Curriculum

The history graduate curriculum is subject to periodic departmental review. Overall, it is a flexible and individually-driven program, designed to build up a critical mass of knowledge based on the historical literature relating to the area of specialization. The curriculum adopts a problem-solving approach to historical research and writing, enabling graduates to think critically, work independently and take conscious ownership of their learning activity and align it with their own educational, academic and career aspirations.

Course Description

Following is a list of existing graduate courses offered by the department:

HIST 303/304 Graduate Seminar in Arab and Middle Eastern History 3.0; 3 cr. (each)
A collaborative investigation of select topics in Arab and Middle Eastern History viewed from multiple perspectives. Periodic progress reports and the incorporation of findings in an interpretive term paper are required. Students can receive credit for both HIST 303 and HIST 304.

HIST 305/306 Graduate Seminar in European History 3.0; 3 cr. (each)
In-depth analysis of selected topics entailing extensive research and the submission of a final analytical term paper. Students can receive credit for both HIST 305 and HIST 306.

HIST 321/322 The Arab Historians, I and II 3.0; 3 cr. (each)
A systematic analysis of a select Arab historian in the context of his time, employing primary sources and recent secondary literature on the subject. Students can receive credit for both HIST 321 and HIST 322.

HIST 323/324 Advanced Documentation and Research, I and II 3.0; 3 cr. (each)
An applied training course in the identification, critical evaluation and utilization of primary and secondary sources; the techniques for their retrieval and modes of incorporation into a historical account. Students can receive credit for either HIST 323 or HIST 324.

HIST 325/326 Social and Intellectual History of the Arabs, I and II 3.0; 3 cr. (each)
A systematic study of social and intellectual trends in Arab history. Primary sources and recent theories and interpretations are emphasized. Students can receive credit for both HIST 325 and HIST 326.

HIST 327/328 Social and Economic History of the Modern Middle East, I and II 3.0; 3 cr. (each)
A detailed analysis of socioeconomic transformations in the modern Middle East based upon primary sources, considered in view of recent theories of development, modernization and globalization. Students can receive credit for both HIST 327 and HIST 328.

HIST 330 Advanced Historical Interpretation 3.0; 3 cr.
A systematic examination of key modern interpretations of history and their impact upon historical methodology and historiography.

HIST 331 Tutorial Topics in Arab and Middle Eastern History 3.0; 3 cr. (each)
A directed individual examination of a selected topic entailing an intensive reading program, research and the submission of a model term paper. May not be repeated for a credit.

HIST 332 Special Topics in History 3.0; 3 cr.
An in-depth course involving a detailed and systematic analysis of the history of a particular topic, area or region. May be repeated for credit.

HIST 395A Comprehensive Exam 0 cr.
Prerequisite: Consent of advisor.

HIST 399 Thesis 9 cr.
Thesis.

HIST 480 Qualifying Exam Part I: Comprehensive Exam 0 cr.
Every term.

HIST 481 Qualifying Exam Part II: Defense of Thesis Proposal 0 cr.
Every term.

HIST 484 PhD Thesis 30 cr.
Every term. To be taken by regular track PhD students. Taken at first thesis registration, then registered for every subsequent term with sequential letter annotations (A-L; 0 credits) until completion of thesis work.

The choice to register for HIST 484 should be done in consultation with the thesis advisor to ensure that the total number of PhD thesis credits and PhD course credits are met as per AUB rules and regulations.

HIST 488 PhD Thesis 42 cr.
Every term. To be taken by accelerated track PhD students. Taken at first thesis registration, then registered for every subsequent term with sequential letter annotations (A-L; 0 credits) until completion of thesis work.

MA in Archaeology

Mission Statement

The graduate program in Archaeology provides students with advanced working knowledge and critical understanding of the methodological and theoretical principles of archaeological investigation and fieldwork. In addition to developing essential knowledge about the material and cultural roots of past societies, the program enhances student awareness about the value and relevance of Lebanon's and the region's archaeological heritage.

Requirements

Students registered in the master's program in archaeology are required to take a minimum of 21 graduate credit hours and to present a thesis based on independent research.

Course Description

AROL 301 Graduate Seminar: Introduction to Theory in Archaeology 3.0; 3 cr.
A seminar to introduce students to key theories and debates in archaeology. Alternate years.

AROL 302 Advanced Seminar in Current Approaches to Archaeological Theory 3.0; 3 cr.
A seminar on current key theories and debates in archaeology, such as center/periphery, economics and world systems analysis, power and hierarchy, cognitive archaeology, critiques of ideology or the politics of interpretation and presentation of the past, native peoples and gender issues. Alternate years.

AROL 303 Readings in Ancient Texts I 3.0; 3 cr.
An introduction to ancient Semitic epigraphy in general, and to one of the ancient Eastern or Western Semitic languages in particular. Alternately, Akkadian, Phoenician or Aramaic texts are studied. Occasionally.

AROL 304 Readings in Ancient Texts II 3.0; 3 cr.
An in-depth study of a particular ancient Semitic language based on grammar and text analysis. Alternately, Akkadian, Phoenician or Aramaic texts are studied. Occasionally.

AROL 305 Artifact Technology and Representation 3.0; 3 cr.
A technical analysis and representation of archaeological artifacts, including composition, production technique, description and drawing for publication of ceramic, metal, stone and bone artifacts. May be repeated for credit.

AROL 307 Seminar in the Bronze Age Archaeology of the Near East 3.0; 3 cr.
A seminar that examines selected problems of the Bronze Age in the Levant during the 3rd and 2nd millennia BC. The course addresses topics such as the development of complex societies in urban communities and incipient territorial states, the incorporation of the Levant into larger empires, the development of palace economies, craft specialization, international trade and political relations as well as the breakdown of the Bronze Age system during the last centuries of the 2nd millennium BC. May be repeated for credit.

AROL 308 Seminar in Iron Age Archaeology of the Near East 3.0; 3 cr.
A seminar that examines important features of the material culture of the Near East from the 12th to the 4th century BC. The course addresses questions such as state formation, trade expansion and networks, international political relations, and the creation of new forms of art and architecture. May be repeated for credit.

AROL 309 Seminar in Graeco-Roman Archaeology of the Near East 3.0; 3 cr.
A seminar that examines important features of the material culture of the Near East from the 12th to the 4th century AD. The course addresses questions such as the growth of urbanization, local responses to Greek and Roman cultural institutions and the creation of new forms of art and architecture. May be repeated for credit.

AROL 310 Seminar in Mediterranean Archaeology 3.0; 3 cr.
This seminar explores the richness and complexity of past societies of the Mediterranean through aspects of the material culture. Through analysis of the development of prehistoric and historic Mediterranean peoples, the seminar considers how archaeological evidence reflects encounters and developments in major issues such as exchange, migration, identity and colonialism. May be repeated for credit.

AROL 321 Graduate Tutorial 3.0; 3 cr.
A study of particular sites and materials to train students in archaeological research and analysis.

AROL 323 Advanced Fieldwork and Data Collection 3.0; 3 cr.
A course of advanced training in archaeological surveys, excavations, artifact recording or ethnographic data collection related to archaeological fieldwork. May be repeated for credit.

AROL 327 Special Topics in Archaeology 3.0; 3 cr.
An in-depth course involving the detailed and systematic analysis of the archaeology of a particular area, region (e.g. Anatolia, the Arabian Peninsula, Egypt, Iran, the Mediterranean, etc.) or subject. May be repeated for credit.

AROL 395A Comprehensive Exam 0 cr.
Prerequisite: Consent of advisor.

AROL 399 Thesis 9 cr.
Thesis.

Department of Mathematics

Chairperson:	Bertrand, Florian J.
Professor Emeritus:	Muwafi, Amin
Professors:	Abi-Khuzam, Faruk F.; Abu-Khuzam, Hazar M.; Khuri-Makdisi, Kamal F.; Nassif, Nabil R.; Raji, Wissam V.; Shayya, Bassam H.
Associate Professors:	Alhakim, Abbas M.; Bertrand, Florian J.; Della Sala, Giuseppe; El Khoury, Sabine S.; Tlas, Tamer M.
Assistant Professors:	Andrist, Rafael; Monni, Stefano; Moufawad, Sophie M.; Roy, Tristan Cyrus; Sabra, Ahmad A.; Taati, Siamak;
Lecturers:	Mroue, Fatima K.; Yamani, Hossam A.
Instructors:	Ashkar, Alice N.; Bou Eid, Michella J.; Fleihan, Najwa S.; Itani-Hatab, Maha S.; Khachadourian, Zadour A.; Nassif, Rana G.; Rahhal, Lina A.; Tannous, Joumana A.

The Department of Mathematics offers programs leading to the degree of Master of Science (MS) in Mathematics.

Under Mathematics, students may choose between two tracks: a track in Pure Mathematics and a track in Applied Mathematics.

MS in Mathematics

Students who are admitted to one of the two MATH tracks, Pure or Applied, must complete the university requirements for graduate study in the Faculty of Arts and Sciences with at least 24 credits at the graduate level and a thesis. These 24 credits must include the following required core courses for both tracks: MATH 303, MATH 304, MATH 309, and MATH 341.

Students following the Pure Mathematics Track are required to take at least one of MATH 306 or MATH 314 and complete the 24 credits by choosing any 3 elective courses offered in the department, totaling 9 credits, in addition to writing and defending a thesis in an area of Pure Mathematics.

Students following the Applied Mathematics Track are required to take at least one of MATH 350 or MATH/STAT 338 and complete the 24 credits by choosing any 3 elective courses offered in the department, totaling 9 credits, in addition to writing and defending a thesis in an area of Applied Mathematics.

MA or MS in Statistics

Students must complete the university requirements for graduate study in the Faculty of Arts and Sciences, at least 24 credits at the graduate level and a thesis. At least 18 of the 24 credits must be taken in the department and must include MATH 303, STAT 331, STAT 332, STAT 333 and STAT 334. Students interested in taking courses outside the department may do so after obtaining approval from the department. The graduate program in statistics is currently frozen.

Course Descriptions

Mathematics

MATH 301 Graduate Tutorial Courses 1–3 cr.
Prerequisite: Graduate standing or consent of instructor. May not be repeated for credit.

MATH 303 Measure and Integration 3.0; 3 cr.
A first course in measure theory, including general properties of measures, construction of Lebesgue measure in Rn, Lebesgue integration and convergence theorems, Lp-spaces, Hardy-Littlewood maximal function, Fubini's theorem and convolutions. Prerequisite: MATH 223 or graduate standing. Annually.

MATH 304 Complex Analysis 3.0; 3 cr.
A second course in complex analysis, covering the homotopy version of Cauchy's theorem, the open mapping theorem, maximum principle, Schwarz's lemma, harmonic functions, normal families, Riemann mapping theorem, Riemannian metrics, method of negative curvature, Picard's theorem, analytic continuation, monodromy and modular function. Prerequisite: MATH 227 or graduate standing. Annually.

MATH 305 Functional Analysis 3.0; 3 cr.
Vector spaces, Hamel basis, Hahn-Banach theorem, Banach spaces, continuous linear operators and functionals, Hilbert spaces and weak topologies. Prerequisite: MATH 223 or graduate standing. Occasionally.

MATH 306 Calculus on Manifolds 3.0; 3 cr.
Manifolds, differentiable structure, vector fields, flows, differential forms, Stokes' theorem, basic Lie group theory. Prerequisite: MATH 223 or graduate standing. Biennially.

MATH 307 Topics in Analysis 3.0; 3 cr.
Topics in Analysis.

MATH 309 Functional Analysis and Partial Differential Equations 3.0; 3 cr.
The course aims to introduce students to deterministic/analytic tools to study problems which appear in several areas of science. The course introduces mathematical notions and objects such as: Hilbert spaces, weak derivatives, distributions and Soboley spaces, adjoints of linear operators on infinite dimensional spaces, bounded linear operators, fixed point arguments, convolution and Fourier transform. This course connects to partial differential equations where the existence of solutions to those elliptic/parabolic/ hyperbolic uses the theory introduced in the first part of the course. Applications to these linear differential equations in diffusion processes and population dynamics will be discussed throughout the course via examples from the literature. This course is self-contained. Annually.

MATH 310 Analysis of Partial Differential equations 3.0; 3 cr.
In this course, the study of Partial Differential Equations (PDEs) will be conducted by developing a proper weak formulation of PDEs and introducing the notion of generalized or weak solutions. After a short review on properties of weak solutions and Lax-Milgram theorem, the regularity of the weak solutions for elliptic, parabolic and hyperbolic PDEs will be studied, with particular consideration given to the standard examples of the respective classes: the Laplacian, the heat, and the wave equations. In the second part of the course, some of the main tools used to study weak solutions of nonlinear PDEs will be introduced. Prerequisites: MATH 303 and MATH 309. Occasionally.

MATH 311 Dynamical Systems 3.0; 3 cr.
The field of Dynamical systems involves the study of the long-term behavior of evolving systems, with wide applications to natural sciences, applied and pure Mathematics such as Partial Differential Equations, Topology and Geometry, Combinatorics and Diophantine Number Theory. This course will serve as an introduction to some of the most important topics of the field, including a treatment of hyperbolic dynamical systems and of the basics of ergodic theory. The last part of the course will deal with some of the modern developments of the subject, such as its applications to PDEs and to the study of homogeneous spaces. Prerequisite: MATH 303 or consent of the instructor. Occasionally.

MATH 312 Harmonic Analysis 3.0; 3 cr.
This is a graduate level course in harmonic analysis. After an introduction to complex measures, the course will present the theory of the (multi-dimensional) Fourier transform on the Schwartz space as well as on L1 and L2 spaces. Further topics treated in the course will include Oscillatory integrals and an introduction to geometric measure theory. Finally, applications to some deep results in the theory of distance sets will be discussed. Prerequisite: MATH 303 or consent of the instructor. Occasionally.

MATH 313 Several Complex Variables 3.0; 3 cr.
This is an introduction to the theory of holomorphic functions in several variables. The course will begin with a review of Complex Analysis in one variable, and then it will introduce holomorphic functions in several variables, starting with the aspects in common with the one-dimensional setting (such as the Cauchy formula and power series expansion). Next, features which are peculiar to several variables will be discussed, including Hartogs' phenomenon and the notion of pseudo-convexity. The course will end with a treatment of some more modern topics. Prerequisite: MATH 304 or consent of the instructor. Occasionally.

MATH 314 Algebraic Topology I 3.0; 3 cr.
Homotopy, fundamental group, Seifert-van Kampen theorem, covering spaces, singular homology. Prerequisites: MATH 214 and MATH 241, or graduate standing. Biennially.

MATH 315 Algebraic Topology II 3.0; 3 cr.
Singular cohomology, Poincare duality, higher homotopy theory, fiber bundles. Prerequisite: MATH 314. Occasionally.

MATH 316 Topics in Topology 3.0; 3 cr.
Topics in Topology.

MATH 317 Introduction to Algebraic Geometry 3.0; 3 cr.
The main purpose of the course is to provide an introduction to the principal notions of Algebraic Geometry, with a treatment flexible enough to allow for expansion in several directions, both towards the algebraic and the analytic side. After a brief review of commutative algebra, the course will introduce (affine and projective) algebraic sets, the Zariski topology, regular and rational maps, as well as notions of smoothness and dimension. A discussion of the main classical examples of algebraic sets and maps will be included in the development of the materials. Prerequisite: MATH 341 or consent of the instructor. Occasionally.

MATH 318 Differential Geometry 3.0; 3 cr.
This course builds on MATH 306 and with examples drawn from Riemannian geometry. Students will be introduced to the theory of fiber bundles, Riemannian metrics, connections and curvature. The last part of the course will be devoted to some more advanced subjects, such as the theory of principal bundles or the study of spaces of constant curvature. The topics covered in the course are also essential to a modern treatment of mathematical and theoretical physics. Prerequisite: MATH 306 or consent of the instructor. Occasionally.

MATH 330 Probability Theory 3.0; 3 cr.
This first course in Probability Theory will be devoted to the main properties of random variables (such as its moments and the notion of independence), with special emphasis put on classical results of convergence of sequence of random variables (for instance in LP, in probability, and in law). The law of large numbers and the central limit theorem will be treated as well, and the last part of the course will deal with the theory of martingales. Prerequisite: MATH 303. Occasionally.

MATH 338 Introduction to Stochastic Processes 3.0; 3 cr.
This course gives an overview of stochastic processes. Topics will include discrete and continuous-time Markov chains with discrete and continuous state space, basic martingale theory and Brownian motion. If time permits, integration with respect to Brownian motion will be covered to provide students with a first idea of stochastic integration. Annually.

MATH 340 Groups and Geometry 3.0; 3 cr.
The goal of this course is to familiarize the students with the connection between the algebraic structure of groups and their actions on geometric objects, in the spirit of Felix Klein's Erlangen program. The course will illustrate how groups can be used to understand geometry and topology and, conversely, how one can study abstract groups by using geometric techniques and ultimately by treating groups themselves as geometric objects. Prerequisite: graduate standing or consent of the instructor. Occasionally.

MATH 341 Modules and Rings 3.0; 3 cr.
Fundamental concepts of modules and rings, projective and injective modules, modules over a PID, Artinian and Noetherian modules and rings, semi-simplicity, and tensor products. Prerequisite: MATH 241 or graduate standing. Annually.

MATH 342 Modules and Rings II 3.0; 3 cr.
A course covering more advanced topics in modules and rings. Prerequisite: MATH 341. Occasionally.

MATH 343 Field Theory 3.0; 3 cr.
Prerequisite: MATH 242. Occasionally.

MATH 344 Commutative Algebra 3.0; 3 cr.
Prerequisites: MATH 242 and MATH 341. Occasionally.

MATH 345 Topics in Algebra 3.0; 3 cr.
Occasionally.

MATH 346 Algebraic Number Theory 3.0; 3 cr.
The subject of this course can be understood in two ways, as algebra applied to number theory, but also as the study of algebraic numbers, that is the roots of polynomials with integer coefficients. These numbers occur naturally when one attempts to solve Diophantine equations. Alongside a review of the relevant algebra (such as field theory and ideal factorization), the course will introduce and discuss algebraic integers, the class group and units. The last part of the course will revolve around more advanced topics such as for instance the Dedekind zeta function. Prerequisite: MATH 341 or consent of the instructor. Occasionally.

MATH 347 Elliptic Curves and Modular Forms 3.0; 3 cr.
This course focuses on two interrelated notions: first, elliptic curves and their arithmetic aspects, and second, modular curves, which are spaces classifying elliptic curves, and modular forms, which are objects living on these modular curves. The course culminates with the statement of the modularity theorem, which expresses a second relation between modular

curves and modular forms. Prerequisites: MATH 227 or 304, MATH 261, MATH 341 or MATH 220, MATH 306 or 223, MATH 220; or consent of the instructor. Occasionally.

MATH 348 Monte Carlo Methods 3.0; 3 cr.
Common techniques and basic principles of Monte Carlo simulations, including an overview of random number generation, rejection methods, importance sampling and variance reduction techniques, Monte Carlo integration, Markov chain Monte Carlo (Metropolis-Hastings and Gibbs sampler and some variants, e.g., cluster algorithms and multilevel samplers, as time allows). Annually.

MATH 350 Discrete Models for Differential Equations 3.1; 3 cr.
A detailed study of methods and tools used in deriving discrete algebraic systems of equations for ordinary and partial differential equations: finite difference and finite element discretization procedures; generation and decomposition of sparse matrices, finite-precision arithmetic, ill-conditioning and pre-conditioning, scalar, vector, and parallelized versions of the algorithms. The course includes tutorial immersion sessions in which students become acquainted with state-of-the-art scientific software tools on standard computational platforms. Prerequisites: Linear algebra and the equivalent of MATH/CMPS 251 (which can be taken concurrently) or consent of instructor. Same as CMPS 350. Annually.

MATH 351 Optimization and Nonlinear Problems 3.1; 3 cr.
A study of practical methods for formulating and solving numerical optimization problems that arise in science, engineering and business applications. Newton's method for nonlinear equations and unconstrained optimization. Simplex and interior-point methods for linear programming. Equality and inequality-constrained optimization. Sequential quadratic programming. Emphasis is on algorithmic description and analysis. The course includes an implementation component where students develop software and use state-of-the-art numerical libraries. Prerequisite: Graduate standing. Same as CMPS 351. Occasionally.

MATH 352 Computational Linear Algebra with Applications 3.0; 3 cr.
This course mostly focuses on problems that involve sparse matrix computations. It underlies the fundamental methods for efficiently solving (sequentially and in parallel) sparse systems of linear equations using direct methods with fill-in phenomena, together with iterative methods such as Krylov subspace methods, with several types of preconditioning. It also treats comprehensively the numerical eigenvalue problems and their applications such as computation of the PageRank Vector for Google matrices. Prerequisite: MATH 350. Occasionally.

MATH 353 Computational Methods for Time-Dependent Systems 3.0; 3 cr.
This course covers numerical methods for time-dependent linear and nonlinear partial differential equations starting with hyperbolic conservation law models such as wave propagation in gases and fluids. Topics include the method of characteristics, difference methods, CFL conditions, weak solutions and finite volume methods for hyperbolic systems. Computation of solutions of other types of time-dependent partial differential equations will also be considered. Implementation is illustrated through computational models using MATLAB to solve problems arising in fluid dynamics and wave propagation. Prerequisite: MATH 350. Occasionally.

MATH 358 Introduction to Symbolic Computing 3.0; 3 cr.
Introductory topics in computer algebra and algorithmic number theory that include fast multiplication of polynomials and integers, fast Fourier transforms, primality testing and integers factorization. Applications to cryptography and pseudo-random number generation. Linear algebra and polynomial factorization over finite fields. Applications to error-correcting codes. Introduction to Grobner bases. Prerequisite: Good background in programming, linear algebra, discrete mathematics or consent of instructor. Same as CMPS 358. Occasionally.

MATH 360 Special Topics in Computational Science 3.0; 3 cr.
A course on selected topics in computational science that changes according to the interests of visiting faculty, instructors and students. Selected topics cover state-of-the-art tools and applications in computational science. Prerequisite: Consent of instructor. Same as CMPS 360. Occasionally.

MATH 395A Comprehensive Exam 0 cr.
Prerequisite: Consent of advisor.
MATH 399 MS Thesis 6 cr.
MS Thesis.

Statistics

The graduate program in statistics is currently frozen.

STAT 331 Advanced Probability Theory 3.0; 3 cr.
Characteristic functions, types of convergence, limiting properties of distribution and characteristic functions, limit theorems, and multivariate functions. Prerequisites: MATH 227, STAT 238 and MATH 303. Annually.

STAT 332 Advanced Mathematical Statistics 3.0; 3 cr.
Distribution theory, decision theory, and advanced topics in estimation and inference. Prerequisites: STAT 235 and STAT 238. Annually.

STAT 333 Multivariate Analysis 3.0; 3 cr.
Multivariate distributions, correlation coefficients, classification and discrimination, Hotelling's T2, tests of hypotheses for multivariate distributions and canonical variables. Prerequisite: STAT 238. Annually.

STAT 334 Advanced Topics in Statistics 3.0; 3 cr.
Annually.

STAT 335 Special Topics from Probability and Statistics 3.0; 3 cr.
May be repeated for credit. Annually.

STAT 338 Introduction to Stochastic Processes 3.0; 3 cr.
This course gives an overview of stochastic processes. Topics will include discrete and continuous-time Markov chains with discrete and continuous state space, basic martingale theory and Brownian motion. If time permits, integration with respect to Brownian motion will be covered to provide students with a first idea of stochastic integration. Annually.

STAT 348 Monte Carlo Methods 3.0; 3 cr.
Common techniques and basic principles of Monte Carlo simulations, including an overview of random number generation, rejection methods, importance sampling and variance reduction techniques, Monte Carlo integration, Markov chain Monte Carlo (Metropolis-Hastings and Gibbs sampler and some variants, e.g., cluster algorithms and multilevel samplers, as time allows). Annually.

STAT 395A Comprehensive Exam 0 cr.
Prerequisite: Consent of advisor.

STAT 399 Thesis 6 cr.
MA or MS Thesis.

Department of Philosophy

Chairperson:	Gannagé, Emma
Professors:	Brassier, Ray; Haydar, Bashshar H.
Associate Professors:	Bashour, Bana M.; Gannagé, Emma; Johns, Christopher; Muller, Hans D.
Assistant Professors:	Mohammadian, Mousa; Turan, Caner
Lecturers:	Agha, Saleh J.; Baasiri, Mahmoud; Barakat, Karim; Chehayeb, Fidaa; El Amm, Charbel; Hasan, Hani; Talhouk, Omar
Instructors:	Hariri, Muhannad; Kasab, Jana; Nisr, Farah Sandra; Sabra, Zainab; Samaha, Raid; Wahab, Karam

MA in Philosophy

General requirements for graduate study are found in the Admissions section of this catalogue. The requirements for an MA in Philosophy consist of 21 credit hours in philosophy courses numbered 300 or above, a thesis proposal and defense, and a thesis and defense, together with any additional prerequisite courses required by the department to make up for deficiencies in undergraduate preparation.

PHIL 300 Special Topics in Logic 3.0; 3 cr.
Prerequisite: Consent of instructor. May be repeated for credit. Occasionally.

PHIL 301 Special Topics in Ethics 3.0; 3 cr.
Prerequisite: Consent of instructor. May be repeated for credit. Occasionally.

PHIL 302 Special Topics in Political Philosophy 3.0; 3 cr.
Prerequisite: Consent of instructor. May be repeated for credit. Occasionally.

PHIL 303 Special Topics in Aesthetics 3.0; 3 cr.
Prerequisite: Consent of instructor. May be repeated for credit. Occasionally.

PHIL 304 Special Topics in Metaphysics 3.0; 3 cr.
Prerequisite: Consent of instructor. May be repeated for credit. Occasionally.

PHIL 305 Special Topics in Epistemology 3.0; 3 cr.
Prerequisite: Consent of instructor. May be repeated for credit. Occasionally.

PHIL 306 Special Topics in the Philosophy of Science 3.0; 3 cr.
Prerequisite: Consent of instructor. May be repeated for credit. Occasionally.

PHIL 307 Special Topics in the Philosophy of Language 3.0; 3 cr.
Prerequisite: Consent of instructor. May be repeated for credit. Occasionally.

PHIL 308 Special Topics in the Philosophy of Mind 3.0; 3 cr.
Prerequisite: Consent of instructor. May be repeated for credit. Occasionally.

PHIL 310 Special Topics in the History of Philosophy 3.0; 3 cr.
Prerequisite: Consent of instructor. May be repeated for credit. Occasionally.

PHIL 312 Special Topics in Contemporary Philosophy 3.0; 3 cr.
Prerequisite: Consent of instructor. May be repeated for credit. Occasionally.

PHIL 320 Graduate Tutorials 3.0; 3 cr.
Prerequisite: Consent of instructor. May not be repeated for credit. Occasionally.

PHIL 395A Comprehensive Exam 0 cr.
Prerequisite: Consent of advisor.

PHIL 399 Thesis 3.0; 3 cr.
Thesis.

Department of Physics

Chairperson:	Kazan, Michel J.
Professor Emeritus:	Mavromatis, Harry A.
Professors:	Antar, Ghassan Y.; Chamseddine, Ali H.; Isber, Samih T.; Kazan, Michel J.; Klushin, Leonid I.; Sabra, Wafic A.; Tabbal, Malek D.; Touma, Jihad R.
Assistant Professors:	Haidar, Mohammad J.; Najem, Sara A.
Lecturers:	Al-Sayegh, Amara A.; Harajli, Zainab; Malaeb, Ola; Rahbani, Nancy

The department provides courses and facilities for graduate work leading to the MS and PhD degrees. The research activities of the department include material science, condensed and soft matter physics, plasma physics, paramagnetic resonance, nonlinear dynamics, astrophysics, high-energy physics, superstring theory and quantum gravity.

MS in Physics

Admission Requirements

Refer to the Faculty of Arts and Sciences section.

Course Work

The MS program requires the completion of 21 credits of courses and a research thesis. The courses consist of four core courses: PHYS 301, PHYS 302, PHYS 303 and PHYS 305, and 9 credits of physics graduate electives. After completion of the four core courses, the student must pass the GRE subject test, considered by the Physics Department as the Master's Comprehensive Exam.

Master Thesis Proposal and Thesis Defense

Refer to the section on Thesis Proposal, Thesis Format and Thesis Defense under General University Academic Information.

Residency Requirements

Refer to Residency Requirements section under General University Academic Information.

Doctor of Philosophy in Theoretical Physics

Mission Statement

The PhD program in the Department of Physics is intended to produce competent, independent researchers who are able to make original contributions to physical sciences. The program prepares students for careers in research, teaching or industry and thus provides qualified scientists for Lebanon and the region. It serves the AUB mission of promoting research and participating in the advancement of knowledge.

Admission

Admission to the PhD program is done on a competitive basis. To be eligible for admission, applicants must have an excellent academic record and must demonstrate exceptional motivation and ability to pursue research in physics. The following items are required for an application:

- Degrees:
  - For the Regular Track, a Master of Science (MS) degree in Physics or related fields from an institution recognized by AUB is required.
  - For the Accelerated Track, a Bachelor of Science (BS) degree in Physics or related fields from an institution recognized by AUB is required.
- Three letters of recommendation.
- GRE General Test as per AUB requirements. Subject GRE is required as per Physics Department requirements. (No GRE is required for applicants to the MS program)
- For English, refer to the Readiness for University Studies in English (RUSE) section in this catalogue.
- A statement of purpose.
- A recommendation for admission by the AUB Department of Physics.

A departmental committee may require an interview with the applicant before giving a recommendation.

Governance

Refer to the section on the Supervision of Doctoral Thesis under General University Academic Information.

Supervision of PhD Thesis

Refer to the section on the Supervision of Doctoral Thesis under General University Academic Information.

PhD Publication Requirements

Refer to PhD Publication Requirements under General University Academic Information.

Course Work

The PhD program requires the completion of at least 36 credit hours of course work for students admitted on the accelerated track (BS holders) and a minimum of 18 credit hours of course work for students admitted on the regular track (MS holders).

The required courses for students admitted on the regular track are PHYS 306 and 308 (6 credits) and at least 12 credits beyond the core program, out of which one course must be in the concentration area, while the others can be taken as electives. Students may take relevant courses outside the department provided they secure departmental approval.

The required courses for students admitted on the accelerated track are PHYS 301, PHYS 302, PHYS 303, PHYS 305, PHYS 306 and PHYS 308 (18 credits) and at least 18 credits beyond the core program, out of which one course must be in the concentration area, while the others can be taken as electives. Students may take relevant courses outside the department provided they secure departmental approval.

PhD Qualification Exam Part I and Part II

Upon completion of a minimum of 15 credits of graduate courses with a cumulative GPA of 3.7 or above in the four core courses, the student should sit for PhD Qualification Exam Part I (written comprehensive examination) to determine whether s/he has acquired the background necessary to continue in the PhD program.

After choosing a thesis advisor, the student should pass the PhD Qualification Exam Part II; the student must formulate, submit, and defend a thesis research proposal to demonstrate a capacity to pursue and complete a doctoral research project.

For more information, refer to the section on PhD Qualifying Exam under General University Academic Information.

Candidacy

Refer to the section on Admission to Candidacy under General University Academic Information.

PhD Thesis and Thesis Defense

Refer to the section on PhD Thesis Format and PhD Thesis Defense under General University Academic Information.

Residency Requirements

Refer to the Residency Requirements section under General University Academic Information.

Graduation Requirements

A student is granted the PhD degree upon approval of the PhD thesis committee in a public session. In addition to the general graduation guidelines specified by the university, the Physics Department also requires that part of the PhD thesis work be published or accepted for publication in a refereed journal by the time of graduation.

Timetable

A student is expected to abide by the following timetable:

- Finish the graduate course work (a minimum of 36 credits after the BS) within 8 terms of starting the graduate study program
- Pass the qualifying exam upon completion of 15 credits, within 3 terms of starting the graduate study program
- Students in the accelerated track should choose a thesis advisor within four terms of starting the graduate study program
- Defend the PhD thesis proposal within 6 terms and advance to candidacy within 7 terms of starting the graduate study program
- Present research work by submitting her/his thesis to the thesis committee and defending it in a public session. The total length of the PhD should not exceed 5 years for the regular track and 6 years for the accelerated track.

Financial Support

The Physics Department offers, on a competitive basis, substantial financial support. For full-time students, it covers tuition and includes a monthly stipend. There are also some funds

available to support participation in two international conferences during PhD study. In return, students help in teaching undergraduate labs and recitations of introductory courses. Their duties may also include help in proctoring and correcting exams.

Course Descriptions

PHYS 301 Classical Mechanics 3.0; 3 cr.
D'Alembert's principle, variational principles and Euler Lagrange's equations, rigid bodies and small oscillations, Hamilton's mechanics, canonical transformations and Hamilton- Jacobi theory, stability, integrable systems and chaotic motion. Annually.

PHYS 302 Statistical Mechanics 3.0; 3 cr.
Statistical ensembles, Boltzmann distribution, density matrix, Fermi-Dirac and Bose-Einstein statistics and applications, phase transitions, mean-field theory and applications. Annually.

PHYS 303 Electromagnetic Theory 3.0; 3 cr.
Boundary-value problems in electrostatics, multipoles, dielectrics, magnetostatics, time-varying fields and Maxwell's equations, electromagnetic waves. Annually.

PHYS 305 Quantum Mechanics 3.0; 3 cr.
Hilbert space formulation of quantum mechanics; theory of angular momentum; Euler rotation; addition of angular momenta; symmetries and conservation laws: time reversal, parity, discrete symmetry; path-integral formulation of quantum mechanics, approximation methods, identical particles, elementary scattering theory. Annually.

PHYS 306 Introduction to Quantum Field Theory 3.0; 3 cr.
Unifying quantum theory and relativity; relativistic quantum mechanics: Klein- Gordon equation, scalar field, second quantization, Dirac's equation and Dirac's field. Interaction fields and Feynman diagrams, quantization of the electromagnetic field. Prerequisite: PHYS 305.

PHYS 307 Mathematical Methods of Physics 3.0; 3 cr.
The course provides an intensive overview of mathematical methods which are essential to the toolbox of any graduate student of physics, whether pursuing experimental or theoretical research. Topics covered include: Complex Variable Techniques, Special Functions, Integral Transforms, Hilbert Spaces, Ordinary and Partial Differential Equations, Green's Functions, Calculus of Variations, Transformation Groups. The course is open to graduates and advanced undergraduates in mathematics, the natural sciences and engineering with instructor permission.

PHYS 308 Advanced Mathematical Methods of Physics 3.0; 3 cr.
The course will equip students with the requisite mathematical tools in analysis, algebra, geometry and topology to appreciate current developments and pursue research in theoretical physics. It covers elements of topology, group theory, linear algebra, Lie groups, Lie algebras and their representations, differentiable manifolds, tensor analysis, differential forms, pseudo-Riemannian geometry, connections and covariant derivatives, curvature and torsion. Computational skills acquired after reading the course will surely prove essential for research in gravitational and theoretical high energy physics, but also for working through fundamental problems in the fields of dynamical systems theory, fluid mechanics and/or thermodynamics. The course is of natural interest to graduate and advanced undergraduate students of physics, but should be equally relevant to students in mathematics, the natural sciences, and engineering.

PHYS 309 Advanced Experimental Physics 1.6; 3 cr.
A weekly lecture on laboratory techniques and data analysis, and a selection of three experiments based on current research at AUB: fluid dynamics, thin films and nanostructured materials, Plasma physics, Thermal physics and opto- thermal techniques, magnetism and magnetic resonance, Microscopy for material characterization.

PHYS 310 Special Topics 3.0; 3 cr. (each)
May be repeated for credit.

PHYS 311 Astrophysics I 3.0; 3 cr.
Stars: observational properties, population, spectra analysis; stellar matter: atomic processes, equation of state including degeneracy effects; stellar structure: differential equations of stellar structure, radiative and convective energy transport, thermonuclear reactions nuclear fusion processes; stellar evolution: discussion of the evolutionary phases of stars, stellar stability and pulsations; final stages of stars: supernovae, white dwarfs, neutron stars and black holes; star formation.

PHYS 312 Astrophysics II 3.0; 3 cr.
Close binary stars and accretion disks. Physics of interstellar medium: heating, cooling, radiative transfer, physics of interstellar dust grains. Dynamics of stellar systems: morphology and dynamics of stellar populations in Galaxies, N-body simulation, spiral structure. Galaxies: galactic morphology, stellar content of galaxies, general properties of galaxies. Galactic evolution: formation of galaxies, stellar populations. Expanding universe: cosmological models, primeval fireball, cosmological red shift.

PHYS 313 Differential Geometry and General Relativity 3.0; 3 cr.
Differential manifolds. Tangent vectors. Vectors and tensor fields. Lie derivatives. Differential forms. Affine connections: covariant derivatives. Curvature and torsion Tensors. Principal of equivalence. Einstein filed equations. Schwarzschild solutions and classical test of general relativity. Weak gravitational fields. Post-Newtonian approximation.

PHYS 314 Non-Equilibrium Statistical Mechanics 3.0; 3 cr.
Phenomenological description of transport processes: diffusion, thermal conduction and Brownian motion. General microscopic approaches: Liouville's and von Neumann's equations. Boltzmann's equation and H-Theorem. Linear response theory: time-dependent correlation function, Green-Kubo formula, fluctuation-dissipation theorems. Stochastic evolution: Markoff process and master equation, correspondence between Langevin and Fokker-Planck pictures, kinetics of phase transitions. Prerequisite: PHYS 302.

PHYS 315 Particle Cosmology 3.0; 3 cr.
Relativistic cosmology: Friedmann equations and their solutions, Hubble diagram. Hot Big Bang model: statistical mechanics of the expanding universe, microwave background, primordial nucleosynthesis, GUT model for baryon asymmetry. Structure formation: Newtonian perturbation theory, gauge invariant relativistic perturbation theory, the large-scale structure of the universe. Inflation theory. Prerequisite: PHYS 313.

PHYS 316 Physics of Soft Matter 3.0; 3 cr.
Overview: liquid crystals, polymers, colloids. Statistical mechanics of correlation and order: scattering, structure factor, response function. Application to liquid crystals: generalized elasticity, nematic-to-smectic transitions. Application to polymers: random and self-voiding walks, coil-to-globe transitions, self-organization of amphiphilic macromolecules. Application to colloids and foams. Prerequisite: PHYS 302.

PHYS 317 Group Theory and Symmetry in Physics 3.0; 3 cr.
Group theory: subgroups, conjugate cases, direct products. Group representation: unitary spaces, unitary representations, Shur's Lemma, orthogonality, tensor products, conjugate classes, Young tableaux. Group theory and quantum mechanics. Point groups: proper rotation group, crystallographic point groups. Space groups. Continuous groups: transformation groups, generators, Lie groups and algebras, Yacobi identity. Application of SU(2). Isospin. Tensor products. Tensor methods: irreducible representations and symmetry, invariant tensors, Clebsch-Gordon decomposition. Application of Lie groups to particle classifications: SU(5) and SO(10).

PHYS 318 Standard Model of Particle Physics 3.0, 3 cr.
Renormalization and renormalization group. Group theory and the quark model. Chiral anomaly. Gauge theories and quantization. Quantum Chromodynamics. Spontaneous symmetry braking. Electroweak symmetry. Standard model of elementary particles. One loop structure and one loop processes.

PHYS 319 String Theory 3.0; 3 cr.
Classical Bosonic string. Quantized bosonic string. Conformal field theory. String perturbation theory. Classical Fermionic string. Quantized fermionic string. Spin structures and superstring partition functions. Heterotic strings. D-branes. Orbifolds. Calabi-Yau compactification.

PHYS 322 Thin Films Physics 3.0; 3 cr.
Introduction to surface and thin films physics: definitions, importance in basic research, impact on technology and society. Ultra-high vacuum techniques and processes: kinetic theory concepts, surface preparation procedures; surface chemical composition: XPS, AES, SIMS, GIXRD. Thin film deposition: evaporation, plasma, laser and ion beam processing; physical and chemical vapor deposition techniques. Surface morphology and physical structure: surface energy, reconstruction, 2-D lattices, nucleation and growth of thin films, microscopy techniques. Theory of surface scattering; inelastic scattering and dielectric theory; electron-based techniques: LEED and RHEED, RBS. Epitaxy: atomistic models and rate equations; steps, ripening and interdiffusion; HRXRD. Conduction and magnetism in thin films; superconductivity; optical and mechanical properties. Pre- or corequisite: PHYS 302.

PHYS 323 Plasma Physics 3.0; 3 cr.
The motion of a single particle (electron or ion) subject to electromagnetic forces; fluid equations for electrons and ions; guiding center description; collisional phenomena occurring in plasmas and the resultant diffusion; propagation of high and low frequency electromagnetic waves in plasmas; description of the plasma as a single fluid; the magneto-hydromagnetic (MHD) equations; MHD instabilities and their effects on the plasma; applications of plasma physics. Pre- or corequisite: PHYS 303.

PHYS 324 Electron Paramagnetic Resonance 3.0; 3 cr.
The electronic Zeeman interaction and the resonance phenomenon, group theory: the rotation group, the spin-Hamiltonian and the spectrum, the lanthanide 4f group, the actinide 5f, ions of the 3d group in intermediate ligand fields and some experimental aspects of EPR. Pre- or corequisite: PHYS 305.

PHYS 330 Principles of Environmental Physics 3.0; 3 cr.
Scope of environmental physics, review of gas laws, transport laws, radiation environment, microclimatology of radiation, momentum transfer, heat transfer, mass transfer, steady state heat balance, crop meteorology, energy for human use and environmental spectroscopy. Not open to physics graduate students. Prerequisites: PHYS 204 and PHYS 205 or equivalent, and some knowledge of calculus.

PHYS 391 Graduate Tutorial 1-3 cr. (each)
May not be repeated for credit.

PHYS 395A Comprehensive Exam 0 cr.
Prerequisite: Consent of advisor.

PHYS 399 Thesis 9 cr.
Thesis.

PHYS 480 Qualifying Exam Part I: Comprehensive Exam 0 cr.
Every term.

PHYS 481 Qualifying Exam Part II: Defense of Thesis Proposal 0 cr.
Every term.

PHYS 484 PhD Thesis 30 cr.
Every term. To be taken only by regular track PhD students. Taken at first thesis registration, then registered for every subsequent term with sequential letter annotations (A-L; 0 credits) until completion of thesis work.

PHYS 488 PhD Thesis 42 cr.
Every term. To be taken only by accelerated track PhD students. Taken at first thesis registration, then registered for every subsequent term with sequential letter annotations (A-L; 0 credits) until completion of thesis work.

The choice to register for PHYS 484 or PHYS 488 should be done in consultation with the thesis advisor to ensure that the total number of PhD thesis credits and PhD course credits are met as per AUB rules and regulations.

Department of Political Studies and Public Administration (PSPA)

Chairperson:	Geukjian, Ohannes
Professor:	Khashan, Hilal
Associate Professors:	Frangie, Samer; Geukjian, Ohannes; Haddad, Tania; Khodr, Hiba; Makdisi, Karim; Tell, Tariq
Associate Professor of Practice:	Bahout, Joseph
Assistant Professors:	Kosmatopoulos, Nikolas; Mouawad, Jamil
Distinguished Professor of Public Policy Practice:	Nahas, Charbel
Senior Lecturer:	Bayrakdarian, Nora
Lecturers:	Akoum, Waleed; Al-Maleh, Rand; Awada, Ghada; Douaihy, Michel; Kachar, Simon; Muhanna, Zeina; Shaar, Rima; Sfeir, Antoine
Instructors:	Ajamian, Melissa; Hankir, Samer; Shibli, Rabih; Yacoubian, Vera

The Department of Political Studies and Public Administration (PSPA) offers three graduate programs: one leading to the degree of Master of Arts in Political Studies (POLS), one leading to the degree of Master of Arts in Public Administration (PUBA), and one leading to the degree of Master of Arts in Public Policy and International Affairs (PPIA).

Graduate students in POLS and PUBA are required to complete 24 credit hours of courses (of which no more than 6 credit hours can be taken outside the major) and defend a thesis (worth 6 credits) in front of a thesis committee. PPIA students are required to complete 24 credit hours of courses (of which no more than 9 credits can be taken outside the program with the Director's permission) and defend either a thesis (worth 6 credits) or a project (worth 3 credits) and internship (3 credits).

MA in Political Studies

Students majoring in Political Studies are required to take two core courses, which must include PSPA 300 and one of PSPA 301, PSPA 310, PSPA 320. Students are encouraged to complete all core courses by the end of their second semester. Other major courses can be taken from the following list in Political Theory: PSPA 301 to PSPA 309, International Politics: PSPA 310 to PSPA 319, Comparative Politics: PSPA 320 to PSPA 329, Environmental Politics: PSPA 341 to PSPA 346, and Public Administration: 350 - 383. The remaining elective course can be taken within the major or any other relevant field (including a foreign language).

MA in Public Administration

Students majoring in Public Administration are required to take the following core courses which include PSPA 300, PSPA 350, PSPA 351 and PSPA 352. Students are encouraged to complete all core courses by the end of their second term. Three additional graduate courses are required from one of the following sub-disciplines: Public Management: PSPA 363, PSPA 370, PSPA 371, PSPA 372, PSPA 373 and PSPA 374 add PSPA 380; PSPA 382; and Public Policy: PSPA 360, PSPA 361, PSPA 362 and PSPA 381; PSPA 383. **The MA program is currently under review**.

Course Descriptions

PSPA 300 Methodology and Research Design 3.0; 3 cr.
An introduction to the philosophy of science and how it influences the choice of research design. Emphasis is on developing skills that are useful for any method (survey, research, comparative historical analysis, game theory). The objective is to provide students with the practical tools they need to successfully complete original research. Core course. Annually.

PSPA 301 Political Theory 3.0; 3 cr.
A course that provides critical examination and analysis of the theoretical bases and perennial issues of political theory and ideologies. Core course. Annually.

PSPA 302 The Modern Project 3.0; 3 cr.
The aim of this course is to explore the various intellectual, academic and political debates around the notion of modernity. Topics covered in this seminar include: modernity; modernization and the modern project; reason and rationalization; religion and secularization; knowledge, post-colonialism and post-modernism; and other related topics. Occasionally.

PSPA 303 Islamic Political Thought 3.0; 3 cr.
An in-depth course on modern Islamic political thought. This course focuses on the historical and intellectual developments that have fueled both revolutionary and conservative trends in Islamic political movements and states. Discussions cover issues such as the relationships between religion and politics, political philosophy and ideology, and political action and revolution. Occasionally.

PSPA 304 Theories of Political Economy 3.0; 3 cr.
A course that surveys various theories and theorists such as Marxism, Polyani, rational choice and the new institutionalism. It introduces students to the study of how the political system and economy interact. Occasionally.

PSPA 305 Political Theory in the Arab World 3.0; 3 cr.
The aim of this course is to explore various intellectual and political debates in the modern Arab world. The course will provide an overview of the development of modern Arab political thought and will present some of the main intellectual and academic debates in this domain. Topics covered in this seminar include: modernity and tradition, orientalism and the West, nationalism, Marxism, liberalism and other related topics. Alternate years.

PSPA 306 Research Methods and Techniques 3.0; 3 cr.
A course that deals with various methods of data collection and analysis. Specific research methods include both quantitative and qualitative techniques such as experimental, survey, field observation, content analysis, historical/comparative and evaluation. Occasionally.

PSPA 307 Knowledge and Power 3.0; 3 cr.
The course explores different aspects of the relationship between knowledge and power. It draws on different philosophical and sociological traditions in political theory to shed light on core cognitive, social, and ethical aspects and dilemmas that concern social scientists both as knowledge-producers who reflect onto power as a conceptual and empirical reality, and as social agents who are themselves inscribed in structures and relations of power. Occasionally.

PSPA 309 Special Topics in Political Theory 3.0; 3 cr.
May be repeated for credit. Occasionally.

PSPA 310 International Politics 3.0; 3 cr.
This seminar provides a survey of the discipline of international politics and contemporary research in the field. In addition to covering central theoretical perspectives in international relations theory, the course will introduce students to contemporary debates in international politics and policy with an emphasis on topics and themes relating to the Middle East. Students will develop critical thinking and analytical writing skills through close reading of key texts and writing exercises. Core course. Annually.

PSPA 311 International Politics and the Middle East 3.0; 3 cr.
This seminar deals with issues and themes relevant to contemporary Middle Eastern politics within the context of international relations. It explores how the politics of the Middle East, US policy in the Middle East, and the Middle East as a regional system have been understood and represented through the lens of international relations theory and scholarship. Topics include: the evolution of the Middle East state system, Arab Nationalism and the Cold War, the Arab-Israeli conflict and US policy towards Israel and the Palestinians, the geopolitics of oil and the Gulf, the Iraq War and its regional consequences, Iran's role in the Arab world, the question of empire and the future of US grand strategy, and Lebanon's position in regional politics. Annually.

PSPA 312 Public International Law 3.0; 3 cr.
A course that aims to provide an understanding of the principles underlying public international law, which facilitates relations among states, resolves disputes, protects human rights, allocates resources and restricts conduct during war time. Emphasis is placed on subfields of international law most closely connected to international politics such as the legal consequences of very serious violations of international law, the role played by the United Nations or the legal regulation of the use of force. Reflecting upon the kind of role international law plays in the conduct of international relations, this course includes many recent case studies and tackles some of the major debates in the field. Annually.

PSPA 313 International Security 3.0; 3 cr.
Security motives play an essential role in international politics, particularly in the conduct of international relations. This course deals with major issues in international security that may include arms control, disarmament, as well as new types of threats, such as terrorism or environmental degradation. It covers traditional and less traditional perspectives on the field. Occasionally.

PSPA 314 The UN and International Politics 3.0; 3 cr.
This seminar examines the role of the United Nations (UN) within the context of international politics, security and development. It focuses on the UN role in the Global South, particularly the Arab region. The course explores theoretical perspectives on the role of the UN in world politics and traces the evolution of UN institutions, in particular UN peacekeeping, from the Cold War to post-Cold War period including the war on terror. It then considers a series of

case studies in depth. The course will include, when possible, guest presentations from UN officials and a field trip to better appreciate the conditions within which UN operations work. Occasionally.

PSPA 315 Arab-Israeli Conflict 3.0; 3 cr.
This seminar examines whether a solution between Palestinians and Jewish Israelis is possible in the historic land of Palestine, and if so how. The course takes a historical approach to trace the root causes of the conflict and understand the main narratives that drive the Palestinian and Jewish national movements, as well as to understand the larger context and structure within which these narratives take place. It also tracks the long history of peace initiatives put forward by the great powers – starting with the UN partition plan and ending with the post Cold War, US-sponsored peace process – and how the shifting in international rules and norms that underlie these initiatives have both shaped and reflected the realities on the ground in terms of both power and resistance. Annually.

PSPA 316/ENSC 650 International Environmental Policy 3.0; 3 cr.
A course that seeks to provide a broad overview of the key concepts, actors and issues related to global environmental policy. This course outlines the evolution of environmental policy in facing global environmental challenges and how such policies have become inherently intertwined with government policy, business practice and international trade. Annually.

PSPA 317 International Political Economy 3.0; 3 cr.
This course provides a critical examination of the politics of international economic relations, global economic development, and transnational economic activity with a special emphasis on the position and experiences of the Middle East states in the global political economy. The course offers a survey of theoretical approaches to international political economy and addresses themes critical to the experience of the Middle East such as state-led industrialization, trade and regionalism, finance, oil, labor migration, MNCs, transnational movements, globalization, neo liberalism, and the politics of development and global governance. Occasionally.

PSPA 318 Theories of International Relations 3.0; 3 cr.
The seminar offers a critical study of readings drawn from the major theoretical traditions (realism, liberalism, constructivism) in international relations theory as well as critical approaches and trends. Occasionally.

PSPA 319 Special Topics in International Politics 1.0-3.0; 1-3 cr.
May be repeated for credit. Occasionally.

PSPA 320 Theories of Comparative Politics 3.0; 3 cr.
A survey of various paradigms in comparative politics, focusing on behavioralist, institutional, development and radical approaches. Themes such as structure of power, state-society relations, political development, political culture and political economy are emphasized. Core course. Annually.

PSPA 321 Contemporary Politics in Middle Eastern States 3.0; 3 cr.
A course that analyzes contemporary politics in selected Middle Eastern states. This course emphasizes the problems of political participation, effective governance and socio-economic development. Occasionally.

PSPA 322 Contemporary Politics in Non-Middle Eastern States 3.0; 3 cr.
A course that examines political institutions, processes and problems facing governments in selected countries outside the Middle East. This course focuses on topics such as authoritarian systems, relations between the public and private sector, and politics of collective identity. Occasionally.

PSPA 323 Communalism in the Middle East 3.0; 3 cr.
A course that deals with the emergence of ethnic and religious issues in the Middle East, with emphasis on post World War I developments. This course addresses the situation of minority groups, the nature of their demands and their prospects of achieving them. In addition, this course assesses the impact of localism on the nation-state in the region. Annually.

PSPA 324 Government and Politics in Lebanon 3.0; 3 cr.
A course that examines the evolution of the political system and the different approaches to the study of government institutions in Lebanon. This course focuses on patterns of change involving state and society from the founding of the state in the early 1920s to the present. Occasionally.

PSPA 325 Political Trends in the Middle East 3.0; 3 cr.
This course examines the genesis and evolution of major political trends that have been impacting the Middle East and North Africa since the latter part of the nineteenth century, especially colonialism, nationalism and nation-building, transnational political conflict, religious extremism, the politics of oil and security issues. Occasionally.

PSPA 329 Special Topics in Comparative Politics 3.0; 3 cr.
May be repeated for credit. Occasionally.

PSPA 330 Graduate Tutorial in Political Science 3.0; 3 cr.
A graduate seminar in which selected topics are arranged on an individual basis where existing courses do not offer the required subject matter. May be repeated for credit. Annually.

PSPA 341/ENSC 657 Environmental Regulation and Legislation 3.0; 3 cr.
An introduction to contemporary legislative approaches to environmental protection, the rationales for their embodiment in policies, and their effectiveness in achieving prescribed goals and alleviating environmental degradation. This course also examines the emergence of environmental initiatives in developing countries with a focus on the latest developments in Lebanon. Occasionally.

PSPA 343/ENSC 658 Environmental Conflict Resolution 3.0; 3 cr.
An introduction to contemporary approaches to global environmental negotiation and conflict resolution, including the efforts of international organizations at risk communication, mediation and facilitation. This course focuses on procedures to manage negotiations of environmental conflicts and disputes between governments, corporations, ecologists, the media and the general population. Information is also provided on environmental dispute cases successfully resolved. Alternate years.

PSPA 345 Special Topics in Environmental Policy and Politics 3.0; 3 cr.
May be repeated for credit. Occasionally.

PSPA 346 Special Topics in Natural Resource Policy and Politics 3.0; 3 cr.
May be repeated for credit. Occasionally.

PSPA 350 Foundations of Organization Theory 3.0; 3 cr.
This seminar is an advanced study and analysis of the development of organization theory, from its foundations and origins up to the present. It takes an interdisciplinary approach that reviews the key critical readings and debates with their different levels of abstraction and analysis as well as their lasting contributions. It also discusses the contemporary research activities and findings in the field of organization theory. Core course. Annually.

PSPA 351 Foundations of Public Administration 3.0; 3 cr.
This seminar is an advanced study and analysis of the field of public administration, from its foundations and origins up to the present. It covers topics such as: historical public administration, the traditional model of public administration, new public management and collaborative public administration. The course will also review contemporary research activities and findings related to public administration. Core course. Annually.

PSPA 352 Foundations of Public Policy 3.0; 3 cr.
This seminar covers topics related to the substance, methods and frameworks of public policy in a variety of disciplines including: welfare economics, political science, political economy and organization theory. Emphasizing the role of theory in empirical policy research, the course illuminates the various policies and policy challenges in the following substantive areas: economics, education, the environment, national security and immigration. Core course. Annually.

PSPA 360 Public Policy Research and Analysis 3.0; 3 cr.
This seminar provides an introduction to policy analysis typologies, policy tools and the factors that shape the utilization of policy analysis. It is designed to give students the theoretical and practical exposure to the process of analyzing public policy as well as to its relevant qualitative, survey and mixed method approaches and techniques. Annually.

PSPA 361 Public and Non-Profit Program Evaluation 3.0; 3 cr.
This seminar introduces students to the theoretical and practical foundations underlying the use of program evaluation in the public and non-profit sectors. Based in large part on the logic-model process of program evaluation, it reviews the quantitative and qualitative techniques used by managers to analyze program processes, outputs and outcomes. It also considers issues such as client management, data collection, data presentation and research ethics. Annually.

PSPA 362 Public Policy and Administration 3.0; 3 cr.
This seminar covers topics and frameworks related to the substance and approaches of public policy as they relate to public administration. Students will engage in a serious analysis of the economic, social and cultural assumptions that underpin government and its relationship to the polity. The course is also designed to give students an organized opportunity to investigate their own interests within a specific key policy area. Annually.

PSPA 363 Public Financial Management 3.0; 3 cr.
This seminar examines the theory, practice, concepts and problems related to the administrative and political management of public financial resources and public sector budgeting. It reviews how economic, political, social and institutional factors, and resources are transformed into budgetary policy. It analyzes the organizational, structural, managerial and legal aspects of the public budget, as well as the most important problems in the phases of the public budget cycle. Annually.

PSPA 370 Human Resource Management and Development 3.0; 3 cr.
This seminar explores theories and models of human resource management, including the policies and processes that relate to governmental personnel. It acquaints students with the authority, responsibility, functions and problems of the human resource management in areas such as staffing, human resource development, performance appraisal, teamwork and compensation. The seminar examines personal and professional issues related to modern Human Resource Management (HRM) from recruitment to termination. The emphasis is on developing familiarity with the real-world applications required of employers and managers. Annually.

PSPA 371 Public Management 3.0; 3 cr.
This seminar investigates the conceptual and practical boundaries of public management reform initiatives from a comparative perspective. Moving beyond the foundations of traditional public administration, topics covered include performance and personnel management, privatization, e-government and accountability. The limits of public management will also be considered. Annually.

PSPA 372 Leadership and Management of Public Organizations 3.0; 3 cr.
This seminar examines the distinction between leadership and management from theoretical and applied perspectives. It also analyzes the major theories of leadership and assesses their impact on group and individual behavior in light of personality differences and cross-cultural management. Alternate years.

PSPA 373 The Ethics of Public Administration 3.0; 3 cr.
This seminar covers contemporary perspectives on ethics and ethical behavior in government. It focuses on the interactions between government and society and analyzes the political, legal, economic and social environments of societal organizations. Some of the contemporary issues addressed are: transparency, accountability and responsiveness, corruptive practices in public administration, administrative discretion and social justice. Alternate years.

PSPA 374 Non-Profit Management 3.0; 3 cr.
A course that examines the development and characteristics of non-profit management systems, managerial challenges, and the application of theories and mechanisms relevant to non-profit management. This course covers topics such as organizational structure, financial management, board-executive relations and public-private cooperation. Alternate years.

PSPA 380 Special Topics in Public Administration 3.0; 3 cr.
May be repeated for credit. Occasionally.

PSPA 381 Special Topics in Public Policy 3.0; 3 cr.
May be repeated for credit. Occasionally.

PSPA 382 Graduate Tutorial in Public Administration 3.0; 3 cr.
A tutorial in which selected topics are arranged on an individual basis where existing courses do not offer the required subject matter. May not be repeated for credit. Annually.

PSPA 383 Graduate Tutorial in Public Policy 3.0; 3 cr.
A tutorial in which selected topics are arranged on an individual basis where existing courses do not offer the required subject matter. May not be repeated for credit. Annually.

PSPA 395A Comprehensive Exam 0 cr.
Prerequisite: Consent of advisor.

PSPA 399 Thesis 9 cr.
Thesis.

MA in Public Policy and International Affairs

The PPIA program is open to graduates from various backgrounds who wish to pursue professional or academic careers in public affairs; as well as to mid-career professionals in Lebanon, the region and internationally who wish to deepen their multidisciplinary knowledge of the relevant fields or acquire new ways of thinking and policy tools.

Program Goals and Learning Outcomes

The program is centered on articulating public and international policy perspectives that are well contextualized in political, economic, social and structural terms. It incorporates the specificities and particularities of the Arab world and its many constituents; links academia to the various policy communities; and seeks to increase interaction and knowledge production within a South-South context.

On successful completion of this multi-disciplinary course of study, students will be able to:

- Explain core theories and processes of public policy and international affairs
- Apply techniques and methodologies in public and international policy research
- Critically analyze key policy and international affairs issues
- Demonstrate oral and written communication skills in public and international policy arenas
- Formulate domestic and international public policy alternatives and arguments
- Critically appraise the validity and limitations of domestic and international public policy theories and arguments

Admission Requirements

Admission requirements to the program will follow FAS admissions policies. Admission to the MA in PPIA is restricted to the fall term. Applicants are generally expected to have a BA degree in a social science field (broadly defined) or one relevant to public policy and/or international affairs, or else professional experience in public policy and/or international affairs as it relates to the Arab region. In all cases, a minimum of one-year work/policy experience is strongly recommended and more is encouraged.

Applicants must have a strong academic record, two letters of recommendation (at least one must assess academic rather than professional abilities), and a statement of purpose that clearly outlines applicant's background and goals. In addition, applicants are recommended to submit a relevant writing sample of no longer than 5,000 words.

Degree Requirements

The program permits full-time or part-time enrollments. To obtain a Master of Arts degree in Public Policy and International Affairs, the student must complete a minimum of 24 credits of graduate coursework and a thesis (6 cr.) or a final project (3 cr.) plus an internship (3 cr.). Course work must include the two core courses (PPIA 301 and PPIA 302), the required methods course (PPIA 308 or approved equivalent), plus five elective courses including at least two PPIA courses that are relevant to the student's program of study.

Credit Summary

Required courses	
Core courses (2)	6 cr.
PPIA 308 Research Methods (or equivalent approved by director) Upon approval of the PPIA director, a student may substitute a relevant methods course for PPIA 308 Research Methods	3 cr.
Additional PPIA courses (2)	6 cr.

Open Elective courses (3)	9 cr.
Thesis (6 cr.) or (Internship (3 cr.) + Project (3 cr.))	6 cr.
	30 cr.

Core Courses	
PPIA 301	Public Policy and Practice
PPIA 302	International Affairs and Policy

Thesis and Project Tracks

Thesis Track

To follow the thesis track, students must first gain approval of a thesis committee that includes members of the PPIA program faculty, and of the FAS Graduate Studies Committee, of a thesis proposal and then defend the completed Master's thesis. Students are expected to uphold the highest standards of academic integrity, scientific rigor and professional relevance while presenting their findings. All accepted projects should be deposited at the library.

Project Track

Students are expected to complete an internship (3 cr.) plus a project (3 cr.).
PPIA students are encouraged to pursue a project track as part of their degree requirements. The project allows students to investigate an issue of relevance to public policy or international affairs in line with their personal research interests. It comprises a compulsory written academic part that tests the student's skills in framing a project in scholarly terms (e.g. conduct basic relevant literature review) and analyzing relevant lessons learned in terms of experience, communication, collaboration, impact and ethics in regards to the project. The remainder of the project depends on the type agreed with the faculty chair and committee, and can be professional, policy or community based. Each student is assigned a committee consisting of an advisor (first reader) and a second reader who jointly supervises and guides the student throughout. It is the responsibility of the student to select a topic and submit a project proposal to be approved by her/his readers and then by the FAS Graduate Studies Committee. While the projects can be presented in diverse forms, students are expected to uphold the highest standards of academic integrity, scientific rigor and professional relevance while presenting their findings. All accepted projects should be deposited at the library. A student who is unable to finish the project within the allotted time period can petition to be allowed an additional semester subject to consent of his committee.

Internship

All project track students are required to complete an internship. Internships offer an exploration of public policy and international affairs through work experience in governmental, non-governmental, or private sector organizations. Students are responsible for securing their internships and having the PPIA program confirm that they meet AUB guidelines. Internships for credit require about 45 contact hours with about 90 hours of work beyond this (total 135 hours or about 10 hr/wk for 3 months). To register for internship the student must have his/her supervisor confirm to the PPIA program in writing at the beginning of the internships that the internships meets these guidelines. At the end of the internship, the supervisor must confirm in writing that these guidelines have been met. Upon completion, the student will write up a short report about the internship that will form a PPIA internship database. Internships can also be taken as an elective course for those on the thesis track.

Course Descriptions

PPIA 301 Public Policy and Practice 3.0; 3 cr.
The course covers topics related to the formation, development and evolution of frameworks of public policy. It compares theories and models of policy-making and decision-making to illustrate the special requirements of the country's context and environment. It examines the roles of various participants in the policy process: legislators, political parties, interest groups, civil society groups, media, administrative structures, citizens and the judiciary. Using a comparative perspective, the course discusses how public policy is formulated, and how and why it changes. The course also examines the role of formal and informal institutions, actors, structures and networks including challenges. The course provides students with an increased understanding of theories of public policy, and the ability to critically analyze and compare public policy. Annually.

PPIA 302 International Affairs and Policy 3.0; 3 cr.
The seminar provides a survey of international affairs and policy. In addition to covering central theoretical perspectives, the course will introduce students to contemporary political, economic, social, and/or environmental issues as well as relevant actors and institutions with a special focus on those relevant to Lebanon and the Arab world. Students will develop critical thinking and analytical writing skills through close reading of key texts and writing exercises. Student engagement will include activities such as class presentations and participation in policy simulations. Annually.

PPIA 304 Development 3.0; 3 cr.
This course offers students historical, political and policy analysis of development both as a reality and as a concept and discipline in the social sciences. It explains the emergence and continuing relevance of development, offering particular critical attention to the close interdependence between development paradigms, international institutions (UN System, World Bank) and global political economy. The course deepens and broadens students' historical understanding of the antecedents behind contemporaneous global and local development issues and challenges with a critical focus on the interdependence between science, advocacy and policy. Annually.

PPIA 306 Political Economy 3.0; 3 cr.
This course starts from the premise that history matters and that a long-term view of production, power and social change is essential for understanding enduring patterns of wealth and poverty in the contemporary world. It goes on to provide students with an overview of scholarly debates on the causes and consequences of the rise of Europe, asking whether the historical literature on state formation and capitalist development helps us understand socio-political developmental success and failure in the Global South after WWII. By emphasizing the historical specificity of the structure of social power inherited from the agrarian past, the course tries to highlight the pitfalls of deploying models based on European example for understanding development and social change in other parts of the globe. Annually.

PPIA 307 Politics of Policy-Making 3.0; 3 cr.
The course provides an analysis of the politics of the policy-making process in its different stages, from elaboration to implementation, through the examination of a range of policy case studies (urban/spatial, development, environment, energy, social, health, etc.) at different scales (neighborhood, city, region, state, groups of states) and in different contexts (local, regional and international). It equips students to understand how policy ideas are framed into technical and normative discourses that depoliticize policy issues and neutralize power and inequalities. It trains them to identify, trace and deconstruct the political elements that determine how policy paradigms emerge, how policy windows come to be created, how policy actors mobilize, network and advocate their positions, and how policy agendas and tools are negotiated and assembled. It also approaches policy-making as a hybrid space between expertise and politics, science and democracy, nature and humanity. Occasionally.

PPIA 308 Research Methods 3.0; 3 cr.
This course provides students with an understanding of research language, concepts and ethics for the purpose of generating evidence-based research for policy-making. It introduces the elements of the research process within quantitative, qualitative and mixed methods approaches, with an emphasis on problem formulation, research design, data collection, analysis and reporting. The students will engage in identifying their main research question, selecting appropriate research methods, and designing the relevant data collection and fieldwork to address their research question. They will also learn how to present their research ideas as research proposals for academic, professional and other audiences. Students will also, throughout the course, be exposed to the variety of public policy tools used to communicate with different publics (memos, briefs, reports, etc.). Annually.

PPIA 309 Evidence, Policy and Communication 3.0; 3 cr.
This course introduces students to the types of questions that need to be answered to address and make improvements to public policy concerns and priorities, including what's the problem, what policy and programmatic options are best suited to address the problem, and how can change be brought about. This course will train students to use the knowledge translation tools and resources available to public policymakers and stakeholders in order to support their use of research evidence; and will enhance students' skills in assessing, selecting, adapting and applying research evidence. Students will experiment with key tools and resources to communicate with different types of policy makers including priority setting, evidence briefs, policy briefs, policy memos, personalized briefing and policy dialogues. This course will provide skills on how to prepare briefs and effective tips on how to communicate evidence (both published and tacit) to policy makers and the public. Annually.

PPIA 310 Topics in Public Policy 3.0; 3 cr.
Each semester, PPIA provides special topics elective courses in public policy. Courses have included: Humanitarian Intervention in Lebanon, Economic Crisis in Lebanon, Social Policy and Practice in the Arab region, Public Policy in the Arab world, Forced Migration, and Public Policy Analysis and Evaluation. May be repeated for credit. Annually.

PPIA 311 Topics in International Affairs 3.0; 3 cr.
Each semester, PPIA provides special topics elective courses in global/international affairs. Courses have included: Humanitarian Intervention in Lebanon, Economic Crisis in Lebanon, Social Policy and Practice in the Arab region, Geopolitics and Policy of Oil and Gas in the East Mediterranean, International law and Security, US and EU Foreign Policy in the Middle East, Public Policy in the Arab world, Forced Migration, International Environmental Policy, Iran and Global Nuclear Policy, and Researching Global. May be repeated for credit. Annually.

PPIA 314 The Global South 3.0; 3 cr.
The purpose of this course is to develop greater understanding of the evolution and history of the Global South. The course highlights the nature of changes within global frameworks and structures. While the course explores the common historical processes that unify the various states, societies and peoples within the global south (e.g. imperialism/colonialism; core/periphery; formation of the G77 block within the United Nations; etc.), it also unpacks the contradictions; class, race and gender discrepancies; power imbalances and other particularities within the Global South. Occasionally.

PPIA 321 Tutorial in Public Policy 1, 2, or 3 cr.
This course is designed to allow students to pursue a course of directed study with a faculty member. It may consist of independent research, directed reading, or policy-related work. Prerequisite: Consent of Instructor. Occasionally. May not be repeated for credit.

PPIA 322 Tutorial in International Affairs 1, 2 or 3 cr.
This course is designed to allow students to pursue a course of directed study with a faculty member. It may consist of independent research, directed reading, or policy-related work. Prerequisite: Consent of Instructor. Occasionally. May not be repeated for credit.

PPIA 395A Comprehensive Exam 0 cr.
Prerequisite: Consent of advisor.

PPIA 397 Internship 3 cr.
An exploration of Public Policy and International Affairs through work experience in governmental, non-governmental, or private sector organizations. Students perform work for academic credit. Prerequisite: Consent of Instructor and Program Director.

PPIA 398 Project 3 cr.
Project.

PPIA 399 Thesis 6 cr.
Thesis.

Department of Psychology

Chairperson:	Dietrich, Arne
Professors:	Dietrich, Arne
Assistant Professors:	Agopian, Sarine; Ayoub, Mona; Badaan, Viviene; Bosqui, Tania; Ismail, Ghena; Saade, Sabine
Lecturers:	Awaida, May A.K.; Fisher, Jennifer; Ouweidat, Hala
Instructors:	Bassil, Margaret; Majzoub, Hana
Professor Emeritus:	Kazarian, Shahe

The Department of Psychology offers a Master's Program in Psychology and a Master's Program in Clinical Psychology. Applicants to the Master's Program in Clinical Psychology are welcome to apply for fall admission only. There will be no spring admission into the Clinical Psychology program. Applicants to the Master's Program in Clinical Psychology must have completed a major, minor or the equivalent (15 credits) in Psychology.

MA in Psychology

The graduate program in Psychology is currently frozen.

Mission Statement

The overall mission of the graduate program in Psychology is to provide students with a strong foundation in psychological science. The program is characterized by both an emphasis on advanced research and statistical training as well as on a strong commitment to critical thinking. The faculty possesses expertise in social, cultural and political psychology, and in areas of learning, cognition and neuroscience. In realizing its mission, the Master's Program in Psychology is committed to the following goals and objectives: to provide education and training in the use of the scientific method in psychological research; to provide education and training in ethical practices in psychology; and to provide supervision of an empirical research study of publishable quality.

A candidate for the MA degree in Psychology is required to complete 21 graduate credit hours in addition to 9 thesis hours. The student must complete PSYC 301 and PSYC 302 and five additional graduate-level courses in psychology. One of these courses can be chosen from other graduate-level courses outside the department, according to the student's interest and with the consent of the advisor.

Psychology MA students will follow the following stream of courses:

Psychology Stream

PSYC 301, PSYC 302 and five courses from the following: PSYC 305, PSYC 310, PSYC 312, PSYC 314, PSYC 316, PSYC 318, PSYC 320, PSYC 350, PSYC 352, PSYC 360; in addition to the Comprehensive Exam, PSYC 395 and Thesis, GPSY 399. Students are required to pass PSYC 302 to be allowed to sit for the Comprehensive Exam.

MA in Clinical Psychology

Mission Statement

The mission of the Master's Program in Clinical Psychology is to educate and train graduate students in the science and practice of clinical psychology. Following the scientist-practitioner model, students will be prepared for doctoral study in clinical psychology or licensure in Lebanon leading to competent, ethical and socially responsible professional practice. In realizing its mission, the Master's Program in Clinical Psychology is committed to the following goals and objectives: to provide education and training in the scientific and professional foundations of the field of clinical psychology; to provide education and training in consideration of cultural diversity in the science and practice of clinical psychology; and to provide education and training in the ethics of research and professional practice.

The clinical psychology program has a two-track option. A candidate for the MA degree in Clinical Psychology must select either the research-track or the practitioner-track. Both tracks involve the completion of 30 credit hours in graduate coursework and 6 credit hours of Clinical Training Practicum. Students in the research-track must also complete 6 credit hours of Thesis, which involves the completion of an independent, empirical study, for a total of 42 credits. Students in the practitioner-track must complete 3 credit hours of a Clinical Project involving a comprehensive case study for a total of 39 credits.

Clinical Psychology Stream

PSYC 301, PSYC 302, PSYC 305, PSYC 350, PSYC 352, PSYC 354, PSYC 356, PSYC 358, PSYC 360, PSYC 362, PSYC 364, PSYC 366; in addition to the Comprehensive Exam, PSYC 395 and Thesis, CPSY 399 or Clinical Project, CPSY 398. Students are required to pass PSYC 302 to be allowed to sit for the Comprehensive Exam.

Course Descriptions

PSYC 301 Research Design in Psychology 3.0; 3 cr.
This course is the first part of the core research requirements for graduate students in psychology. It provides students with a solid foundation in the basic quantitative research methods and designs, addresses ethical issues in psychological research, and introduces students to statistical analyses that will be needed for PSYC 302 and the master's thesis. Annually.

PSYC 302 Statistical Analyses in Psychology 3.0; 3 cr.
An advanced course in statistical analyses for the social sciences. The course explores bivariate, multivariate and structural statistical analysis using SPSS; the course combines both lecture- and lab-based sessions. Prerequisite: PSYC 301. Annually.

PSYC 305 Ethics and Community-Based Learning in Psychology 3.0; 3 cr.
An in-depth-exploration of the ethical and professional issues in scientific and applied psychology, with a special focus on the role psychology plays in civic engagement and community-based learning. Topics include confidentiality, informed consent, competence, integrity and social responsibility. Optional opportunities to engage in community-based learning are available to students registered in this course. Annually.

PSYC 310 Advanced Social Psychology 3.0; 3 cr.
A critical survey of social-psychological theory and research, with special emphasis on cross-cultural variations; the course covers topics in social cognition and group processes. Alternate years.

PSYC 312 Systems Neuroscience 3.0; 3 cr.
An advanced course on the underlying neural mechanisms of human mental processes. Using primary and secondary literature, topics are approached from a systems level and include but are not limited to: decision-making, social cognition, control of action, creativity, language, cultural evolution, attention, memory, consciousness and brain- computer interfaces. Alternate years.

PSYC 314 Cognitive Methods 3.0; 3 cr.
This course provides students with an in-depth review of a theoretical or computational approach to studying human behavior (e.g., signal detection theory, Bayesian inference), with an emphasis on experimental techniques and procedures used to study one or more aspects of cognition, including perception, attention, memory and decision-making. Alternate years.

PSYC 316 Experimental Analysis of Behavior 3.0; 3 cr.
An advanced course in the psychology of learning and behavior analysis concerned with the theories of associative learning and operant conditioning. It explores the classical and operant conditioning paradigms from an experimental perspective. Alternate years.

PSYC 318 Special Topics in Psychology 3.0; 3 cr.
The topic varies from term to term. May be repeated for credit. Prerequisite: Consent of instructor.

PSYC 320 Graduate Tutorial in Psychology 3.0; 3 cr.
May not be repeated for credit. Prerequisites: graduate standing and consent of instructor. Annually.
PSYC 350 Advanced Psychopathology I 3.0; 3 cr.
A critical examination of the symptomatology, etiology and treatment of adult psychological disorders including but not limited to mood and anxiety, psychotic, personality, eating and substance-related disorders. Annually.

PSYC 352 Advanced Psychopathology II 3.0; 3 cr.
A course on the critical examination of childhood disorders including disruptive behavioral disorders, various anxiety and mood disorders and pervasive development disorders. Focus is placed on diagnosis and etiology including environmental and neurobiological influences of childhood psychopathology. Annually.

PSYC 354 Psychological Assessment 3.0; 3 cr.
The objective of this course is to provide students with the knowledge base and skills required to conduct a psychological assessment of a variety of mental health and neurological disorders. The course covers both psychometric and behavioral approaches to psychological assessment. Annually.

PSYC 356 Introduction to Cognitive and Behavioral Interventions 3.0; 3 cr.
This course provides an introduction to the theory and practice of cognitive and behavioral psychological interventions. These approaches will be contextualized within critical discussion of the empirically supported treatments and evidence-based practice movements. The course will survey key cognitive and behavioral approaches, including mindfulness and acceptance based “third wave” approaches. Annually.

PSYC 358 Introduction to Family Therapy 3.0; 3 cr.
A course on theories and practices of psychotherapy with families, couples and children. Students will gain a broad theoretical understanding of the various approaches to conducting family and couples therapy, including family systems, structural, strategic, solution-focused, behavioral and emotion-focused approaches. Annually.

PSYC 360 Psychopharmacology 3.0; 3 cr.
A course on the principles of neuropharmacology, neurochemical systems, and the current medications used to treat psychological disorders, including psychotic disorders, mood disorders, anxiety disorders, eating disorders, drug addictions, conduct disorders and attention deficit hyperactivity disorder. Annually.

PSYC 362A Clinical Practicum 3.12; 3 cr.
Clinical training at AUBMC, an approved clinical setting, under the direct supervision of qualified clinical academic faculty and/or qualified clinical staff in the practicum setting. 14 hours per week. Annually.

PSYC 362B Clinical Practicum 3.12; 3 cr.
Clinical training in an approved clinical setting outside AUBMC, under the direct supervision of qualified clinical academic faculty and/or qualified clinical staff in the practicum setting. 14 hours per week. Annually.

PSYC 364A Advanced Clinical Practicum 3.12; 3 cr.
Advanced clinical training at AUBMC, an approved clinical setting, under the direct supervision of qualified clinical academic faculty and/or qualified clinical staff in the practicum setting. 14 hours per week. Annually.

PSYC 364B Advanced Clinical Practicum 3.12; 3 cr.
Advanced clinical training in an approved clinical setting outside AUBMC under the direct supervision of qualified clinical academic faculty and/or qualified clinical staff in the practicum setting. 14 hours per week. Annually.

PSYC 366 Introduction to Psychodynamic Clinical Methods 3.0; 3 cr.
This course provides an introduction to the theory and practice of contemporary psychodynamic interventions. The course will cover current evidence-based psychodynamic approaches including transference-based psychotherapy, dynamic interpersonal therapy and mentalization therapy. Annually.

PSYC 395A Comprehensive Exam 0.0; 0 cr.
Prerequisite: PSYC 302 and consent of advisor.

PSYC 399 Thesis 9.0; 9 cr.
Annually.

CPSY 399 Thesis 6.0; 6 cr.
Annually.

Department of Sociology, Anthropology, and Media Studies

Chairperson:	Atwood, Blake
Director of Media Studies:	Burris, Greg
Professor:	Hanafi, Sari; Scheid, Kirsten
Associate Professors:	Atwood, Blake; Burris, Greg; Wick, Livia
Assistant Professors:	Carney, Josh; Farah, May; Kassir, Alexandra; Kosmatopoulos, Nikolas; Majed, Rima; Mourad, Sara; Perdigon, Sylvain; Saleh, Elizabeth; Sukarieh, Rana; Tarraf, Zeina
Lecturers:	Barakat, Rabie; Fathallah, Zeina; Hamdar, Sarah
Instructors:	Azar, George; Ghanem, Samar; Rassi, Rima; Seroujian, Narod
Part- Time Instructors:	Agha, Dina; Boustany, Nora

Admission

Requirements for admission into the MA program in Anthropology or Sociology are consistent with those of the Faculty of Arts and Sciences. Admission to the MA in Anthropology is restricted to the fall term. Applicants are required to submit two letters of recommendation and a statement of goals/research interests and experiences. Each student may be interviewed upon application to determine her/his background and qualification.

MA in Anthropology

The anthropology MA program offers students general training in sociocultural anthropology. AUB's program, especially with regard to its faculty's expertise in creative expression and arts production; mental health and well-being; cultural ethics; refugees; and medical, legal and historical anthropology, is distinguished by offering students the opportunity to develop a strong foundation in classical anthropological paradigms and to relate them to emerging concerns of modern Arab societies. Students will have the opportunity to study the development of the discipline by exploring classical and contemporary theories and by conducting original fieldwork or doing research on secondary sources. The program is designed to sensitize students to their responsibilities as anthropologists, expose them to fieldwork, help them acquire an understanding of anthropological theory and history, and inspire experimentation with the medium and form of ethnographic writing.

MA in Sociology

The MA in Sociology program offers students the opportunity to develop solid training and to acquire the necessary knowledge in the field of sociology. The department's faculty members cover several areas of research expertise, including contemporary sociological theory, comparative sociology, economic and political sociology, and cultural sociology. Other

substantive issues include citizenship and civil society, knowledge production, ethnicity and sectarianism, sociology of religion, transnationalism, migration and refugee studies, sexuality and gender studies, and sociology of war and violence. The program provides students with the opportunity to develop their knowledge and understanding of key theoretical approaches in sociology in addition to getting a strong grounding in research methodology with training in both qualitative and quantitative methods of inquiry. Students are expected to further develop their intellectual skills through the critical examination of contemporary social issues, especially as they pertain to the Arab world. In addition, the program encourages students to critically consider the relationship between theory, research, policy and practice, and to reflect on ethical considerations in doing social research. At the end of the program, students will put their acquired skills and knowledge to conduct original empirical research through a thesis.

Graduate Studies in Anthropology and Sociology

Students pursuing either an MA in Anthropology or Sociology are encouraged to work with faculty from other humanities and social sciences departments, in particular, media studies, political science, and the Center for Arab and Middle Eastern Studies. A master's degree in either field has a very wide application. Graduates in Anthropology and Sociology will be qualified to pursue doctoral level studies in their field. Alternatively, they will have acquired the research methods, exposure to scholarship and intercultural skills to work effectively in multicultural settings such as non-governmental and governmental organizations, as well as expertise applicable in such domains as business, education, law and public policy.

Requirements

A candidate for the MA degree in Sociology is required to complete 21 graduate credit hours in addition to a thesis. Sociology students must complete two core courses SOAN 300 and SOAN 312 or SOAN 305, in addition to three courses in sociology. Sociology students choosing a concentration in communication are also required to complete SOAN 313. The remainder of the requirements may be selected from other offerings in the department or in the FAS and other schools and faculties on campus, with the consent of the advisor and according to the interest of the graduate student. A candidate for the MA degree in Anthropology must complete two core courses SOAN 304 and SOAN 310 or SOAN 305, in addition to three courses in anthropology. Students in both programs wishing to learn Arabic for purposes of fieldwork may complete up to 6 credits of Arabic language classes towards their MA degree.

Course Descriptions

SOAN 300 Graduate Research Methods 3.0; 3 cr.
An advanced course in the formulation of research problems, research designs, and techniques of data collection including quantitative and qualitative methods and micro versus macro approaches to social reality. Students participate in actual research projects and apply various techniques of data collection and analysis to interpret research findings. Annually.

SOAN 301 The Ethnographer's Craft 3.0; 3 cr.
Anthropology or any sociocultural research is not simply the gathering of data. The course will expose students to the classic and cutting-edge texts in anthropology today. Readings include the works of Mauss, Evans-Pritchard, Malinowski and texts that have had the most impact in the field in the last decade. Close attention to the crafting of ethnographies will teach students an analytical method of reading that will help them understand the choices of theory, methodology and style that have been made to create classic anthropological knowledge. Thus, this course will enable students to conceive, devise and write-up their own ethnographic research. Alternate years.

SOAN 302 Culture and Mental Health 3.0; 3 cr.
This graduate seminar explores anthropological approaches to the study of mental health and illness. It will introduce students to theoretical traditions in medical and psychological anthropology. Addressing ethnographies from different settings, the course treats works on subjective experiences, becoming cultural beings, as well as on mental health as scientific practice and objects of knowledge and intervention. Occasionally.

SOAN 303 Art, Aesthetics and Social Change 3.0; 3 cr.
This course combines cultural anthropology, art studies, urban studies and history to look at the role of sensuality and aesthetics in social movements that involve envisioning a different future. Focusing on case studies from the Arab world, the US and the former Soviet Union, the course will expose students to the most recent literature in affect theory, critical art theory and Middle East studies, as well as the classic texts on power, social hierarchy and structuralism. Occasionally.

SOAN 305/MCOM 305 Seminar in Social and Cultural Theory 3.0; 3cr.
Anthropology, sociology, and media studies share fundamental histories, theories, and aims. This course exposes students to important theories in all three disciplines to lay a strong theoretical foundation for students' own research projects. The course takes advantage of the department's unique alignment of expert diversity and regional focus to provide students with a well-rounded awareness of the multiple ways social scientists have understood cultural problems and cultures have initiated epistemological inquiry.

SOAN 304 Anthropological Research Methods 3.0; 3 cr.
This course is about the various methods of enquiry and interpretation used in anthropological research. Though ethnographic methods are shaped by each research situation and its particular historical and cultural circumstances, they are also guided by broad theoretical questions. This course takes the perspective that research is comprised of three interrelated domains: creative theoretical speculation, methodological 'operationalization' of theoretical questions and concrete research practices. The trick (or 'magic') of ethnographic research is to relate empirical and observational data in many forms to the theories that motivate their collection. We explore the politics and ethics of research, kinds of observation, effective interviewing strategies, note-taking, conducting surveys, examining archives, ways of 'coding' or indexing information, data analysis and approaches to writing. A review of the development of educational thought as expressed in the writings and ideas of major philosophers. This review endeavors to deal with thought in the context of the historical times. Arab thought is included. Annually.

SOAN 307 Graduate Seminar in Transitional Justice 3.0; 3 cr.
The seminar is an exploration of the strategies and courses of action for post-conflict societies. Consistent with the perspectives and premises of transnational justice, this seminar examines the ways in which states and the international community attempt to achieve justice in periods of political transition. Some of the leading theories and applied dimensions will be critically assessed in light of the operation of international and domestic criminal, historical and administrative justice. Annually.

SOAN 308 Empires, Colonialism, Decolonization 3.0; 3 cr.
This course provides students with an overview of the decolonization processes and their main intellectual legacies and outcomes in the formerly colonized world. It engages the main debates in post-colonial and later decolonial theory, and the major themes and thinkers of the anti-colonial struggles of the 20th century. Occasionally.

SOAN 309 Sociology of Islam 3.0; 3 cr.
This course provides students with knowledge on contemporary Islam and Muslim communities from a sociological perspective and explores a critical understanding and

analysis of Muslim intellectual, religious, and cultural productions and traditions. By assessing notions of "religion", "modernity", and "secularism", the course inquires how different Islamic trends negotiated these notions in their self-understanding of Islam. This course is cross-listed with ISLM 304. Annually.

SOAN 310 Seminar in Anthropological Theory 3.0; 3 cr.
An in-depth survey of the major theoretical developments in sociocultural anthropology. The seminar focuses on both chronological treatment of issues and theories as well as on the contributions of leading theorists. Prerequisite: Graduate standing or consent of instructor. Annually.

SOAN 312 Seminar in Sociological Theory 3.0; 3 cr.
The seminar critically explores some of the enduring controversies and major developments in sociological theory. An effort is first made to elucidate the origins, strategies, and ideological antecedents and components of sociological theory. A special focus is placed on the reformulations of the classic tradition and recent postmodern and other promising directions. Annually.

SOAN 313/MCOM 301 Seminar in Communication Theory and Research 3.0; 3 cr.
The seminar introduces student to trends in mass communication research and theoretical approaches to the communication process and communication context (small group communication, media processing and effects, media and society, culture and communication). Focus is placed on contemporary communication theories that have emerged in the discipline since the 1950s.Annually.

SOAN 314 Palestinians in the Arab World
This course provides an overview of the contemporary social, political and cultural experience of the Palestinians through case studies of different Palestinian communities. It identifies key events and themes in the modern Palestinian experience, and draws on different full-time and visiting faculty research expertise to examine themes relating to the Nakba and memory, settler-colonialism, transnational Palestine, refugees and migration, art, medicine, religion and kinship, among others. Occasionally.

SOAN 315 Seminar in Middle Eastern Culture and Society 3.0; 3 cr.
A seminar exploring social structures, cultural patterns, processes and agents of social and cultural change. This course includes presentation and analysis of field data. Occasionally.

SOAN 317/MCOM 302 Seminar in Middle East Media and Society 3.0; 3 cr.
A seminar on the political, social and economic effects of the new communication technologies on modern Arab society. Special attention is given to the effects of cultural deviance in the media on children and the effects of communication media on social and cultural change. Alternate years.

SOAN 318 Human Migration 3.0; 3 cr.
This graduate seminar explores sociological and anthropological approaches and theories to the study of migration. A comparative study of the causes and effects of human migration worldwide. This course covers issues concerned with voluntary and forced migration as well as with temporary labor migration and voluntary migration and resettlement, with an emphasis on current refugee crises in the Arab region and diasporic movements. Alternate years.

SOAN 320 Graduate Tutorial in Anthropology 3.0; 3 cr.
This, like other graduate tutorials in sociology and communication, is open to graduate students preferably during the second term of their first year of program study. Tutorials

provide opportunities for students to pursue directed readings and preliminary grounded research of relevance to their envisaged fields of concentration. May not be repeated for credit. Occasionally.

SOAN 321 Graduate Tutorial in Sociology 3.0; 3 cr.
May not be repeated for credit. Occasionally.

SOAN 323 Special Topics in Anthropology 3.0; 3 cr.
This, like other special topics in sociology and communication, is normally devoted to SOAN faculty or visiting professors and recognized scholars to explore topics of current interest. May be repeated for credit. Occasionally.

SOAN 324 Special Topics in Sociology 3.0; 3 cr.
May be repeated for credit. Occasionally.

SOAN 395A Comprehensive Exam in Anthropology 0 cr.
Successful defense of thesis proposal. Prerequisite: Consent of advisor.

SOAN 399 Thesis 9 cr.
Thesis.

MA in Media Studies

Mission Statement

The AUB MA in Media Studies offers students a broad-based multidisciplinary liberal arts curriculum grounded in the social sciences that teaches students media theory and research, and focuses on the role of media in society. The program offers a regional and global scope and stresses a liberal arts approach that emphasizes theory, research and critical skills. In addition to exploring media theories, students learn different research methods and critical inquiry into the nature, processes and consequences of traditional and new media. The program stresses the university's commitment "to creative and critical thinking and civic responsibility."

Admission

Requirements for admission into the MA program are consistent with those of the Faculty of Arts and Sciences. Admission to the MA in Media Studies is restricted to the fall term. Applicants are required to submit the following: two letters of recommendation, and a statement of goals/research interests and experiences. Each student may be interviewed upon application to determine her/his background and qualification.

Requirements

The MA in Media Studies follows a liberal curriculum grounded in the social sciences. Its curriculum is intended for returning professionals, and AUB and non-AUB graduates who aim to build fundamental knowledge in the theories, research methods and critical skills of the field.

The MA program offers two tracks. Students may choose either a thesis option or a project option. Both options require 30 credits. Students must decide which track they want to pursue by the time they successfully complete the comprehensive exam, which is normally at the end of the second term for full-time students. Based on their comprehensive exam performance, students will be advised to pursue one track or the other.

- The thesis option requires seven courses (21 credits), the comprehensive exam (0 credits) and a 9-credit thesis (MCOM 399).

- The project option requires nine courses (27credits), the comprehensive exam (0 credits) and a 3-credit project (MCOM 398).

All candidates for the MA in Media Studies must complete MCOM 300, MCOM 301 or 305, MCOM 302 and MCOM 395 (comprehensive exam), and at least two courses from the list of department electives. The remainder of the courses may be selected from the department electives, the approved general electives, or other unlisted graduate courses upon the advisor's consent.

Core Courses: MCOM 300, MCOM 301 or 305, and MCOM 302.

Department Electives: MCOM 313, MCOM 314, MCOM 315, MCOM 316, MCOM 317, MCOM 362, MCOM 363, MCOM 390, MCOM 391, SOAN 310, SOAN 312, SOAN 315.

Course Descriptions

MCOM 300 Graduate Research Methods in Media Studies 2.2; 3 cr.
This course teaches students how to critically read, design and implement scientific research and use quantitative, qualitative, and mixed methods and data analysis techniques to address research questions common in the field of media studies. Students participate in actual research projects and apply various techniques of data collection, analysis and interpretation. Prerequisite: Restricted to major or instructor consent. Annually.

MCOM 301/SOAN 313 Seminar in Communication Theory and Research 3.0; 3 cr.
The seminar introduces students to trends in media studies research and theoretical approaches to the media and communication process. Focus is placed on contemporary media and communication theories. Prerequisite: Restricted to major or instructor consent. Annually.

MCOM 302/SOAN 317 Seminar in Middle East Media and Society 3.0; 3 cr.
A seminar on the political, social and economic effects of the Arab media on modern Arab society. Special attention is given to the relationship between communication media on social and sociocultural change. Prerequisite: Restricted to major or instructor consent. Annually.

MCOM 305/SOAN 305 Seminar in Social and Cultural Theory 3.0; 3cr.
Anthropology, sociology, and media studies share fundamental histories, theories, and aims. This course exposes students to important theories in all three disciplines to lay a strong theoretical foundation for students' own research projects. The course takes advantage of the department's unique alignment of expert diversity and regional focus to provide students with a well-rounded awareness of the multiple ways social scientists have understood cultural problems and cultures have initiated epistemological inquiry.

MCOM 313 Seminar in Communication and Development 3.0; 3 cr.
A seminar on the role of communication in developing societies, with focus on the media as a modernizing agent and on questions that are relevant to the understanding of the socioeconomic developmental process in less developed cultures. Occasionally.

MCOM 314 Issues in Transnational Media Studies 3.0; 3 cr.
In this graduate seminar, students will be introduced to some of the key debates and issues facing the field of media studies in our increasingly global era. In the last twenty years, "globalization" has become an academic buzzword. What does globalization mean for the production, distribution and reception of media texts, including film, television, social media and music? In this course, students will be introduced to a variety of issues in transnational media studies. Readings will deal with questions of media industries, transnational distribution practices, methods of surveillance and security, and social media activism. Occasionally.

MCOM 315 Race and Media 3.0; 3 cr.
In this graduate seminar, students will be introduced to several important ongoing debates regarding the intersection of race and media. After looking at a variety of scholarly approaches to race, students will closely examine an array of contemporary interventions in media and race studies. Topics may include lynching photography, Hollywood orientalism, music videos, race on the Internet, zombie horror cinema and the racialization of bodies in the era of drone warfare. Occasionally.

MCOM 316 Media, Belief and Conflict 3.0; 3 cr.
This course examines the complex relationship between media, modern forms of belief, and their role in contemporary social and political conflict. The course takes a comparative approach, drawing connections between critical theory and current interdisciplinary conversations to open up the three terms in the title. Occasionally.

MCOM 317 Sex, Gender and Media in the Middle East 3.0; 3 cr.
This seminar examines the media's central role in the production and circulation of narratives and counter-narratives of gender oppression and sexual liberation in the region. Through critical readings in film, television and literature, we consider how representations of male dominance, women's emancipation and LGBT rights have shaped Middle Eastern politics with particular emphasis on decolonization, the War on Terror and immigration. Occasionally.

MCOM 362 Media Representations 3.0; 3 cr.
This course examines the role of the media in constructing our social reality through an examination of media practices both historically and in the present. It particularly examines the representations of Arabs and the Arab world in the Western media, and the US in the Arab media. It covers politics of culture and identity as they shape and intersect with today's globalized media. Occasionally.

MCOM 363 Historical Approaches to Media 3.0; 3 cr.
This course situates the history of communication – from the telegraph to today's social media – as more than a history of technology, and discusses the complexity with which the social world is constructed. Both technology and history enter into conversation, opening up points of critical engagement of modern understandings of the world. Occasionally.

MCOM 390 Special Topics in Media Studies 3.0; 3 cr.
This course is normally devoted to MCOM faculty or visiting professors and recognized scholars to explore topics of current interest. May be repeated for credit. Occasionally.

MCOM 391 Graduate Tutorial in Media Studies 3.0; 3 cr.
This course is open to graduate students, preferably during the second term of their first year of program study. Tutorials provide opportunities for students to pursue directed readings and preliminary grounded research of relevance to their envisaged fields of concentration. May not be repeated for credit.

MCOM 395A Comprehensive Exam 0 cr.
Prerequisite: Consent of advisor.

MCOM 398 Project 3 cr.
Project.

MCOM 399 Thesis 9 cr.
Thesis.

The Anis Makdisi Program in Literature (AMPL)

Director:	Jarrar, Maher
Advisory Committee:	AbdelMegeed, Maha; Harb, Sirene; Jarrar, Maher; Makdisi, Saree (UCLA)

The Anis Makdisi Program in Literature (AMPL) was inaugurated in October 2002.

Objectives

The AMPL promotes and supports interdisciplinary dialogue and different approaches in the study of literature following the tradition initiated by Anis K. Makdisi. The aim of this program is to encourage and develop scholarly interest in the humanities in general and in literature in particular, and to foster intellectual exchange among members of different departments, students, and visiting scholars.

Activities

Program activities include:

- an annual Anis K. Makdisi memorial lecture by a leading scholar in literature or a noted author of poetry or prose. All lectures are published by the program.
- a series of seminars on various issues and topics in literature and cultural studies offered by local, regional, and international scholars, novelists, and artists. The primary aim of the seminars is to enrich the study and the teaching of literature at AUB by providing wide discussion forums.
- informal gatherings (lectures, discussions, colloquia) as a venue for scholarly debate for the academic community in Beirut.

Scholarships

The Program offers two scholarships every year:

- The Anis K. Makdisi Graduate Fellowship to support graduate studies in literature at AUB
- The Anis K. Makdisi Scholarship in Literature for undergraduate studies
  Website: https://www.aub.edu.lb/fas/ampl/Pages/index.aspx

Center for Arab and Middle Eastern Studies (CAMES)

Director:	Hanafi, Sari
Assistant Director:	Saidi, Aliya R.
Lecturer:	Sultani Kanawati, Rima
Instructor:	Semaan, Rima
Middle Eastern Studies Steering Committee:	Atwood, Blake Robert; Hanafi, Sari; Mejcher-Atassi, Sonja; Orfali, Bilal; Saidi, Aliya; Tell, Tariq
Islamic Studies Steering Committee:	Hanafi, Sari; Haydar, Bashshar; Ismail, Ghena; Khodr, Hiba; Orfali, Bilal; Saidi, Aliya

The Center for Arab and Middle Eastern Studies (CAMES) offers interdisciplinary MA degrees in Middle Eastern Studies and Islamic Studies. CAMES's goal is to enhance the understanding of the Middle East and Islamic civilization and to encourage informed scholarship in all related academic disciplines. The MA programs aim to assist students in acquiring a sound grounding in one or more aspects of the study of the Middle East and Islamic civilization, and in the Arabic language. The Center offers seminars in Middle Eastern and Islamic Studies as well as a full range of Arabic language courses for non-native speakers. CAMES is an interdepartmental, interdisciplinary unit. The MA programs draw on other departments to provide coursework and thesis advising for their students. To complement students' coursework and promote scholarship about Middle Eastern and Islamic Studies at AUB, the Center also sponsors visiting lectures and conferences, and holds occasional events such as film screenings and readings.

CAMES focuses on current methodologies and approaches in the fields of Middle Eastern and Islamic Studies. Students structure their own coursework in Middle Eastern and Islamic Studies, and in fields such as history, Arabic language and literature, contemporary politics, international relations, archaeology, anthropology, sociology, media studies and philosophy. The courses, thesis and project requirements encourage students to think critically and independently while undertaking analytical, in-depth research.

CAMES is committed to the study of the Arabic language and offers courses at all levels, as well as seven-week intensive language courses in Modern Standard Arabic and Lebanese colloquial Arabic in the summer, in coordination with the Department of Arabic and Near Eastern Languages.

Requirements

General requirements for graduate study are found in the Admissions section of this catalogue. Applicants to the MA in Islamic Studies track must submit an Arabic writing sample with their application. The submission of official GRE scores is optional.

MA in Middle Eastern Studies

The MA program in Middle Eastern Studies is designed for students who wish to obtain broad

knowledge of the contemporary Middle East and study the Arabic language. The interdisciplinary nature of the program encourages students to develop a critical understanding of the history, culture and politics of the region as well as to conduct in-depth, independent research.

Thesis Option

Students following the thesis option are required to complete a minimum of 21 credit hours in courses numbered 300 and above in addition to a 9-credit thesis. They are also required to take the two core courses, MEST 300 Making of the Modern Middle East and MEST 301 Introduction to Middle Eastern Studies. Non-native speakers of Arabic are required to complete a minimum of 6 credits of Arabic language study and may take up to 9 credits of Arabic. Students may take their remaining courses at CAMES or at departments other than CAMES in topics related to Middle Eastern Studies.

Project Option

Students following the project option are required to complete a minimum of 27 credit hours in courses numbered 300 and above in addition to a 3-credit project. They are also required to take the two core courses, MEST 300 Making of the Modern Middle East and MEST 301 Introduction to Middle Eastern Studies. Non-native speakers of Arabic are required to complete a minimum of 6 credits of Arabic language study and may take up to 12 credits of Arabic. Students may take their remaining courses at CAMES or at departments other than CAMES in topics related to Middle Eastern Studies.

Courses

MEST 300 Making of the Modern Middle East 3.0; 3 cr.
This course is a survey of the modern history of the Middle East with a focus on the late 18th century to the present. It examines the main political, economic, social and cultural institutions and forces at work, with an emphasis on identifying how specific events as well as long-term processes defined social and political realities in the region. Topics covered include: Ottoman reform and legacy; political ideologies including Arab nationalism, state nationalisms, communism and Islamism, among others; interactions with imperialist and colonial powers; regional conflicts; social movements (including women and peasants); and cultural changes. Annually.

MEST 301 Introduction to Middle Eastern Studies 3.0; 3 cr.
A general course in modern Middle Eastern studies designed to introduce students to the interdisciplinary study of the Middle East. Faculty from the various departments associated with CAMES, such as History and Archaeology, Philosophy, Arabic, Economics, Political Studies, Sociology, Anthropology and Media Studies are asked to present a seminar that illustrates the approaches and methodologies used in their respective fields to study the region. Consent of instructor required. Annually.

MEST 302 Tutorial 3 cr.
May not be repeated for credit. Every Term.

MEST 310 Seminar in Early Islamic History 3.0; 3 cr.
A seminar course that provides a social and intellectual introduction to approximately the first five hundred years of Arabic Islamic history, using a thematic rather than a chronological approach. Consent of instructor required. Annually.

MEST 311 Special Topics in Medieval Islamic Cultural History 3.0; 3 cr.
Consent of instructor required. Biennially.

MEST 315 Special Topics in Modern Middle Eastern Social and Political History 3.0; 3 cr.
Consent of instructor required. Biennially.

MEST 316 Special Topics in Modern Arabic Cultural and Intellectual History 3.0; 3 cr.
Consent of instructor required. Biennially.

MEST 317 Special Topics in Contemporary Middle Eastern Politics 3.0; 3 cr.
Consent of instructor required. Biennially.

MEST 318 Special Topics in Contemporary Middle Eastern Society 3.0; 3 cr.
Consent of instructor required. Biennially.

MEST 321/322 Arabic as a Foreign Language I and II 5.0; 3 cr. (each)
This sequence of courses introduces students who have no previous knowledge of Arabic to the Arabic language and culture within its Lebanese setting. The course utilizes an integrated approach to Arabic and emphasizes communicative tasks and contexts. By the end of the course, students will be able to speak and write simple connected sentences about themselves, their families and their immediate environment, and read and listen to short authentic texts. By the end of the course sequence, students reach Intermediate-Low to Intermediate-Mid proficiency in Arabic on the ACTFL scale. Prerequisites: placement based on a placement examination. Each term.

MEST 323/324 Arabic as a Foreign Language III and IV 5.0; 3 cr. (each)
This course sequence aims to further enhance students' proficiency in the various skills by expanding their vocabulary, control of pronunciation and grammatical structures, and cultural knowledge. The course utilizes an integrated approach to Arabic that is based on communicative tasks and contexts. Students' activities at this level involve giving oral presentations and doing writing projects. By the end of this course sequence, students reach Intermediate-Mid to Intermediate-High proficiency in Arabic following the ACTFL scale. Prerequisites: MEST 321 and MEST 322 or equivalent, or placement based on a placement examination. Each term.

MEST 325/326 Arabic as a Foreign Language V and VI 3.0; 3 cr. (each)
This course sequence aims to enable students to reach advanced proficiency in Arabic in all skills. Students are required to do extensive readings on a variety of topics and genres, such as literature, language and the social sciences. They are also expected to engage in debates, give oral presentations and write short research papers. The course utilizes an integrated approach to Arabic and is based on communicative tasks and contexts. By the end of this course sequence, students reach Advanced-Low to Advanced-Mid proficiency in Arabic following the ACTFL scale. Prerequisites: MEST 323 and MEST 324 or the equivalent, or placement based on a placement examination. Every term.

MEST 327/328 Arabic as a Foreign Language VII and VIII 3.0; 3 cr. (each)
This course sequence aims to take students to the Advanced-High level in the various skills in Arabic. Readings at this level are extensive and span a variety of genres. Listening skills are sharpened through extensive work with news broadcasts, documentaries, and television shows in both Standard and Lebanese Arabic. The course also features extended oral presentations in class and extensive writing activities. Special emphasis is placed on understanding the nuances of the language and the use of idiomatic expressions and rhetorical devices in all language skills. Prerequisites: MEST 325 and 326 or the equivalent, or placement based on a placement examination. Every term.

MEST 329 Special Topics in Arabic Language and Literature 3.0; 3 cr.
Occasionally.

MEST 330 Introductory Syriac 3.0; 3 cr.
The course provides students with working knowledge of the Syriac language and grammar. With the help of a lexicon, students are expected to read and translate simple Syriac texts. Occasionally.

MEST 331 Introduction to Syriac Literature 3.0; 3 cr.
The aim of this introductory course is to provide the student with an overview of Syriac literature from its origins to the present day. Prerequisite: ARAB 215/MEST 330, or consent of instructor. Occasionally. Students who receive credit for MEST 331 cannot receive credit for ARAB 217.

MEST 332 Intermediate Syriac 3.0; 3 cr.
This course complements ARAB 215/MEST 330 ‹Introduction to Syriac Language›, focusing on the reading, translation, and analysis of Syriac texts from various authors, genres, and time periods. In addition, the course provides a review of Syriac grammar. It is intended for those students who had taken the introductory course ARAB 215/MEST 330 or who already have a basic knowledge of Syriac and wish to continue studying the Syriac language for a second term. Prerequisite: MEST 331 or consent of instructor. Annually.

MEST 340 Introduction to Lebanese Arabic 5.0; 3 cr.
This course is for foreign speakers of Arabic only. The course builds proficiency in Lebanese Arabic through the introduction of grammatical features of the Lebanese dialect and the practice of interactive functional skills, including listening comprehension, conversation tasks and vocabulary building. For undergraduate and graduate students. Prerequisite: placement based on a placement interview. Each term.

MEST 341 Intermediate Lebanese Arabic 5.0; 3 cr.
This course is for foreign speakers of Arabic only. Intermediate Lebanese Arabic is a continuation of MEST 240/340 Introduction to Lebanese Arabic. The course emphasizes the further development of conversational skills in Lebanese Arabic, and therefore primarily targets speaking and listening skills. Knowledge of the Arabic alphabet is required to join MEST 341. This course concentrates on increasing vocabulary and command of syntax enabling students to reach a higher level of fluency. For undergraduate and graduate students. Prerequisite: MEST 240/340 or placement based on a placement interview. Each term.

MEST 342 Advanced Lebanese Arabic 3.0; 3 cr.
This course is the continuation of the sequence begun in MEST 241/341 Intermediate Lebanese Arabic and MEST 240/340 Introduction to Lebanese Arabic. Like the preceding courses, it focuses on spoken rather than written Arabic, and will therefore primarily target the oral/aural skills, speaking and listening. Knowledge of the Arabic alphabet is required to join MEST 342. The course is designed to meet the needs and expectations of non-native young adults and adults who are seeking to develop a comfortable level of proficiency in a variety of complicated communicative tasks and social situations. For undergraduate and graduate students. Prerequisite: MEST 241/341 or placement based on a placement interview. Each term.

MEST 395A Middle Eastern Studies Comprehensive Exam 0 cr.
Prerequisite: Successfully defending the thesis/project proposal. Consent of advisor.

MEST 398 Project 3 cr.
Project.

MEST 399 Thesis 9 cr.
Thesis.

MA in Islamic Studies

The MA program in Islamic Studies is an interdisciplinary program with the goal of providing students with the background to expand their knowledge and understanding of classical and modern Islamic religious thought, context, and textual traditions. It highlights ethics as the overarching principle and figh as highly informed by the spirit of ethics. Framed in the paradigm of ethical pluralism, this program will be about text and context and will offer a shared space where social scientists and scholars in Islamic jurisprudence collaborate in an effort to examine Maqasidic Fiqh and new interpretations of the Islamic corpus.

Students are required to complete 24 credit hours in courses numbered 300 and above, in addition to a 6-credit thesis. They are required to take the 5 core courses: ISLM 300 Seminar in Qur'anic Studies; ISLM 301 Sources and Methods; ISLM 303 Seminar in Islamic Ethics; ISLM 304 Sociology of Islam (or any course that deals with Islam and Society, upon the approval of the Islamic Studies program director), and ISLM 305 Seminar in Maqasidic Fiqh.

Non-native speakers of Arabic are required to take intensive Arabic language classes, which are not counted as part of the degree credits. The program recommends the study of a second European language other than English, and for native speakers of Arabic to also develop a reading proficiency in a second language central to literature in Islamic civilizations and cultures, or a second Semitic language, depending on the field of specialization.

Course Descriptions

ISLM 300 Graduate Seminar in Qur'anic Studies 3.0; 3 cr.
A survey of the different problems in Qur'anic studies, such as the compilation of the Qur'an, al-nasikh wal-mansukh, the secret letters, and the different schools of tafsir. The language of instruction in this course is Arabic.

ISLM 301 Sources and Methods 3.0; 3 cr.
This course introduces students to the sources, research tools and methods in Islamic Studies. Students will explore the history of the discipline and its major research areas including history, language, literature, religious sciences, intellectual sciences and social studies. Arabic native speakers can replace ISLM 301 with the equivalent Arabic course: ARAB 309. Annually.

ISLM 302 Islamic Civilizations 3.0; 3 cr.
This course examines key aspects of Islamic civilizations, cultures and thought. It will focus on the political, social and religious institutions that shaped Islamic civilizations as well as on the intellectual and scholarly traditions, which characterized the Muslim world from the foundation of Islam onwards, and across various geographical regions and cultures. Beginning with the geographical, cultural and historical context of the rise of Islam, the life of the Prophet, and the Qur'an, it will extend through modernity and beyond, with a special emphasis on texts. The readings consist of a selection of translated primary sources from languages that are central to the literature of Islam, as well as complementary secondary source literature. Annually.

ISLM 303 Seminar in Islamic Ethics 3.0; 3 cr.
This course covers key concepts, theoretical principles, and the doctrines of Islamic Ethics. The course critically examines how these principles and their applications have been addressing contemporary issues related to various fields including finance and business, social and political affairs, intercultural issues, as well as biomedical sciences. By the end of the course, students will work on developing a framework for ethical reasoning around specific ethical dilemma, as part of the training in problem solving. Annually.

ISLM 304 Sociology of Islam 3.0; 3 cr.

This course provides the students with knowledge on contemporary Islam and Muslim communities from a sociological perspective and explores a critical understanding and analysis of Muslim intellectual, religious, and cultural productions and traditions. By assessing notions of "Religion", "modernity", and "secularism", the course inquires how different Islamic trends negotiated them in their self-understanding of Islam. This course is cross-listed with SOAN 309. Annually.

ISLM 305 Seminar in Maqasidic Fiqh 3.0; 3 cr.
This seminar will undertake to study the Islamic legal theory (usul al-fiqh) and practice (fiqh) in conjunction with Islamic ethics, which serves as an integral part of the juridical tradition of Islam. The sources of figh like the Qur'an, the Tradition (Sunnah), consensus (ijma'), analogy (qiyas) and reason (agl) will be examined in connection with Maqsid al- sharia (high objectives of Islam) and the process by which legal decisions in Islam are made. Annually.

ISLM 315 The Qur'an in History 3.0; 3 cr.
A historical study of the Qur'an and other allied disciplines. Themes include the Islamic concept of the Qur'an; thematic and formal aspects of the Qur'an; modes of interpretation and principles of exegesis; and medieval and modern controversies regarding its history, formal structure, authorship and authority. Biennially.

ISLM 316 Art and Architecture in Islamic Civilizations 3.0; 3 cr.
This course examines Islamic art, material culture and architecture, with a focus on key cities in the Ottoman and Qajar regions. The course also studies local perceptions of modernity and how these views related to or diverged from those of the European, British and American colonialists/missionaries in the region. This also includes a study of identity politics, archaeology, collecting practices and museums. Biennially.

ISLM 317 Approaches to the Qur'an 3.0; 3 cr.
This interactive graduate seminar presents an introduction to the corpus of Sunni Islamic exegesis (tafsir) from the 9th to the 20th century. Biennially.

ISLM 321 Graduate Seminar in Islamic Philosophy and Theology 3.0; 3 cr.
This course covers the major debates, concepts, modes of reasoning, figures and texts of Islamic philosophy (falsafa) and theology (kalam) in their intellectual historical contexts. Biennially.

ISLM 325 Graduate Seminar in Sufism 3.0; 3 cr.
A general presentation of Sufism that, while not aiming at exhaustiveness, will seek to acquaint students with the place and function of Sufism in Islam; the main outlines of its history; doctrinal and ritual features; the relationship between Sufism and literature, especially poetry. The course will give an overview of the sources of classical Sufism. Students will read Islamic mystical texts dealing with the Sufi Path, the nature of God and the hidden meanings of the Qur'an, dreams and miraculous powers, and the different Sufi stations. Biennially.

ISLM 331 Islamic Movements and Reform 3.0; 3 cr.
An in-depth course on modern Islamic political thought. This course focuses on the historical and intellectual developments that have fueled both revolutionary and conservative trends in Islamic political movements and states. Discussions over issues such as the relationships between religion and politics, political philosophy and ideology, and political action and revolution. Biennially.

ISLM 333 Islamic Thought and Modernity 3.0; 3 cr.
This course examines the main reform movements of the eighteenth and nineteenth centuries and the transformations in Islamic thought in the wake of the encounter with Europe. It also explores various models of Islamic political and social activism, and major themes addressed by leading thinkers of Islamic movements in the twentieth century. The focus is

on Islamic movements from Egypt and the Arab Middle East, India/Pakistan and Iran. Topics include the intellectual networks of scholars in the eighteenth century, the contexts of various forms of reform and revival, questions of continuity and European influence, the effects of the encounter with colonialism and imperialism, the attitude toward nationalism and other modern ideologies, and Islamic discussions of modernity and liberalism. In addition to background essays, primary sources in translation will be studied; the selected texts are classics that have wide circulation within contemporary Islamic movements. Biennially.

ISLM 341 Christian-Muslim Encounters 3.0; 3 cr.
A collaborative investigation of select topics in Arab and Middle Eastern History viewed from multiple perspectives. Periodic progress reports and the incorporation of findings in an interpretive term paper are required. Students who receive credit for ISLM 341 cannot receive credit for ARAB 248. Biennially.

ISLM 395A Islamic Studies Comprehensive Exam 0 cr.
Prerequisite: Consent of advisor.

ISLM 396 Special Topics in Islamic Studies 3.0; 3 cr.
May be repeated for credit.

ISLM 397 Tutorial 3.0; 3 cr.
May not be repeated for credit. Every term.

ISLM 399 Thesis 6 cr.
Thesis.

Graduate Diploma in Islamic Studies

The Graduate Diploma in Islamic Studies is a multidisciplinary program that delivers a world-class AUB education in an online asynchronous format, providing students with the flexibility to learn about Islamic intellectual history, religious thought, culture, and society at their own pace. This diploma provides a comprehensive outlook on the religion and combines theoretical knowledge of Islamic Studies with practical research experience, focusing on Islamic ethics and Maqasidic Fiqh while simultaneously training students to critically analyze Islamic texts and scriptures across the social sciences and humanities. Graduates of this degree will gain an in-depth understanding of Islamic Studies enabling them to pursue careers requiring an advanced knowledge of Islam in multiple high-demand fields in the MENA and Southeast Asia regions and beyond, such as academia, journalism, consulting, and governmental roles.

Admission Requirements

Applicants to the Graduate Diploma in Islamic Studies must meet the university's minimum requirements for admission to a graduate degree program:

- An undergraduate bachelor's degree (or its equivalent) in any field of study
- A grade point average of at least 3.0 or the equivalent in the last two years of study
- English language proficiency

Exceptions to the above requirements will be made on a case-by-case basis for applicants who have work experience in the field of Islamic Studies, or an advanced knowledge of religious studies.

Upon completion of this diploma, students can pursue the MA in Islamic Studies offered at AUB. A maximum of 12 credits from the diploma can be transferred towards the requirements for this MA Provided that the grade is equivalent to B+ or above.

Program Requirements

This diploma is made up of five courses, each of which is worth three credits, totaling 15 credits. Participants may complete the diploma in one year or two years. Courses follow an online asynchronous format and require 14 weeks each to complete. However, students can opt for in-person classes. These courses are the same as the required courses in the Master of Islamic Studies program (see above). Students can replace one of the required courses by any elective upon approval of the Islamic Studies Diploma director.

Intensive Summer Arabic Programs

Modern Standard Arabic

MEST 360 Elementary Arabic (Intensive) 9 cr.
This course is designed to introduce students who have no previous knowledge of Arabic to the Arabic language and culture within its Lebanese setting. The course utilizes an integrated approach that teaches both Standard and Lebanese Arabic based on communicative tasks and contexts. By the end of the course, students will be able to speak and write simple connected sentences about themselves, their families and their immediate environment. They will also be able to read and listen to short authentic texts (announcements, advertisements, short weather reports, menus, daily schedules, etc.) During the course, students will become familiar with Arab culture in general and various aspects of Lebanese culture and society. The course will use Alif Baa: Introduction to Arabic Letters and Sounds (3rd Edition) as well as part of Al-Kitaab fii Ta'allum al-'Arabiyya: Part One (3rd Edition). At the end of this course, students are expected to reach Intermediate-Low to Intermediate-Mid proficiency in Arabic on the (ACTFL) scale. Annually.

MEST 361 High Elementary Arabic (Intensive) 9 cr.
This course is designed for students who have had the equivalent of one semester of Arabic instruction. It is also appropriate for students who have already had some limited exposure to the Arabic language, for instance, those who have lived in an Arab country or an Arabic-speaking environment, as well as those who have received some tutoring in Arabic. Students who enroll at this level are expected to know the Arabic alphabet and have limited reading, writing and conversational skills. The course utilizes an integrated approach that teaches both Standard and Lebanese Arabic based on communicative tasks and contexts and will use Al-Kitaab fii Ta'allum al-'Arabiyya: Part One (3rd Edition). By the end of the course, students are expected to reach Intermediate-Mid proficiency in Arabic following the ACTFL scale. Annually.

MEST 362 Intermediate Arabic (Intensive) 9 cr.
This course is designed for students who have completed at least two semesters of Arabic in an academic setting but whose placement results require that they go at a slower pace than the intermediate class. The course is also appropriate for students who have been away from the language for some time. The objectives of this course, in general, are to further develop the students' skills and strategies, expand active vocabulary in a wide variety of topics and settings, enhance knowledge of basic Arabic grammar, and further develop intercultural competence. The course utilizes an integrated approach that teaches both Standard and Lebanese Arabic based on communicative tasks and contexts and will use Al-Kitaab fii Ta'allum al-'Arabiyya: Part One (3rd Edition) and a part of Al-Kitaab fii Ta'allum al-'Arabiyya: Part Two (3rd Edition). By the end of the course, students are expected to reach Intermediate-Mid to Intermediate-High proficiency in Arabic following the ACTFL scale. Annually.

MEST 363 Intermediate Mid Arabic (Intensive) 9 cr.
This course is designed for students who have had the equivalent of two to three semesters of Arabic instruction. The course aims to further enhance students' proficiency in the various

skills, expand their cultural knowledge, expand their vocabulary, and enhance their control of grammatical structures and pronunciation. All communications between instructors and students are carried out strictly in Arabic. Part of the students' activities at this level involves giving oral presentations and doing a lengthy writing project. The course utilizes an integrated approach that teaches both Standard and Lebanese Arabic based on communicative tasks and contexts and will use Al-Kitaab fii Ta'allum al-'Arabiyya: Part Two (3rd Edition) and parts of Al-Kitaab fii Ta'allum al- 'Arabiyya: Part Two (2nd Edition). By the end of the course, students are expected to reach Intermediate-High proficiency in Arabic following the ACTFL scale. Annually.

MEST 364 Intermediate High Arabic (Intensive) 9 cr.
This course is designed for students who have already had the equivalent of four to five semesters of Arabic instruction. The objective of the course is to further enhance students' proficiency in the various skills, expand their cultural knowledge, expand their vocabulary, and enhance their control of complex grammatical structures and pronunciation. The course utilizes an integrated approach that teaches both Standard and Lebanese Arabic based on communicative tasks and contexts. By the end of the class, students are expected to comprehend lengthy authentic listening material and to give long oral presentations with facility. They are also expected to be able to write extensive compositions and to read authentic Arabic texts for research purposes. The course will use part of Al-Kitaab fii Ta'allum al-'Arabiyya: Part Two (2nd Edition) and part of Al-Kitaab fii Ta'allum al-'Arabiyya: Part Three. By the end of the course, students are expected to reach Advanced-Low to Advanced-Mid proficiency in Arabic following the ACTFL scale. Annually.

MEST 365 Advanced Arabic (Intensive) 9 cr.
This course is designed for students who have already had the equivalent of six semesters of Arabic instruction. It aims to enable students to reach higher levels of advanced proficiency in all skills. Students are required to do extensive readings on a variety of topics and genres, such as literature, language and the social sciences. They are also expected to engage in debates, give oral presentations and write short research papers. The course utilizes an integrated approach that teaches both Standard and Lebanese Arabic based on communicative tasks and contexts and will use Al-Kitaab fii Ta'allum al-'Arabiyya: Part Three, to be supplemented by extra material as needed. By the end of the course, students are expected to reach Advanced-Mid to Advanced-High proficiency in Arabic following the ACTFL scale. Annually.

MEST 366 Advanced High Arabic (Intensive) 9 cr.
This course is designed for students who are placed at the Advanced-Mid level of proficiency of Arabic upon entering the program and it aims to take them to the Advanced-High level in the various language skills. Readings at this level are extensive and span a variety of genres; readings will cover at least one novel, short stories, academic articles, lengthy newspaper articles, and selections from medieval texts. Listening skills are sharpened through extensive work with news broadcasts, documentaries, and television shows in both Standard and Lebanese Arabic. Special emphasis is placed on understanding the nuances of the language and the use of idiomatic expressions and rhetorical devices in all the language skills. The course also features extended oral presentations in class where students demonstrate the oral skills of an educated native or near native speaker of Arabic. The course will use Al-Kitaab fii Ta'allum al-'Arabiyya: Part Three in addition to other readings assigned by the teachers. By the end of the course, students are expected to reach Advanced-High proficiency in Arabic following the ACTFL scale. Annually.

MEST 367 Superior Arabic (Intensive) 9 cr.
Students entering this level are expected to have Advanced-High proficiency in Arabic and are expected to make progress towards Superior proficiency. This level features extensive readings that cover a wide variety of genres including novels, short stories, academic articles, lengthy newspaper articles, and selections from medieval texts. Listening skills are en-

hanced through extensive work with news broadcasts, documentaries, and television shows in both Standard and Lebanese Arabic. Special emphasis is placed on understanding the nuances of the language and the use of idiomatic expressions and rhetorical devices in all the language skills. The course also features extended oral presentations in class where students demonstrate the oral skills of an educated native or near native speaker of Arabic. The course will use Al- Kitaab fii Ta'allum al-'Arabiyya: Part Three in addition to other readings assigned by the teachers in a variety of genres. Annually.

Lebanese Colloquial Arabic

MEST 380 Introductory Lebanese Colloquial Arabic (Intensive) 9 cr.
This course is designed for students who have had little or no previous exposure to Arabic and would like to gain basic proficiency in Lebanese Arabic (LA). The course builds proficiency in LA through a communicative-based approach. Through video and text materials that deal with a wide variety of communicative functions and tasks and that are rich in cultural content, students will develop their speaking and listening skills in LA. In addition, they will be able to contextualize these skills in culturally-appropriate contexts and demonstrate their understanding of the diverse products, practices, and perspectives of Lebanese culture and society. The course will introduce students to the Arabic alphabet and to an extensive vocabulary and grammatical structures that will enable them to interact with speakers of LA in contexts related to the Novice and Intermediate levels of proficiency with ease and confidence. The course will focus on discussing topics of personal and public interest, describing and narrating personal experiences, delivering presentations, watching and analyzing TV programs, soap operas and films, and listening to songs. The course utilizes a wide variety of instructional materials developed by the CAMES Arabic teaching team. No prior knowledge of Arabic is required for the course. Annually.

MEST 382 Intermediate Lebanese Colloquial Arabic (Intensive) 9 cr.
This course is designed for students who already have some knowledge of Standard Arabic and/or Lebanese Arabic (LA) but want to devote more attention to developing higher level of proficiency in LA. The program provides students with the opportunity to improve their Lebanese colloquial Arabic skills through a wide variety of activities, including discussing topics of personal and public interest, describing and narrating in detail, holding conversations and debates, stating and supporting opinions, delivering presentations, watching and analyzing TV programs, soap operas and films, and listening to songs and music. In addition, the program helps students develop familiarity with and understanding of the diverse products, practices, and perspectives of Lebanese culture and society. The program utilizes a wide variety of instructional materials developed by the CAMES Arabic teaching team. The prerequisite for this program is one year (two semesters or the equivalent) of Arabic study. To ensure proper placement in the program, a Skype oral interview is required of all applicants. Annually.

MEST 384 Advanced Lebanese Colloquial Arabic 9 cr.
The Advanced Lebanese Colloquial Arabic class enables students to further develop their speaking and listening skills in Lebanese Arabic with special attention to expanding their knowledge of Lebanese culture. Students in the course are exposed to a variety of historical, social, economic, touristic, and artistic topics related to Lebanese Arabic language and culture. The class enhances students' listening skills by exposing them to different uses of the Lebanese dialect in authentic frames such as news reports, television and Internet series. Conversation skills are developed by encouraging students to speak in a participatory manner during the extensive discussions of the materials in class, with emphasis on pronunciation and speaking the Lebanese dialect properly. The class encourages students to use the general vocabulary used in daily life situations in a precise and smooth manner, and enriches their linguistic reserve by exposing them to a large amount of vocabulary and expressions related to the historical, social, economic, touristic, media and artistic fields. This enables students to use more complex and advanced structures and to master the use of certain verbs and words of recurrent use in the Lebanese dialect that have multiple meanings. The class demonstrates the similarities and differences between Lebanese Arabic and Standard Arabic, allowing students to learn how to move between the two with ease and helping them to understand the sociolinguistic contexts in which these Arabic varieties are used. Annually.

The Prince Alwaleed Bin Talal Bin Abdulaziz Alsaud Center for American Studies and Research (CASAR)

Director:	Myers, Robert
Program Coordinator and Instructor of American Studies:	Baghdadi, Rana

The MA Program is frozen. Please contact CASAR faculty for more details.

MA in Transnational American Studies

The Center for American Studies and Research offers a Master of Arts in Transnational American Studies. We conceive of transnational American Studies in terms of the cultural, political and social relations between, among and across the Americas and the Middle East/North Africa region. CASAR's goals are to increase understanding of the interdependencies between America and the MENA region, as well as to understand how culture and U.S. geopolitical power circulate beyond American borders. The MA program aims to assist students in acquiring an academic grounding in the theories and methods of the discipline of American Studies, as well as to foster transnational scholarship at the intersections of interdisciplinary American and MENA Studies. The MA program is interdisciplinary: CASAR offers seminars in transnational American Studies, and students also draw on faculty expertise in other departments for elective course offerings and thesis advising. To complement students' coursework and promote scholarship related to transnational American Studies at AUB, the Center sponsors conferences, lectures and other events.

Students structure their own course of study by specializing in areas such as Arab and Middle East Studies, contemporary politics, international relations, history, anthropology, sociology, fine arts, media studies or literary studies. The courses and thesis or project requirements offer students the opportunity to engage in critical, independent thinking and to undertake in-depth research.

Admission to the MA in Transnational American Studies is restricted to the fall term.

All students are required to take three Transnational American Studies core courses: AMST 300, AMST 301 and AMST 302.

The MA in Transnational American Studies offers a thesis option and a project option. Students are strongly encouraged to select the project option.

Project Option

Students following the project option are required to complete a minimum of 27 credit hours in courses numbered 300 and above, as well as a 3-credit project. In addition, students will choose electives in consultation with the director of the program. No more than 3 credits of the program of study can be in Arabic language study, unless the student petitions to include additional Arabic credits in her/his program of study.

Thesis Option

Students following the thesis option are required to complete a minimum of 21 credit hours in courses numbered 300 and above, as well as a 9-credit thesis. In addition, students will

choose electives in consultation with the director of CASAR. No more than 3 credits can be in Arabic, unless the student petitions to include additional Arabic credits in her/his program of study.

The MA in Transnational American Studies is currently frozen.

Course Descriptions

AMST 300 Introduction to Transnational American Studies 3.0; 3 cr.
This graduate seminar introduces students (1) to current theories and methods in the field, (2) to the history of American Studies nationally and transnationally and (3) to the participating faculty in the program. It is the required introductory seminar for all Transnational American Studies graduate students and is open only to those who have been accepted into the MA program. During the course of the term, other affiliated American Studies participating faculty members will visit the seminar to introduce themselves and their fields of specialization.

AMST 301 America in the Middle East 3.0; 3 cr.
Although the United States' encounter with the Middle East may appear to be a relatively recent phenomenon, this course illustrates that America has imagined the Middle East ever since the beginning of North American colonization. Moreover, America has been in the Middle East for a period that extends long before U.S. military and diplomatic presence in the region. In addition to documenting various moments of encounter between America and the Middle East, this course also problematizes the very terms "America" and "Middle East" by introducing each region as a geographic imaginary region. In this way, the course first asks what are the borders and limits of "America" and the "Middle East" and how and when are these borders and limits produced? Prerequisite: AMST 300.

AMST 302 Theories and Methods of Transnational American Studies 3.0; 3 cr.
This seminar introduces students to interdisciplinary approaches to the study of transnational American culture and social history. During the term, we will examine the history of American Studies, as well as focus on contemporary scholarship in the field. This course explores the political and social meanings of cultural conflict, national identity, and transnational culture and politics through close analysis and classroom discussion of various research methodologies that employ primary source material such as historical documents, literature, ethnography, and visual and popular culture. We will focus on how ideas about race, gender, sexuality, class, region and nation have shaped contests over the meaning of citizenship and belonging. The seminar will be framed around the following questions: What is distinct about interdisciplinary scholarship? What kinds of questions do American Studies scholars ask and why? What does a comparative and transnational framework require and offer in terms of methodology? Prerequisite: AMST 301.

AMST 375 Special Topics in Transnational American Studies 3.0; 3 cr.
Special Topics in Transnational American Studies.

AMST 395A Comprehensive Exam 0 cr.
Prerequisite: Consent of advisor.

AMST 397 American Studies Graduate Tutorial 3.0; 3 cr.
American Studies Graduate Tutorial.

AMST 398 Project 3 cr.
Project.

AMST 399 Thesis 9 cr.

Thesis.

Center for Language Research and Teaching (CeLRT)

Director:	Shaaban, Kassim A.
Professors:	Choueiri, Lina G.; Ghaith, Ghazi M.; Shaaban, Kassim A.
Associate Professors:	Hanafi, Sari; Orfali, Bilal W.
Assistant Professors:	Allen, Ira J.; Avant, Doyle R.; Kelly, Niamh; Majed, Rima; Nish, Jennifer M.; Vermy, A. Michael; Zimmerman, Erin.

CeLRT is currently inactive. For more information, please contact the Center Director.

The proposed functions of the Center are the following:

- Providing language practitioners with professional support through workshops, panel discussions, forums, seminars, and discussions
- Establishing connections with professional organizations and supporting their goals and mission
- Holding a biannual conference on different topics in theoretical and applied linguistics and related fields (sociolinguistics, language acquisition, pragmatics, and mass communication)
- Publishing an electronic journal that addresses generic language issues as well as issues specific to the language situation and language education in the Middle East region
- Working on offering new postgraduate degrees in language related areas such as Creative Writing, Rhetoric and Composition, and Translation
- Offering consultation services in language-related areas
- Hosting visiting scholars and post-doctoral fellows
- Working on the establishment of new language-based interdisciplinary graduate programs at AUB, and
- Engaging in research in theoretical and applied linguistics and in language teaching and language learning

Kamal A. Shair Central Research Science Laboratory (KAS CRSL)

Interim Director:	Ghaddar, Tarek, PhD
Laboratory Manager:	Shatila, Rania, MS
Laboratory Scientist:	Issa, Daniella, MS
Laboratory Scientist:	Souss, Nathalie, MS
Laboratory Assistant:	Abi Aad, Nour, BS

The Kamal A. Shair Central Research Science Laboratory (KAS CRSL), commonly known as the CORE facility, at the American University of Beirut is a six-million-dollar Faculty of Arts & Sciences facility housing more than 40 major equipment distributed between Four Areas (Central Wing, East Wing, West Wing, and Basement; ~400 m2) and a multitude of other multi-user equipment and facilities. The KAS CRSL is considered as the pride of FAS and AUB, as it serves research in most disciplines across AUB (mainly FAS, MSFEA, FAFS, FHS, FM) and constitutes a state of-the-art platform essential for a thriving and progressive university research environment.

The KAS CRSL is comprised of Six Main Sections: Bioscience, Chromatography, Magneto-science, Materials Science, Microscopy & Imaging, Spectrophotometry. The KAS CRSL complements other specialized departmental and faculty research laboratories, and as such aims at promoting individual as well as joint and multidisciplinary cooperative research.

The KAS CRSL is designed primarily to serve AUB faculty members, their graduate students, and their collaborators whether from industry or other universities within Lebanon, the MENA region, or internationally. Furthermore, the KAS CRSL contributes to excellence in undergraduate teaching by providing students with hands-on learning experience on advanced instrumentations and a head-start in scientific research.

The KAS CRSL is a testimony to AUB's commitment to advance science, technology, research, and innovation at the highest levels of quality and safety. There are more than 300 active users working and conducting their research studies at the KAS CRSL and producing more than 250 publications per year. The KAS CRSL is constantly offering its users top-of-the-line and day-to-day training sessions and workshops, troubleshooting, as well as method validation, equipment calibration, and occasional data analysis. Its mission is to provide cutting-edge technologies and facilities that enable our researchers to compete on the global scale.

The KAS CRSL is located in Emile Bustani Hall, Room 120. Contact the KAS CRSL by email at crsl@aub.edu.lb or by phone at AUB extension 4300.

Graduate Program in Computational Science (GPCS)

Director:	Touma, Jihad (Physics, FAS)
Executive Committee Members:	Araman, Victor (Decision Science, OSB) Doummar, Joanna (Geology, FAS) Issa, Ibrahim (Electrical and Computer Engineering, MSFEA) Monni, Stefano (Mathematics, FAS) Mouawad, Amer A. (Computer Science, FAS) Najem, Sara A. (Physics, FAS) Taati, Siamak (Mathematics, FAS)

Computational Science is a thriving field of study at the interface of computer science, mathematics and statistics, the natural sciences, engineering, and financial engineering. Practitioners of the art develop mathematical models, construct and optimize numerical algorithms, then deploy them on increasingly powerful computers to address real-life problems in fields where quantitative/compute-intensive modeling and simulation are essential to optimal design, predictive analytics, and inference.

The Graduate Program in Computational Science (GPCS) at AUB is open to students with a background in computer science, applied mathematics and statistics, the natural sciences, engineering, economics, or business who wish to further their undergraduate experience with computers and computing via intensive, hands-on study, development, and application of state-of-the-art numerical algorithms.

Having completed core courses in the program, a student will then follow a sequence of elective courses, then formulate and tackle problems in computationally-intensive fields currently explored at AUB (e.g., data analytics, computational theory, bioinformatics, biostatistics, computational biosciences, physics, astrophysics, hydrogeology, continuum mechanics, optimization, operations research, and risk analysis).

The program prepares its students for an academic adventure in applied mathematics, computational sciences and related fields, as well as a career in industries or research centers where numerical modeling, simulation, design, and/or optimization are key.

Admission Requirements

Admission to the master's program in computational science follows basic AUB regulations, and will be ultimately based on interview. To be considered, applicants to the program should either: 1) be holders of a bachelor's degree in the natural sciences, business, computer sci-

ence, economics, engineering, or mathematics; have successfully completed the equivalent of CMPS 201, MATH 201, MATH 202, MATH 218 or 219; and have acquired proficiency in discrete mathematics, numerical analysis and statistics, at a level equivalent to MATH/CMPS 211, MATH/CMPS 251, and STAT 230 (233), respectively; or 2) be holders of a bachelor's degree, and have completed the equivalent of MATH 202, STAT 230 and of the FAS core course requirements for a minor in computational science. Some candidates may be admitted as prospective students until full completion of the required undergraduate courses.

Graduate assistantships (GFAP) are available for some applicants to the program based on qualifications.

Graduation Requirements

- 9 credits consisting of three core courses in advanced numerical methods, optimization and data science, to be selected from the following three baskets respectively:

1. Advanced Numerical Methods (3 credits)

A. General
   - MATH/CMPS 350 Discrete Models for Differential Equations
   - MATH/STAT 348 Monte Carlo Methods

B. Discipline Specific
   - BIOL 370 Bioinformatics
   - PHYS 310A Computational Physics
   - MECH 663 Computational fluid dynamics

2. Optimization (3 credits)
   - MATH/CMPS 351 Optimization and Nonlinear Problems
   - ENMG 616 Advanced Optimization Techniques

3. Data Science (3 credits)
   - CMPS 364 Advanced Machine Learning
   - EECE 633 Data Mining
   - EECE 664M Introduction to Machine Learning
   - EECE 667 Pattern Recognition
   - EECE 693 Neural Networks

- 12 credits of electives which the student would typically select within one of the program's approved tracks: Data Analytics, Computational Theory, Bioinformatics, Biostatistics, Computational Biosciences, Computational (Astro)-Physics, Hydrogeology, Continuum Mechanics, Optimization, Operations Research, or Risk Analysis. Alternatively, students can, in coordination with their advisor, and with the approval of the GPCS committee, define a 12-credit track that best suits their background and research interests.
- A 9-credit thesis (CMTS 399) in which qualified students demonstrate the ability of constructing, implementing and/or proficiently using computational tools to address problems in their chosen track.

Courses that count towards credit in Computational Science:

MATH/CMPS 350 Discrete Models for Differential Equations 3.1; 3 cr.
A detailed study of methods and tools used in deriving discrete algebraic systems of equations for ordinary and partial differential equations: finite difference and finite element discretization procedures; generation and decomposition of sparse matrices, finite-precision

arithmetic, ill-conditioning and pre-conditioning, scalar, vector, and parallelized versions of the algorithms. The course includes tutorial immersion sessions in which students become acquainted with state-of-the-art scientific software tools on standard computational platforms. Prerequisites: Linear algebra and the equivalent of MATH/CMPS 251 (which can be taken concurrently) or consent of instructor. Annually.

PHYS 310 Special Topics 3.0; 3 cr. (each)
May be repeated for credit.

STAT 348 Monte Carlo Methods 3.0; 3 cr.
Common techniques and basic principles of Monte Carlo simulations, including an overview of random number generation, rejection methods, importance sampling and variance reduction techniques, Monte Carlo integration, Markov chain Monte Carlo (Metropolis-Hastings and Gibbs sampler and some variants, e.g., cluster algorithms and multilevel samplers, as time allows). Annually.

BIOL 370 Bioinformatics 2.3; 3 cr.
A project-based course that teaches computer and statistics skills to handle biological data efficiently and creatively. Projects can involve the analysis of any type of biological data, such as image data, survival data, microarray data, sequence data, next-generation sequencing data, etc. Students can either analyze data from their own work or recapitulate parts of a published analysis. During the course, each student writes analysis scripts in R that automatize an entire workflow from data pre-processing to analysis, output of results and plotting.

MECH 663 Computational Fluid Dynamics 3.0; 3 cr.
A course that deals with the discretization process in fluid dynamics; numerical approaches and applications; iterative and direct matrix methods; numerical implementation of turbulence models. Prerequisites: MECH 314 and MECH 412.

Optimization

MATH/CMPS 351 Optimization and Nonlinear Problems 3.1; 3 cr.
A study of practical methods for formulating and solving numerical optimization problems that arise in science, engineering and business applications. Newton's method for nonlinear equations and unconstrained optimization. Simplex and interior-point methods for linear programming. Equality and inequality-constrained optimization. Sequential quadratic programming. Emphasis is on algorithmic description and analysis. The course includes an implementation component where students develop software and use state-of-the-art numerical libraries. Annually.

ENMG 616 Advanced Optimization Techniques 3.0; 3 cr.
The course is divided into four parts covering integer programming, nonlinear programming, stochastic programming and heuristic methods. Students will develop skills in modeling complex systems using mathematical programming, analyzing the structure of mathematical programs, and developing and applying the correct solution techniques. Students will also have hands-on experience in using software packages for solving optimization problems.

Data Analytics

CMPS 364 Advanced Machine Learning 3.0; 3 cr.
This course focuses on Deep Learning and its applications. Deep Learning has revolutionized the field of Machine Learning and has turned Artificial Intelligence from a research endeavor into an actual reality. In this course, students will learn about the fundamentals of Deep Learning, and how to build Deep Learning models for various real-world applications, particularly in Computer Vision and Natural Language Processing. This course was previous-

ly numbered CMPS 392. Annually.

EECE 633 Data Mining 3.0; 3 cr.
This course is an introduction to data mining. Data mining refers to knowledge discovery, using huge amounts of data to arrive at non-trivial conclusions. Topics will range from statistics to machine learning to database, with a focus on analysis of large data sets. The course will target at least one new data mining problem involving real data, for which the students will have to find a solution. Prerequisite: EECE 330 or consent of instructor.

EECE 664M Introduction to Machine Learning 3 cr.
The course provides an overview of machine learning theory and algorithms that learn from experience to predict or control yet to be seen instances. The course discusses the intuition and the theory of some selected modern machine learning concepts as well as practical know-how to successfully apply them to new problems. It covers topics in supervised learning such as parametric/ non-parametric, generative/ discriminative algorithms for classification and regression and in unsupervised learning for clustering, dimensionality reduction and reinforcement learning. The course also includes case studies and applications so that students can gain practice on regularization, model selection, parameter estimation, Bayesian networks, hidden Markov models, support vector machines, reinforcement learning, neural networks and deep learning.

Students cannot receive credit for both EECE 664M and EECE 633 and EECE 667. Prerequisites: EECE 330, and MATH 218 or MATH 219, and STAT 230 or STAT 233 or consent of instructor.

EECE 667 Pattern Recognition 3 cr.
The course provides an overview of the algorithms used in machine learning. The course discusses modern concepts for model selection and parameter estimation, decision-making and statistical learning. Special emphasis will be given to regression and classification for supervised modes of learning. Students will be assigned typical machine learning problems to investigate as projects.

EECE 693 Neural Networks 3 cr.
The course provides a comprehensive foundation to artificial neural networks and machine learning with applications to pattern recognition and data mining; learning processes: supervised and unsupervised, deterministic and statistical; clustering; single layer and multilayer perceptrons; least-mean-square, back propagation, deep learning; Al-Alaoui pattern recognition algorithms; radial basis function networks; committee machines; principal component analysis; self-organizing maps; current topics of interest.

CMTS 395A Comprehensive Exam 0 cr.
Prerequisite: Consent of advisor.

CMTS 397 Tutorial 3 cr.
May not be repeated for credit. Every term.

CMTS 399 Thesis 9 cr.
Thesis.

Institute of Financial Economics (IFE)

Director:	Neaime, Simon E.
Senior Fellows:	Altug, Sumru G.; Makdisi, Samir A.; Saghir, Jamal M.
Fellows:	Neaime, Simon E.

Steering Committee

Simon Neaime, Chairperson, Professor, Department of Economics
Sumru Altug, Member, Professor and Senior Fellow, Institute of Financial Economics
Samir Makdisi, Member, Professor Emeritus, Department of Economics
Jamal Saghir, Member, Professor of Practice and Distinguished Fellow, Institute of Financial Economics
Ali Chehab, Member, Professor, Department of Engineering
Assem Safieddine, Member, Professor, Olayan School of Business
Nabil Nassif, Member, Professor, Department of Mathematics

Objectives

Effective October 2001, the Institute of Money and Banking, founded in 1984 at the initiative of Samir Makdisi, was restructured as the Institute of Financial Economics to be engaged in research work, seminars and workshops primarily in the areas of financial, monetary, international and political economics.

In tandem with the ongoing process of globalization, there has been a growing emphasis on the fields of financial, monetary and international economics. A major objective of the Institute is to promote research and other academic activities in these fields and thereby build it up into a major research center with a particular concern in the economy of Arab countries and developing countries. The Institute encourages collaborative work with appropriate national, regional and international organizations, and research centers.
The principal goals of the Institute may be briefly outlined as follows:

- Its first goal is to conduct, organize and sponsor high-level research work related in particular (but not exclusively) to financial, monetary and international economics as well as to political economy. Emphasis will be placed on policy-oriented empirical work pertaining to the Arab region and other developing areas, and collaborative teamwork will be promoted. Such research will prove beneficial to governments and organizations concerned with the design of economic and financial policies, especially in the Arab region.
- Its second goal is to hold seminars, workshops and lectures on various topics related to the above areas. The first two types of activities will, among other things, bring together academicians, financial managers and experts, and policy makers to analyze issues of relevance at the policy level.

- Finally, it aims to accommodate visiting scholars and experts, for various intervals of time, to conduct research at the Institute and sponsor public lectures in financial, monetary and related fields.

Activities

- A Seminar Series consisting of lectures given by invited scholars and experts in the field.
- A Working Paper Series which the Institute publishes as part of its role in making available ongoing research within and outside the University.

Membership and Governance

The Institute is an independent academic entity within the Faculty of Arts and Sciences with its own endowment fund. It is managed by a director and staffed with research fellows, visiting scholars, post-doctoral fellows, research assistants and associates, graduate research assistants and an assistant to the director.

Science and Mathematics Education Center (SMEC)

Director:	El Mouhayar, Rabih
Professors:	BouJaoude, Saouma
Associate Professor:	Amin, Tamer; El Mouhayar, Rabih; Khishfe, Rola
Lecturer:	Osman, Enja

The overall mission of the Science and Mathematics Education Center is four-fold:

- to conduct and support quality research on the teaching and learning of science and mathematics at the pre-school, elementary, and secondary levels,
- to contribute to the development of quality science and mathematics teaching and research professionals,
- to design and provide ongoing professional development for science and mathematics teachers in Lebanon and abroad,
- and to effect a positive influence on the quality and status of school science and mathematics education locally, regionally, and internationally.

The Center currently accomplishes its mission through the performance of a variety of functions including, but not limited to:

- designing and teaching science and mathematics education courses for pre-service teachers and master's level graduate students in cooperation with the Department of Education,
- designing and conducting research on teaching, learning, and teacher professional development in science and mathematics,
- designing and developing instructional materials in science and mathematics for students and teachers,
- maintaining a current science and mathematics curriculum library for use by pre-service and in-service teaching professionals,
- providing outreach consultation in science and mathematics education for schools, institutions, and governments regarding curriculum design, design of instructional environments, methods of evaluation, and professional development for teachers, and
- providing in-service professional development for teachers and subject-matter coordinators through special courses, workshops, institutes, conferences, or through participation in professional development initiatives sponsored by AUB or other institutions and organizations.

University Preparatory Program (UPP)

Director:	Harkouss, Samar
Lecturer:	Harkouss, Samar
Instructors:	El-Harake, Rima; Peltekian, Katia

The University Preparatory Program (UPP) is a unit within the Faculty of Arts and Sciences. Its main objective is to address the specific English language needs of students who have completed high school with strong academic records but are unprepared to function in all-English curricula at the university level.

The UPP also offers two intensive English summer courses for newly admitted graduate students coming from outside AUB who have not fulfilled the English Language requirement. These courses aim at enabling such students to function effectively in all English curricula.

UPGR 001A First Intensive English Summer Course for Graduate Students 0 cr.
This course is a graduate level intensive English course (a minimum of 34 contact hours per week), which prepares students from various disciplines with the requisite English language skills and competencies to succeed in their graduate studies at AUB. Prerequisite: 25-28 on the EEE or 490-549 on the paper-based TOEFL (or 57-80 on the internet-based TOEFL).

Students who have not yet taken any English test or who have taken the test and achieved the scores below are eligible for enrolment in UPGR 001A.

Students who take this course and pass it with a minimum grade of (C+) will be allowed to directly enroll in ENGL 300 without taking any English entrance exam again.

However, students who had not initially taken an English test will have to pass the course with a minimum grade of (C+) and should take an English test and achieve the scores listed in the table below.

TOEFL IBT	TOEFL PBT	EEE
57-80	490-549	25-28

Students who take this course and pass it with a minimum grade of (C+) will be allowed to directly enroll in ENGL 300 without taking any other English entrance exam.

University Preparatory Program (UPP) Graduate Courses

UPGR 001A First Intensive English Summer Course for Graduate Students 0 cr.
This course is a graduate level intensive English course (a minimum of 34 contact hours per week), which prepares students from various disciplines with the requisite English language skills and competencies to succeed in their graduate studies at AUB. Prerequisite: 25-28 on the EEE or 490-549 on the paper-based TOEFL (or 57-80 on the internet-based TOEFL).

UPGR 001B Intensive English Summer Course for Graduate Students 0 cr.
This course is a graduate level intensive English course (a minimum of 20 contact hours per week) designed to equip students independent of their disciplines with the requisite English language skills and competencies for success in their graduate studies at AUB. Prerequisite: 29-31 on the EEE, or 550 -572 on the paper-based TOEFL (or 213-229 on the computer-based TOEFL or 81-87 on the internet-based TOEFL), or 6.0-6.5 on the IELTS.

The Zaki Nassif Program for Music (ZNPM)

Chairperson:	Nassif, Nabil
Academic Committee:	Jureidini, Wadi; Sadek, Walid; Kurani, David; Orfali, Bilal; Taher, Ali; Touma, Jihad

The Zaki Nassif Program for Music was inaugurated in December 2004.

Objectives

The Program aims to preserve and promote the musical heritage of Zaki Nassif and to foster excellence in the teaching of music by contributing to its advancement through a variety of activities that include:

- Reinstating and sustaining musical studies programs and music curricula at AUB
- Recruiting scholars and new faculty members to initiate music courses and programs at the department of Fine Arts and Arts History in the AUB Faculty of Arts and Sciences
- Organizing competitions, concerts, conferences, and seminars
- Inviting professional musicians and academics to the university
- Awarding prizes, scholarships, and fellowships to students in the name of Zaki Nassif

The Center for Arts and Humanities (Mellon Grant)

Director:	Brassier, Raymond
Program Manager:	Bassil, Rita

AUB's Centre for Arts and Humanities (CAH) seeks to increase understanding and appreciation for the Arts and Humanities both inside and outside the university. Hosting a diverse array of cultural events, including lectures, exhibitions, plays, films, and performances, CAH provides a forum for research and debate in the Arts and Humanities. These events are intended to enrich cultural engagement and dialogue not only for faculty and students on campus but also for the wider intellectual community in Beirut and beyond. CAH creates forums for scholarly collaboration and exchange, organizing workshops and symposia to facilitate the exploration of new and challenging ideas. It also fosters exchanges between artists and writers, encouraging creative collaboration to broaden AUB's intellectual landscape. Building regional relationships, CAH has established ties and exchanges with universities in Lebanon and the wider region, contributing to a vibrant network of academic and cultural connections. It has been instrumental in organizing significant conferences at AUB, sparking debate and inquiry within the university and the broader community.

The Writing Center

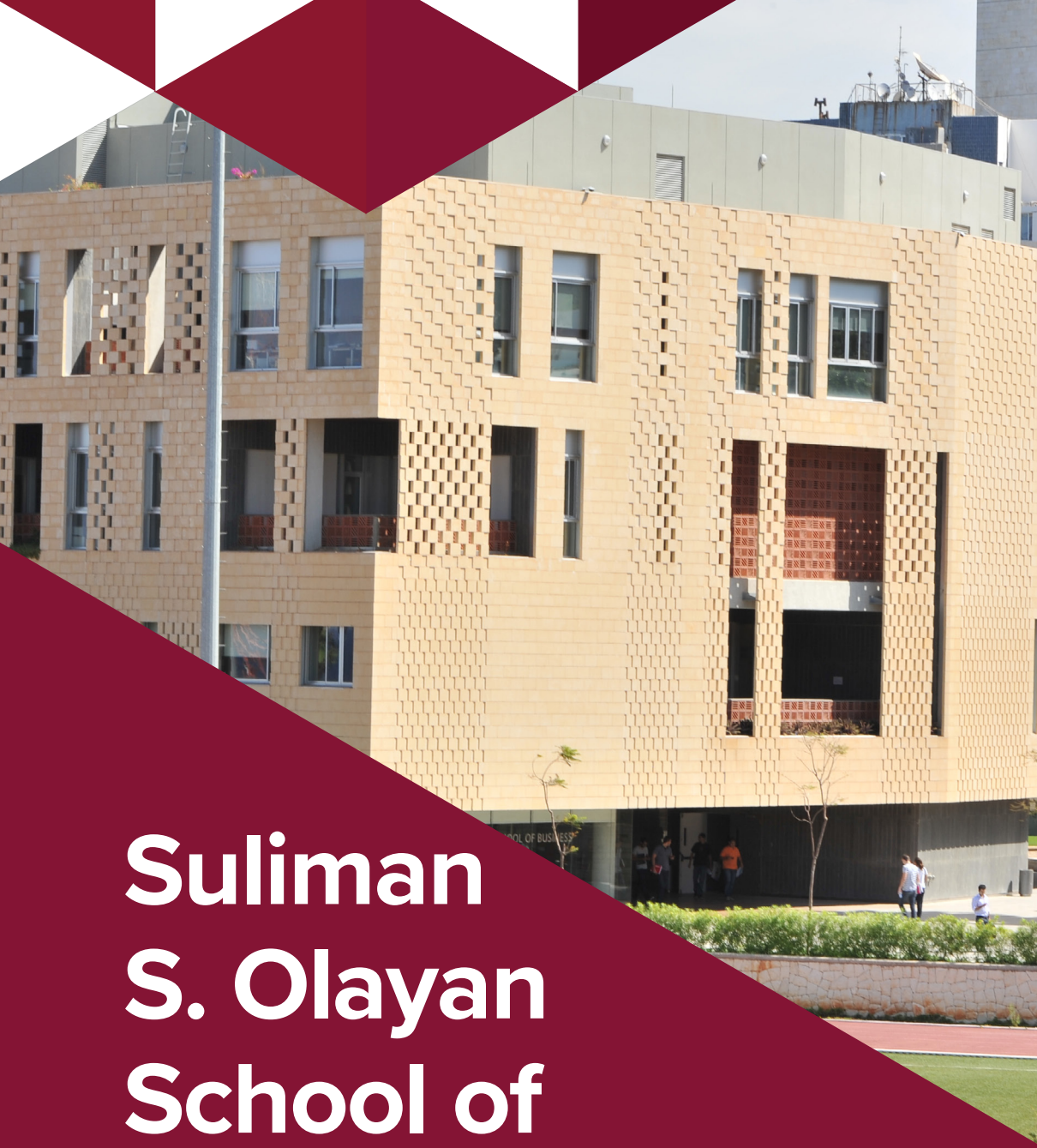
Interim Director:	Baalbaki, Rula
Administrative Assistant:	Takkoush, Sarah

The Writing Center's mission is to support the teaching and learning of writing on campus. Established in 2004, the Writing Center performs this work through its peer tutoring program, support for General Education Writing in the Disciplines courses and special projects and events at AUB and beyond. We are committed to research and outreach to the larger community.

The Writing Center supports AUB students, staff, and faculty via one-on-one consultations and workshops on individual or group writing projects at any stage of development. Undergraduate and graduate students serve as tutors who work to help individuals become stronger writers in both English and Arabic. Appointments may be made on our online scheduler at https://aub.mywconline.com or by phone. Writing resources and more information about Writing Center tutors and services are located on our website at https://aub.edu.lb/fas/writingcenter.

The Writing Center supports faculty members via writing workshops, small group meetings, and individual consultations. Writing Center staff collaborate with faculty members as they develop, assess, and revise courses complying with the General Education-mandated requirement to offer Writing in the Disciplines instruction in every major. Workshops for programs or departments and individual consultations for faculty seeking to improve writing assignments and activities in their courses can be scheduled by emailing or calling the Writing Center.

The main Writing Center office is located in Ada Dodge Hall, room 214. Contact the Writing Center by email at writingcenter@aub.edu.lb or by phone at AUB extension 3157.



Suliman S. Olayan School of Business (OSB)

Graduate Program

Officers of the Faculty

Fadlo Khuri	President of the University
Zaher Dawy	Provost
Yusuf Sidani	Dean
Lama Moussawi	Associate Dean for Research and Faculty Development
Victor Araman	Associate Dean for Programs
Fouad Zablith	Associate Dean for Online Learning and Program Development
Bradley Jon Tucker	Registrar
Antoine Sabbagh	Director of Admissions
Fida Afiouni	Associate Provost
Lokman Meho	University Librarian

Professional Administrators

Abir Sinno	Director of Strategic Initiatives and Continuous Improvement
David Matta	Director of Career Management Services
Dania El-Ashi	Senior Service Delivery Manager
Layan Sarkis	Administrative Affairs Manager
Amal Shbaro	Administrative Assistant to the Dean
Mohammad Hasan Senan	Accreditation Officer
Nada Khalidy Kouzi	Facilities and Events Manager
Zeina Succar	Financial Officer

Program Directors and Coordinators

Zeina Harfoush Nsouli	Executive Director of the Undergraduate Program
Maya El Helou	Director of Graduate Programs
Yasmeen Makarem	Director of the MHRM Program
Patrick Fitzgerald	EMBA Director, Acting Associate Dean for Executive Education
Mohammad Faour	Director of the MFIN Program
Walid Nasr	Director of the MSBA Program
Wassim Dbouk	Director of the Investment Management Program
Hagop Panossian	Director of the International Case Competition Program

Center Directors

Bijan Azad	Director of the Darwazah Center for Innovation Management and Entrepreneurship
Nada Naufal	Director of the Rami Fouad Makhzoumi Initiative in Corporate Governance
Nada Khaddage	Director of the Center for Inclusive Business and Leadership for Women (CIBL)
Randa Salamoun	Director of the Case Hub Initiative

Middle East Advisory Board

Elissar Farah Antonios	Chief Executive Officer of Citi Bank	UAE
Karim Baalbaki	Managing Director, BCI Holding S.A.| Lebanon
Tarek Daouk	CEO, Dentsu Aegis Network| MENA
Charbel Fakhoury	Vice President Enterprise Services, Microsoft	Middle East & Africa
Rana Ghandour Salhab	Member of the Middle East Board of Directors and Executive Committee at Deloitte	Middle East
Dipak C. Jain	Former Dean	U.S.
Daniel A. Szpiro	Dean	MARIST School of Professional Programs
Raja Assili	Chief Executive Officer at Qatari Investors Group QSC

The Finance, Accounting, and Managerial Economics Track

Convener:	Jamali, Ibrahim
Professors:	Elfakhani, Said; Safieddine, Assem
Associate Professors:	Dbouk, Wassim; Ismail, Ahmad; Jamali, Ibrahim; Mazboudi, Mohamad
Assistant Professors:	Faour, Mohamad; Abou Tanos, Barbara; Harakeh, Mostafa
Visiting Assistant Professor:	Ahmed, Neveen
Senior Lecturers:	Azzam, Henry; Ghanem, Abdel Jalil; Tannir-Fawaz, Lina; Uwaydah-Mardini, Rania
Lecturer:	Hout, Bassima

The Management, Marketing and Entrepreneurship Track

Convener:	Safieddine, Assem
Professors:	Sidani, Yusuf
Associate Professors:	Afiouni, Fida
Visiting Associate Professor	Samara; Georges
Assistant Professors:	Itani, Mona; Joseph, Jay; Saade, Nathalie; Makarem, Yasmeen; Abi Aad, Amine; Merhabi, Mohamad-Amir; Al Chami, Rola; El Kebbi, Amr
Senior Lecturers:	Abdallah, Hanin; Dimechkie, Riad; Panossian, Hagop; Khauli, Leila; Wahbi, Marwan
Lecturers:	Kfoury, Jessy
Instructors:	Kfouri, Michael

The Business Information and Decision Systems Track

Convener:	Fleszar, Krzysztof
Professors:	Osman, Ibrahim; Fleszar, Krzysztof; Araman, Victor; Azad, Bijan; Moussawi, Lama
Associate Professors:	Bou Hamad, Imad; Nasr, Walid; Zablith, Fouad
Assistant Professors:	Khreich, Wael; Salamoun, Randa
Visiting Associate Professor	Taleb, Sirine
Senior Lecturers:	Geutcherian, Rita
Lecturers:	Majdalani, Elie

History and Overview

Business Education at AUB started in 1900 and was provided either by a department or by a semi-autonomous school under the university's Faculty of Arts and Sciences for approximately one hundred years. In celebration of the hundred-year anniversary of offering business programs, AUB established an independent School of Business (later named the Suliman S. Olayan School of Business, OSB) in September 2000, as the sixth faculty of the University.

To date, AUB has graduated over 8,000 students from its undergraduate business programs and over 1,750 from its graduate business programs. Since its formal establishment as a distinct school, OSB has grown its full-time faculty complement from 13 members in the academic year 2000-2001 to 48 members today. It now graduates approximately 290 students from its undergraduate program and more than 180 students from its graduate programs.

OSB currently offers five degree programs which include an Executive Master of Business Administration (herein referred to as the Executive MBA), a Master of Business Administration (herein referred to as the MBA), a Master's in Finance (herein referred to as the MFIN), a Master's in Human Resource Management (herein referred to as the MHRM), a

Master's in Business Analytics (herein referred to as the MS-BA) and a Bachelor of Business Administration (herein referred to as the BBA).

The First AUB Faculty to Be Named

In June 2003, the AUB School of Business was named the Suliman S. Olayan School of Business (herein referred to as OSB) in honor of the late international Saudi businessman and AUB trustee whose family has always been a major supporter of AUB.

This watershed event triggered a series of major developments intended to broaden and deepen the delivery of quality undergraduate and graduate business programs at AUB. An entirely new curriculum was introduced for the BBA and MBA degrees in Fall 2001. Both degrees were redesigned to follow leading trends in international business education. In Spring 2004, OSB launched the Executive MBA program in response to the professional development needs of senior corporate leaders in the region. In 2012, OSB introduced a Specialized Master's in Finance and a Specialized Master's in Human Resource Management, and in 2017, introduced a Master of Science in Business Analytics, to its suite of graduate degree program offerings as part of its strategy to better serve the region, increase its graduate enrollment and further enhance AUB's global brand as the regional business education leader.

Accreditation

The degree programs of OSB are accredited by the Association to Advance Collegiate Schools of Business (AACSB International).

Requiring rigorous quality audits and adherence to best academic practices, AACSB accreditation, which is attained by fewer than 5 percent of business schools worldwide, is the international quality assurance standard for business education programs. Initial accreditation was achieved in 2009, and as per AACSB re-accreditation guidelines, OSB was re-accredited in 2014, and more recently in 2019, marking 10 years of AACSB accreditation.

Vision

The Suliman S. Olayan School of Business' vision is to transform business thinking in the MENA region.

Mission

The Suliman S. Olayan School of Business' mission is to enable world-class business research, learning and knowledge transfer from our authoritative anchor point within the MENA region.

Leaders Values

Lifelong Learning | We see business education as an enduring journey perpetually nurturing curiosity and fostering innovation. We aim to remain at the cutting edge of business thought and practice, embodying the belief that learning never ceases.

Empowerment | We inspire individuals to explore new horizons, innovate boldly, and take on leadership roles. We foster a culture where leaders are cultivated to drive change and make significant contributions.

Agility | Agility underscores our adaptability to rapidly changing business environments. We strive to remain proactive, flexible, and robust in strategy and action, embodying versatility in academic, research, and community engagement.

Diligence | Diligence drives us to continually refine our processes, enhance our programs, and achieve exceptional results with integrity and responsibility. We are passionate about preparing leaders who are deeply devoted to their craft and community.

Excellence | Excellence in teaching, research, and service inspires us to push boundaries, innovate tirelessly, and uphold the highest standards of quality, preparing future leaders for unrivaled success in the global marketplace.

Respect | Respect fosters an environment where dignity, diversity, and dialogue flourish. We are committed to honor the perspectives and contributions of all stakeholders, fostering a culture of psychological safety where everyone thrives.

Sustainability | We strive to integrate environmental stewardship, societal well-being, and economic prosperity into our curriculum, intellectual contributions, and operations. We aspire to develop leaders with the skills and passion to provide sustainable solutions for global challenges.

Ethics and Integrity at OSB

OSB is committed to the highest standards of academic integrity and expects its faculty and students to exhibit exemplary behavior in this regard. All business students are responsible for familiarizing themselves with and always abiding by the AUB policies, rules and regulations that define standards for academic integrity.

Organization and Governance

The Suliman S. Olayan School of Business (OSB) is managed by the dean, associate deans, track conveners, program directors and the professional administrators of the school. Track conveners report directly to the dean of the school. The school is guided by the Middle East Advisory Board, a board composed of accomplished regional thought leaders and trendsetters in business. It operates under a set of school bylaws available at the following web address:

https://aub.policytech.eu/dotNet/documents/?docid=149&public=true

OSB is organized into the functional equivalent of multidisciplinary departments, referred to as tracks. While each track has its distinct identity and designated faculty members, a track is markedly different from a department; it allows for multiple faculty membership, offers fertile soil for cross-disciplinary synergy, and facilitates faculty cooperation.

The school has three tracks, each encompassing a cluster of distinct academic business disciplines and headed by a track convener. The tracks are:

- Finance, Accounting and Managerial Economics (FAME)
- Management, Marketing and Entrepreneurship (MME)
- Business Information and Decision Systems (BIDS)

Graduate Programs

OSB currently offers five graduate degree programs: Executive MBA, MBA, Master's in Finance, Master's in Human Resource Management and Master's in Business Analytics.

For transfer of credits from one Master's Degree to an OSB graduate degree, no more than 9 credits (12 credits in the case of the MBA program) are transferable provided they are not credits earned by an internship, thesis or practicum, and degree minimum residency requirement is maintained. Normally, credits counted toward another graduate degree at AUB or another institution may be transferred to OSB even if they have already been used to satisfy requirements for another awarded graduate degree. Students applying for dual graduate degree, one of which is the MBA, must complete at least 54 credits to fulfill dual degree graduation requirement. In the case of dual specialized master's degrees, student must complete at least 48 credits to fulfill dual specialized master's degree graduation requirement.

The Executive MBA Program

Philosophy

The OSB Executive MBA Program is designed for experienced business leaders and motivated professionals that aspire for continuous growth and advancement. The immersive, leadership and strategy experience aims to provide you with the tools to maximize your impact in complex business environments globally, while broadening your perspective within your industry.

Admission to the Program

Recruitment is ongoing throughout the academic year. However, applicants are encouraged to apply as early as possible.

Admission into the OSB EMBA program is a multi-step process:

- Submission of the application
- Application review
- Interview
- Decision

Criteria for Admission

- Undergraduate degree
- Leadership Skills
- Approximately 10+ years of experience (with at least 5 years of documented management experience)
- English proficiency
- An interview

The Application Process

To apply for admission, the following must be submitted before the interview:

- An application form
- Recent photograph in digital format
- Copy of identity card or passport
- Two letters of recommendation
- Official transcripts for all undergraduate and graduate coursework
- Copy of academic degrees
- Proof of English proficiency (English requirements), please refer to Readiness for University Studies in English (RUSE)
- An application fee
- A curriculum vitae

Program Components

Overview

Students can complete the EMBA in 15 months starting the fall term provided they pass all core and elective courses, complete the EMBA capstone project, and maintain a cumulative average (GPA) of at least 3.3 in all courses taken for graduate credit. Students coming from non-business backgrounds must also complete all their remedial courses. Failing to maintain a cumulative GPA of 3.3 upon completion of the courses for the program's academic year or obtaining a grade less than C+ in any course will cause a delay in graduation until the program requirements are met. Students can also satisfy all the above requirements if registered part-time over two calendar years.

Program Highlights

The EMBA program provides practical knowledge in the areas of:

- Executive Coaching
- Global Business Environment
- Business Communication Proficiency
- Digital Transformation
- Business Professional Knowledge and Competence
- Ethics
- Decision-Making

Program Outline

The OSB blended Executive MBA Program is the leading program in the MENA region and delivers the knowledge and expertise from our world-renowned professors by leveraging their practical experience and applied research from around the world.

The program consists of 44 credits distributed over 8 general management disciplines that are covered in 24 core courses and 2 special topic courses that address a range of multidisciplinary and company-wide issues.

The Curriculum

Discipline	Course
Strategy	Strategy Strategic Analysis Managing Risk and Uncertainty
Marketing	Strategic Marketing Digital Marketing
Corporate Finance	Applied Corporate Finance Strategic Financial Management
Operations Management	People Management Operations Management Sustainable Supply Chain Management Corporate Information Technology Management Innovation Management
Economics	Microeconomics Macroeconomics
Decision-Making and Data Analysis	Statistics and Data Analysis Quantitative Models for Decision-Making Business and Data Analytics
Managerial Accounting	Financial Statements Analysis Management Accounting
Management and O.B.	Organizational Behavior Executive Communication Negotiation and Conflict Resolution Leading People and Organizations Corporate Governance

Program Delivery

With a practical and convenient learning structure, our executives convene 9 times throughout the program. We ensure continuous learning and interaction in between sessions through our technically designed on-line blended learning format. To optimize the experience for virtual learning, we have introduced half-day hybrid classroom residency sessions.

- 15 months program, approximately 53 days out of office

- 8 weeks on campus, 1 week international study trip, and approximately 5 weeks blended format
- Personal Leadership Development
- International Study Trip
- Tailored individual project developed over 6 months

Ongoing Leadership Development	Courses	Months	Duration
	Core Courses On-campus	Sept 2023	6 days
		Nov 2023	6 days
		Jan 2024	6 days
		March 2024	6 days
		May 2024	6 days
		July 2024	6 days
		Sept 2024	6 days
	Special Topics On-campus	Oct 2022	5 days (International Residency Trip)
		Dec 2022	6 days
Project: June 2024 - Dec 2024			

Online learning periods occur between each on-campus module, ensuring continuous learning and interaction between participants throughout the program.

Academic Policies

Academic Rules and Regulations

University academic rules and regulations apply. The minimum passing grade in a course is (C+). A participant who fails a course must retake it. An average of at least B+ must be maintained throughout the program. Failure to do so will result in the participant being placed on academic probation, which can be lifted only upon completion of a timed development plan, mutually agreed upon by the Executive MBA Director. The OSB EMBA Oversight Committee may discontinue the participant from the Executive MBA program if the participant fails to remove the probation within the time period specified in the plan.

Academic Advisors

The EMBA is cohort program. All participants follow the same degree plan, and therefore there is no need for advisor's approval of the student's schedule each session. Otherwise, the student can consult with the EMBA Academic Director for further advice.

Course Descriptions

EMBA 510 Strategy 2 cr.
Develops an understanding of the strategies learned in management, operations, marketing, accounting and finance. Emphasis is on combining analytical, integrative, communication and decision-making skills to develop and implement strategic direction for an organization. Issues include formulation of alternatives, and providing solutions and recommendations with a main focus on gaining an advantage against competitors in the complex and dynamic global marketplace.

EMBA 511 Strategic Analysis 1 cr.
Examines the tools and analytical techniques that managers need to evaluate and implement short and long-term strategies.

EMBA 512 Managing Risk and Uncertainty 1 cr.
Discusses strategic and operational models covering action-oriented plans in order to mitigate risks. Topics include analysis of business uncertainty, decision-making required for strategy success, assessment of qualitative and qualitative risks, risk response, risk management plans, estimation of decision analysis parameters, decision analysis, and risk management closeout.

EMBA 520 Strategic Marketing 2 cr.
The course is designed to offer a contemporary understanding of the art and science of Marketing. The course attempts to offer a comprehensive, yet streamlined and balanced coverage of key Strategic Marketing Management concepts, and how the marketing function integrates with other functional areas of business to create and maintain customer and company value. Issues covered include: adapting marketing practices to the new market realities; understanding markets and realizing market opportunities; achieving customer satisfaction, value, and retention; understanding key characteristics of the business and consumer markets; defining competition; appreciating distinct features of services; understanding segmentation, targeting, and positioning; role of market research; and designing marketing mix programs.

EMBA 521 Digital Marketing 1 cr.
Focuses on how digitalization has transformed traditional marketing. It introduces a 5th P of Participation (by consumers). Participants will explore best-practices related to the business use of social media, digital marketing and how to use analytics in marketing to conduct business effectively in the digital era. The course will draw on a wide range of business transformation examples from the last few years. It also examines the impact of digital advertising, mobile marketing, social media, user-generated content, crowdfunding and social networks.

EMBA 530 Applied Corporate Finance 1.5 cr.
The course covers major theoretical and practical themes of Corporate Finance. The course integrates the use of financial theory to solve practical problems with the goal of wealth maximization. Topics include cash flows estimation, risk and return measurement, discounted cash flows techniques under certainty and uncertainty, capital restructuring, mergers, acquisitions, spin-offs, take-overs, and their applications. The learning pedagogy is focused on applied case setting.

EMBA 531 Strategic Financial Management 1.5 cr.
Introduces framework, concepts and tools for analyzing financial decisions based on modern financial theory. Topics include financial planning, forecasting and valuation

models, advanced capital budgeting under uncertainty, real options, advanced capital structure, capital restructuring and working capital management. The course provides an overview of the role of finance in strategic decision-making, the formulations and implementation of financial policies, procedures to problem-solving situations, financial innovation and corporate strategy and business simulation models through the use of business cases.

EMBA 540 People Management 1 cr.
Discusses strategies for building a sustainable competitive advantage through people. Emphasis will be placed on trends and innovations in HR, Strategic HR, talent acquisition, learning and development, trends in performance management, compensation and benefits, as well as talent retention and managing the diverse workforce.

EMBA 541 Operations Management 2 cr.
This course provides a foundation for understanding the operations of a firm as a competitive advantage. It Introduces the basic skills necessary to critically analyze a firm's operating performance and practices. We adopt in this course a process view approach that applies across industries. A great emphasize is also put on a set of tools and techniques that can be used in practice to help managers be more effective in making strategic (operational) decisions.

EMBA 542 Sustainable Supply Chain Management 1 cr.
We discuss in this course the design, the planning, and the management of sustainable supply chain processes. We connect the competitive strategy to the different logistical and cross-functional drivers affecting the supply chain function. We highlight the role of sustainability at the core of supply chain management and vice versa. We focus on concepts and tools to hedge against risk of information and alignment including postponement strategies, supply chain integration and channel coordination.

EMBA 543 Corporate Information Technology Management 1 cr.
Focuses on how processes, technologies and information can be used to align the strategy of company with its operations in four areas: technology/information management; alignment of strategy with operations; process management; and integration of processes within and across organizations with technology and information.

EMBA 544 Innovation Management 1 cr.
Focuses on how innovation is different from invention; how innovation can be technological, organizational and business model; familiarizes participants with approaches to organizing and managing an innovative initiative within an existing firm or new venture.

EMBA 550 Microeconomics 1.5 cr.
The course introduces the principles of microeconomics and its applications in managerial decision making. The course begins with the analysis of market equilibrium using the framework of demand and supply and proceeds to quantitative demand analysis, with a particular emphasis on the elasticity of demand and its relation to a firm's total revenues. The course proceeds to an examination of the production and costs of a firm, with an emphasis on the optimal choice of inputs. The profit-maximizing output decisions under different market structures (perfect competition, monopoly, monopolistic competition and oligopoly) are also thoroughly examined. The course concludes with an introduction to game theory, a tool which allows managers to devise optimal courses of actions in market structures that are characterized by strategic interdependence.

EMBA 551 Macroeconomics 1.5 cr.
The course introduces the basic principles of macroeconomics and its applications. It gives a high-level overview of the determinants and drivers of economic activity as well as the effects of monetary and fiscal policies on economic activity. The main topics covered include measuring aggregate economic activity and prices, economic fluctuations and business cycles as well as monetary and fiscal policies' effects on economic activity. The course proceeds to a discussion of the determinants of exchange rate fluctuations in view of the latter's importance for the activities of an international organization.

EMBA 560 Statistics and Data Analysis 1.5 cr.
Introduces statistical concepts and tools to support the executive decision-making process in a business environment. The course, which stresses application and managerial problem solving actions, covers: data collection and analysis, descriptive statistics, graphical summarization, probability and probability distribution, sampling, statistical inference, confidence intervals, hypothesis testing, simple and multiple regression analysis and forecasting.

EMBA 561 Quantitative Models for Decision-Making 2 cr.
Introduces the basic concepts and methods of management science and their application to the analysis of strategic and tactical decision problems. Topics covered can include decision-making under uncertainty, linear programming, integer programing and simulation in business. Applications will cover a wide range of areas.

EMBA 562 Business and Data Analytics 2 cr.
The course gives managers and executives a better understanding of how data analytics tools can be used to improve business performance and help organizations gain a competitive advantage. More specifically, the course's main focus is on commonly used predictive analytics techniques. Examples from various business fields are provided. Although this is not a computer-skills course, it does include some use of user-friendly software such as Statistical Package for the Social Sciences (SPSS).

EMBA 570 Financial Statements Analysis 1 cr.
Integrates contemporary corporate financial reporting issues with financial analysis pertaining to the executive's own organization. The course, which stresses the user approach, covers the creation and analysis of balance sheets, profit and loss accounts and cash flow statement, effective financial statements and disclosures interpretation, financial statements measurements, standard setting issues and communicating decision-useful information to stakeholders. It also addresses international financial reporting, investment and performance evaluation, extraction of information to support the development, implementation, monitoring and evaluation of a successful global strategy, using a case approach.

EMBA 571 Management Accounting 1.5 cr.
This course introduces management accounting tools and techniques that are most useful to generate information for decision making and control. It examines the accounting information used by managers for decision making purposes in order to improve overall performance, profitability, and competitiveness. Topics covered include cost behavior, cost allocation systems, cost-volume-profit analysis, as well as budgeting and variance analysis.

EMBA 580 Organizational Behavior 1 cr.
Focuses on the behavioral issues of individuals and groups in organizations by examining the skills required for leading people and teams and developing talent, shaping and changing culture, and ensuring alignment with strategy. This course explores the behavioral aspects of the modern workplace including processes such as individual attributes, perceptions,

values and attitudes, motivation, team dynamics and cross-cultural differences. The course provides a micro-level analysis of behavior of individuals and groups within their organizations, and the influence that the environment has on such behavior patterns. The course also tackles the importance of organizational culture, how it is shaped and how it is possible to better align strategy and culture.

EMBA 581 Executive Communication 1 cr.
Explores the range and qualities of effective leadership communication in business. Emphasis is placed on putting theory and technique into practice, with respect to thinking, listening, writing, speaking and behavior. The course also focuses on the strategies for cross-cultural communication and speaking to influence and inspire action. Case studies, role-playing and presentations offer specific guidance and individualized feedback into enhancing skills and developing performance.

EMBA 582 Negotiation and Conflict Resolution 1 cr.
Examines key principles and concepts that are built based on a robust negotiation framework and that are critical to the negotiation process and how to apply these concepts to real life negotiations. In addition, it focuses on the development of analytical and behavioral skills for resolving conflict at the workplace. The course will include in-class negotiation simulations that give participants the opportunity to practice negotiation strategies and tactics in a low-risk environment and to learn about how others negotiate in similar situations. The course is highly experiential and builds on real life examples and practices. Emphasis is placed on managing emotions during the negotiation process, effective communication, advanced negotiation based on a framework, and different types of power and influence.

EMBA 583 Leading People and Organization 1 cr.
Focuses on the concepts and skills needed for executive leadership in the modern organization. Emphasis will be placed on leadership concepts and applications in relation to vision, power, influence, motivation, values, attitudes, behavior, followership, communication, leading strategic change, empowerment and ethical leadership. The course draws on case studies, role-modeling exercises, and personal assessment and development.

EMBA 584 Corporate Governance 1 cr.
Explore the ecosystem behind the corporate governance system, and how businesses and corporations are structured, managed, directed, and controlled. Differentiate between the different structures of Governance including the duties, rights, and responsibilities of the main stakeholders. Understand the impact of the stakeholders' primacy versus the shareholders' primacy on businesses, and how it can affect business sustainability.

EMBA 590 Capstone Project 6 cr.
Capstone Project

EMBA 591 Special Topics 6 cr.
Special Topics

The MBA Program

Philosophy

The Master of Business Administration (MBA) BA program is designed for professionals and future leaders looking to advance and transform their career while positively impacting their communities. The MBA program delivers a global world- class level of education that drives in the most influential, diversified, and innovative business thinkers from around the globe, leveraging on world-renowned faculty, current advances in academic theory and concepts that compliment practical learning, with a customized format that would fit individual needs of participants.

Admission to the Program

There are two admission deadlines for the program:

- March, for enrollment in the Fall term
- November, for enrollment in the Spring term.

For more details, please refer to the Admissions section of the AUB graduate catalogue under Application Procedures.

Criteria for Admission

The MBA program is looking to attract and admit distinctive candidates with diverse backgrounds and well-balanced competencies - including strong analytical reasoning, critical thinking, maturity, effective communication skills, and demonstrated leadership potential. Each application will be reviewed holistically in a thorough manner. For that, all the below elements are taken into account when assessing the applicants' profiles for admission:

- **Curriculum Vitae (CV).** The CV should list the education, details the work experience, highlights the extra-curricular activities as well as any additional information deemed relevant.
- **Average GPA.** An average GPA of 3.3 and above or AUB equivalent from a university recognized by AUB is required for an applicant to be considered for regular admission. Applicants with a GPA between (2.7) and (3.3) can still be considered but only for an admission under probation.

- **Work experience.** Admitted applicants have typically a number of years of experience. Exceptionally, outstanding applicants (i.e. acceptable GMAT score and high GPA) with less than one year of experience might be considered.

- **GMAT test score.** Students are required to take the Graduate Management Admission Test (GMAT) or GRE for admission at OSB. In lieu of GMAT, candidates may submit a GRE equivalence score (quantitative and verbal sections). Such standardized test allows a more objective assessment of the candidate academic abilities and analytical skills. Candidates who have a strong undergraduate academic performance, have acquired compelling work experience, and have demonstrated leadership potential, might be exempted from submitting a test score.

- **Two letters of recommendation.** The letters represent an important element that helps assessing the applicant's competencies beyond the academic performance, and therefore should preferably highlight the applicant's strengths and work experience.

- **Essays.** Applicants must submit three essays as part of their application. These essays will be used to complete the holistic assessment of the profile of the applicant.

- **Interview.** Applicants might be invited for an interview in order to complement the holistic assessment.

The Application Process

To apply for admission, the following must be submitted before the interview:

- An application form
- Recent photograph in digital format
- Copy of identity card or passport
- Two letters of recommendation
- Official transcripts for all undergraduate and graduate coursework
- Proof of English proficiency (please refer to Readiness for University Studies in English - RUSE)
- A curriculum vitae
- A Statement of Purpose
- An application fee
- Note that all students who do not have an undergraduate degree from AUB or any American, Canadian, British or Australian University, must meet the Rules of the

Readiness for University Studies in English (RUSE) of the university. To apply please submit an online application form at https://graduateadmissions.aub. edu.lb/

- In the OSB, the MBA/OMBA Oversight Committee shall act on admission to the MBA program of all applicants. For additional information on graduate admissions, refer to the Admissions section of this catalogue.

Program Components

Overview

The MBA program was launched in the mid-1940s and is continuously committed to the highest standards of quality in graduate management education. The MBA is a general management program that covers the various areas of business and offers students a robust knowledge platform comprised of a set of functional, cross-functional and skill-based courses. Indeed, a set of core courses as well as a variety of electives courses are available for students to choose from to tailor their learning experience to suit their individual needs.

Starting Fall 2020, OSB delivers the MBA program in two modalities: in residence on campus and online. When applying to the MBA program, the applicant must specify whether the application is for the on-campus MBA or the online MBA program (OMBA). Applicants to either mode of delivery, i.e., MBA or OMBA, are subjected to the same admission criteria.

All MBA courses provide students with opportunities to learn, practice and lead in a number of industries including Management Consulting, Entrepreneurship, Banking, Marketing, Media and others.

Program Highlights

- Flexible, innovative curriculum which fosters collaboration, community, teamwork and an entrepreneurial spirit.
- World-class faculty research and a focus on experiential, participatory and analytical learning.
- Rigorous academic training applied to real-world settings practice while developing effective leadership and management skills.
- Ongoing assessment of learning outcomes geared towards continuous improvement.
- A global community of alumni worldwide embodying a powerful network that lasts a lifetime.

Impactful learning, executive connections and partnership opportunities are some of the benefits of the MBA experience at OSB. All our courses provide students with opportunities to learn, practice and lead. The program provides knowledge and recognition from the business world on industries of topics of interest such as consulting, strategy, innovation and other topics from a variety of industries.

Program Outline

The MBA curriculum is composed of eight (8) core courses and a choice of 4 elective courses

from a list of courses offering important areas of interest to the students. The program is offered on a full-time and part-time basis to suit the needs of students. Completion period ranges between 10 and 20 months depending on student preferences. It is the only graduate program at OSB which starts every fall and spring of the academic year.

The Curriculum

Curriculum		**Credits**
Required Core Business Courses		**24**
MNGT 306	Leadership and Behavior in Organizations	3
MKTG 306	Marketing Management	3
DSCN 300	Models for Decision-Making	3
BUSS 315	Prices, Markets and the Economic Environment	3
ACCT 301	Financial Reporting and Analysis	3
DCSN 310	Operations and Process Management	3
BUSS 349	Strategic Management	3
FINA 306	Intermediate Corporate Finance	3
Electives		**12**
Four Business Elective Courses		3 credits each
Total Credit Hours		**36**

Program Delivery

The program can either be completed on a full-time or part-time basis. As a full-time student, the program can be completed within one academic year as follows:

One Year MBA Degree Plan		
Course Title	**Normal (Cr.)**	**Core Elective Remedial**
Summer term (Required for Non-BBA Holders)		
Preterm Course: Financial Accounting/Basics of Finance	0	Remedial
Preterm Course: Statistics and Team Building	0	Remedial
Fall term		
ACCT301: Financial Reporting and Analysis	3	Core
DCSN300: Models for Decision Making	3	Core
MNGT306: Leadership and Behavior in Organizations	3	Core
MKTG306: Marketing Management	3	Core
Winter term		
Elective I	3	Elective
Spring term		
FINA306: Intermediate Corporate Finance	3	Core
DCSN310: Operations Management	3	Core
BUSS315: Advanced Business Analysis	3	Core
BUSS349: Advanced Seminar in Strategic Management	3	Core
Summer term		
Elective II	3	Elective
Elective III	3	Elective
Elective IV	3	Elective

Part-time MBA-OMBA students have up to three years to complete the program as follows:

Two-Year MBA Degree Plan		
Course Title	**Normal (Cr.)**	**Core Elective Remedial**
Summer term (Required for Non-BBA Holders)		
Preterm Course: Financial Accounting/Basics of Finance	0	Remedial
Preterm Course: Basics of Finance	0	Remedial
Preterm Course: Statistics and Team Building	0	Remedial
Year 1 Fall term (Fall I + Fall II for OMBA)		
ACCT301: Financial Reporting and Analysis	3	Core
MNGT306: Leadership and Behavior in Organizations	3	Core
Year 1 Spring term (Spring I + Spring II for OMBA)		
FINA306: Intermediate Corporate Finance	3	Core
DCSN310: Operations Management	3	Core
Year 1 Summer term		
Elective I	3	Elective
Elective II	3	Elective
Year 2 Fall term (Fall I + Fall II for OMBA)		
DCSN300: Models for Decision Making	3	Core
ElectMKTG306: Marketing Management	3	Core
Year 2 Spring term (Spring I + Spring II for OMBA)		
BUSS315: Advanced Business Analysis	3	Core
BUSS349: Advanced Seminar in Strategic Management	3	Core
Year 2 Summer term		
Elective III	3	Elective
Elective IV	3	Elective

Academic Policies

Academic Rules and Regulations

University Academic Rules and Regulations on courses, grades, probation and dismissal apply. The minimum passing grade in a course is C+. Students in the MBA program are required to maintain a cumulative GPA of at least 3.3 in all courses taken for graduate credit.

Academic Advisors

The MBA-OMBA programs are offered according to the degree plans presented earlier, and therefore there is no need for advisor's approval of the student's schedule each term. Otherwise, the student can consult with the MBA-OMBA Director for further advice. The General University Academic Information section of this catalogue provides further information on academic advisors.

MBA Courses and Course Descriptions

Our MBA courses are taught by professionals in the field who bring forth their dynamic experiences and diverse backgrounds. Through the program, students will further their understanding of core management and business knowledge and practice while simultaneously enriching their perspective and practical knowledge on how to be innovative and entrepreneurial, and a responsible business professional with a global perspective and strong strategic foundation for success. Through class discussions, team learning and hands-on work, students will experience professional growth as well as personal development. In addition to the core and elective courses, professional leadership workshops will be offered to students. Each student must complete two prior to graduation.

MBA courses all have a prefix indicating the discipline: ACCT (Accounting), DCSN (Business Decision Systems), ENTM (Entrepreneurship), FINA (Finance), INFO (Business Information Systems), MKTG (Marketing) and MNGT (Management). Integrative and multi-disciplinary courses that do not belong to a particular discipline are labeled by the prefix BUSS. It is important to note that the successful completion of the pre-MBA integrative foundation module is a prerequisite for enrollment in all core and elective courses listed below. To deepen the learning of the student and to allow for program's customizing, student can also select courses offered by other graduate programs within OSB and AUB, subject to the approval of the director.

Remedial Courses

The integrative pre-MBA foundation module is an intensive, level-setting, 0-credit suite of three short courses offering basics in Accounting, Finance and Statistics. It normally takes place over a period of one month prior to the start of each of the fall and spring terms. It is offered online in an adaptive format and should be completed prior to the start of the program. The modules are followed by an assessment test. The MBA-OMBA director can allow in exceptional cases the student to start the accounting foundation module prior to joining the program and complete the basic of finance and statistics during the first term.

Core Courses

University Academic Rules and Regulations on courses, grades, probation and dismissal apply. The minimum passing grade in a course is C+. Students in the MBA program are required to maintain a cumulative GPA of at least 3.3 in all courses taken for graduate credit.

ACCT 301 Financial Reporting and Analysis 3 cr.
The course integrates contemporary corporate financial reporting issues with financial analysis, interpretation and performance evaluation for decision-making purposes. It presents an in-depth discussion of factors affecting analysis of business organizations and business strategy issues, and explores measurement of items on financial statements as well as financial reporting implications and investment evaluation. These topics are examined with an emphasis on the ethical dilemmas that managers may face when reporting financial information.

BUSS 315 Prices, Markets and the Economic Environment 3 cr.
This course develops understanding of how firms are influenced by the microeconomic and macroeconomic environments in which they operate. As such, it is composed of two broad parts. In the first part, students will gain an understanding of the functioning of markets and firms on the microeconomic level. Topics include pricing decisions in practice, externalities and government regulation, and risk and uncertainty in managerial decision-making. In the latter part of the course, students transcend the market to examine the broader economic environment surrounding the firm on the macroeconomic level. The effects of fiscal and monetary policies on the economy, the open economy, balance of payments, exchange rate determination and macroeconomic policy under both fixed and floating exchange rates, economic depression, hyperinflation and budget deficits will all be examined in detail.

BUSS 349 Advanced Seminar in Strategic Management 3 cr.
This advanced class is a senior capstone course for students; an integrative, big-picture course which exposes students to the strategic planning process of firms in local and global settings by utilizing the knowledge acquired from other core courses such as marketing, accounting, finance, operations, and pricing and markets. Students will culminate the curriculum through the application of core functional foundation concepts to various business situations. Emphasis will be placed on identifying the tools needed for strategic analysis of firms and industries and on comprehending the key internal and external issues executives encounter when managing corporations and departments. Topics include strategy formulation, implementation, execution, competitive positioning and evaluation techniques. Students are required to identify current problems and chart the future direction of different businesses and industries. Prerequisites: Minimum of 18 credits of core courses including MKTG 306 and MNGT 306.

DCSN 300 Models for Decision-Making 3 cr.
This course provides “the best practices” of spreadsheet modeling and data analytics, solving and interpretation for informed decision-making. It considers practical real life decision-making problems drawn from all functional areas of business and uses the most extensive and valuable suite of tools available in management science for developing hands-on skills. It is designed as two independent modules. Module I covers the modeling process, explains the various modeling approaches and considers single and multiple-objective decision-making. Business models are drawn from diverse applications in finance, marketing and operations. This module stresses the logic associated with model development and formulation, interpretation of solutions, sensitivity analysis and modeling

limitations. In addition, students analyze real cases from their own work experience and the literature. Module II is about understanding how data can be analyzed to clarify alternatives, develop insights, support analysis and make informed decisions. The topics of data analysis covered are applied to data sets and cases from a wide variety of business applications.

DCSN 310 Operations and Process Management 3 cr.
This course gives an overview of the strategic and tactical decisions involved in operating a production or service system for sustainable competitive advantage. Emphasis is on the core concepts of capacity, variability and quality. Topics include evaluating process capacity; estimating and reducing labor costs; batching and flow interruptions; waiting-time problems and throughput losses; quality management, statistical process control and six-sigma capability; and lean operations. Links among operations, finance and strategic success are explored.

FINA 306 Intermediate Corporate Finance 3 cr.
This course covers topics such as financial management decision-making, financial planning, forecasting and valuation models, capital budgeting under uncertainty, modern capital structure theories, leasing, equity and debt financing, modern dividend theories, working capital policies, ethical issues in finance, and mergers and acquisitions using some cases simulating real world decision-making. Pre-requisite: Pre-Foundation finance course.

MKTG 306 Marketing Management 3 cr.
This course deals with the fundamental aspects of managing and delivering marketing programs within a corporate context. Topics covered include analyzing marketing opportunities and channels; developing marketing strategies; marketing decision- making, customer analysis and insight; product, pricing, communication and promotion; and branding. The major elements of the marketing process and their relationship with each other will be thoroughly examined in local, regional and international contexts through case examples. Additionally, students will delve into the analytical and research techniques used to make marketing decisions. The application of these techniques to marketing situations in both profit and non-profit organizations will be practiced through the use of case studies and individual assignments.

MNGT 306 Leadership and Behavior in Organizations 3 cr.
This course sets the base for proper understanding and micro-level analysis of the role of individual and group behavior in organizations. It is designed as two independent modules. Module I concerns organizational behavior while Module II concerns leadership. The course will serve as an introduction to behavioral aspects of the modern workplace, including such processes as leadership, communication, motivation, conflict resolution and team building, and the influence that the environment has on such behavioral patterns. The course will help students assimilate the different roles people play in an organization irrespective of their departmental positions or functional affiliations, and recognize the interactions inherent among people, structures and environments. Particular attention is accorded to leadership as a focal point of group processes and a critical ingredient in successful organizational endeavors and transformations. Through this course, students will analyze, evaluate and apply management and organizational behavior concepts, approaches and tools to both novel business problems and situations and to managerial decision-making situations.

Elective Courses

MBA Accounting and Finance Elective Courses

FINA 315 Investment Analysis and Evaluation 3 cr.
An analysis of investments in financial securities that focuses on securities markets, investment risk-return trade-off, asset pricing models and stock price behavior in relation to the capital market efficiency hypothesis. Particular emphasis is placed on stocks, bonds, and financial futures and options.

FINA 318 Derivative Securities 3 cr.
Emphasizes derivatives theories and applications, derivatives exchanges, valuation of derivatives (futures, forward, swaps, standard and exotic options on different underlying assets), trading practices and regulations, management of financial risks and empirical evidence on derivative markets efficiency. Prerequisite: FINA 306.

FINA 320 Investment Banking 3 cr.
Designed to meld the practical and theoretical aspects of investment banking, focusing on a review of syndication and underwriting, advisory services, clearing and funding operations, corporate restructuring, evaluation of capital investment opportunities and integrating financial engineering into real-world investment banking applications. Prerequisite: FINA 306.

FINA 325 Global Finance 3 cr.
A study of global financial markets and instruments. Topics covered include financial and investment decisions in an international environment, operations of international money and capital markets, management of foreign exchange risk, working capital management, direct foreign investment, political risk analysis and currency derivatives forward, and swap markets.

FINA 330 Banking Risk Management 3 cr.
Deals with financial decision-making procedures and policies of commercial banks. The focus is on regulatory environment, strategic credit decision, international banking, applications of financial engineering in risk management and management of assets and liabilities of commercial banks using the portfolio analysis approach and capital adequacy indicators. Casework is emphasized. Prerequisite: FINA 306.

FINA 333 Entrepreneurial Finance 3 cr.
Aims to take the student through the various stages of financing the entrepreneur deals with from conception, to startup to harvest. The course will go in depth in understanding entrepreneurial business models, identifying financing needs, structuring multi-staged financing, assessing financial performance, and valuing entrepreneurial ventures. From the investor's perspective, the course is designed to enable improved investment and financing decisions in entrepreneurial settings. From the viewpoint of the entrepreneur, it will examine financial planning and forecasting, financial management of start-up and rapidly growing ventures, developing business plans, company valuation, evaluation of alternative sources of financing, and venture capital.

FINA 337 Market Risk Measurement and Management 3 cr.
Aims to give hands-on experience of the techniques used by risk professionals to measure and manage market risk. The topics covered include emerging market risks, including currency crises, value-at-risk (delta-normal, historical simulation, Monte Carlo), conditional value-at-risk, risk budgeting, stress testing, liquidity risk and measuring and managing corporate exposures, including cash flow at risk.

FINA 340 Advanced Corporate Finance 3 cr.
Emphasizes strategic financial policies in theory and practice, and the formulations and implementations of financial policies through the case study approach. Case analysis covers issues such as management of short-term and long-term assets, raising capital, distribution and retention of earnings, agency problems, mergers and acquisitions, corporate failure and restructuring. Prerequisite: FINA 306.

FINA 341 Corporate Governance 3 cr.
A study of legal accountability in conformity with corporate and securities disclosure laws, market for corporate control, the role of institutional investors, leveraged buyouts, hiring and firing strategies, management compensation packages and the role of the board of directors in ensuring an appropriate accountability system and the integrity of financial reporting.

MBA Management and Marketing Elective Courses

ENTM 310 New Venture Management 3 cr.
This course focuses on the founding and development of new business organizations (startup or franchise or even intra corporate), from the point of view of the entrepreneurial manager; it briefly identifies the prerequisites of successful new ventures, the threats to their survival, and the practical actions entrepreneurs may take to overcome them and successfully grow their venture. Law, organizational design, resource acquisition and valuation form the backbone of this course. Prerequisite: ACCT 301.

ENTM 311 Family Business Management 3 cr.
This course focuses on family businesses: their importance, structure, governance, management challenges; issues and solutions relating to succession, inheritance, business continuity, family vs. non-family management, and rivalry between siblings, cousins, or across generations. The managerial, strategic, financial and behavioral complexities in these firms are also analyzed. Compensation, attracting and retaining both family and nonfamily talent, and financing the enterprise are covered. Time allowing, a couple of sessions will be devoted to introduce the basic elements of good decision making (no quantitative content): Learn to establish the framework under which good decisions are made, starting with the definition of the problem, and ending with the evaluation of alternatives and their tradeoffs under uncertainty, risk and incomplete information. Prerequisite: MNGT 306.

ENTM 320 Social Entrepreneurship 3 cr.
A social enterprise is a hybrid organization that applies commercial strategies and uses market mechanisms to solve social issues. This course provides a foundation for students to understand social entrepreneurship. It reviews various schools of thought and perspectives on social entrepreneurship's role in tackling social issues, while covering concrete tools for students to begin to engage communities, identify a problem, and develop an innovative solution.

MNGT 332 Human Capital Management 3 cr.
An advanced analysis of human resource function and the challenge of managing human capital in a modern corporation. The course highlights the interrelationships of the different human-resource-management functions and the strategic role of HR in today's environment, and capitalizes on new trends and actual case examples to illustrate current HR best practices. Prerequisite: MNGT 306.

MNGT 319 Change Management 3 cr.
Examines in depth the change management process as a central paradigm in modern management theory and practice. The course spans a broad spectrum, including different

change models and the various organizational forces that enable and resist change; and change processes at the individual, group and organizational levels. The course also introduces theories, tools, approaches and key competencies for managing change as well as practical case studies in the management of change.

MNGT 320 Trending Issues in Management 3 cr.
Helps students keep pace with rapid developments in managerial know-how, covering both conceptual breakthroughs and innovative applications. This course focuses on the rapidly changing intellectual landscape in management in an attempt to discuss future directions and dominant trends in the making. The intended learning output is to ensure student preparedness for the sharp edge of management practice.

MNGT 350 Special Topics in Management 3 cr.
An analysis of contemporary management issues and problems. The course may be repeated for credit when topics vary. Credits depend on the course offered. Prerequisite: Consent of track convener.

MKTG 311 Applied Market Research 3 cr.
The course is designed to offer an advanced understanding of the market research process through coverage of the steps comprising the process from defining the research problem; to developing an approach; to formulating a research design and designing survey or questionnaire forms; to data collection, analysis and implementation. The course takes on an applied orientation in covering the research process. Prerequisites: MKTG 306 and BUSS 300.

MKTG 312 Consumer Behavior 3 cr.
Uses a behavioral science perspective to describe, understand and predict the behavior of consumers in the marketplace. This course also magnifies the basic decision-making processes followed by consumers when faced with a choice situation. Prerequisite: MKTG 306.

MKTG 325 Services Marketing Management 3 cr.
Addresses topics such as creating a sustained competitive advantage, designing the service delivery system, creating a service culture, building customer loyalty, exploiting the virtual value chain, reengineering the delivery system, delivering services on the web, implementing total quality management program and globalization of services. Prerequisite: MKTG 306.

MKTG 341 Global Marketing Strategy 3 cr.
An examination of the global strategic marketing task through the eyes of the marketing manager. Topics covered include understanding the global marketing environment, analyzing global marketing opportunities, developing global marketing strategies, designing global marketing programs and managing the global effort. Prerequisite: MKTG 306.

MKTG 350 Special Topics in Marketing 3 cr.
An analysis of contemporary marketing issues and problems. The course may be repeated for credit when topics vary. Credits depend on the course offered. Prerequisite: Consent of track convener.

MBA Decision Systems and Management Information Systems Elective Courses

DCSN 320 Performance Management 3 cr.
Strategic performance management is essential for ensuring the sustainability, continuous

improvement and target setting of any public or private organization. The course covers qualitative and quantitative performance measurement and management frameworks that consider performance indicators from the stakeholder's perspective. It addresses complex decision-making scenarios where a mix of tangible and intangible measures with tradeoffs needs to be considered to determine an overall relative performance measure for an organization with respect to its peers. Approaches such as the Analytic Hierarchy Process (AHP) and Data Envelopment Analysis are covered to analyze various metrics and balanced scorecard information. Students form groups and select a topic for their final project and gain hands-on learning experience with appropriate software tools. Prerequisite: DCSN 300.

DCSN 330 Project Management 3 cr.
The modern business relies upon improving and aligning processes with business strategy. These improvements are implemented as projects. While managing traditional projects such as construction is covered, this course emphasizes the management of the building blocks of a project's processes. Since project management is both an art and a science that balances soft (management) and hard (tool and technology) skills, both are taught. The course equips students to manage or participate in complex projects and work with project stakeholders. Prerequisite: DCSN300

DCSN 340 Supply Chain Management 3 cr.
Addresses issues of matching supply with demand in the context of supply chain management by managing both supply and demand. While the treatment is model-based, the course is aimed at developing insights needed by general managers or management consultants. The emphasis is on managing uncertain demand, both within the firm and across the supply chain. Topics include drivers of supply chain management, designing the supply chain network, planning demand and supply in a supply chain, designing and planning transportation networks, the Newsvendor model, quick response strategies, the order-up-to inventory model, risk-pooling strategies and supply chain coordination. An introduction to managing demand through revenue management is also provided. Prerequisite: DCSN 310.

INFO 320 Building Business Value with Technology Innovation 3 cr.
Information technology (IT) is the key enabler of most key innovations and improvements in business and society. This course develops critical analysis skills required to bring new ideas into fruition that build and maintain organizations. These innovations require leveraging IT in these businesses. The course covers marketing to technology organizations, employing IT to create new business models, and innovation at industry- leading companies using IT and current IT trends.

BUSS 398 Project 3 cr.
The MBA project consists of a field consulting project, a case study or an extended research paper defined in agreement with the faculty readers in question. Each student is assigned a committee consisting of an advisor (first reader) and a second reader who jointly supervise and guide the student throughout. It is the responsibility of the student to select a topic and submit a project proposal to be approved by her/his readers and then by the OSB Graduate Studies Committee. All accepted projects should be deposited at the library. A student who is unable to finish the project in one term can register an additional time subject to the consent of the readers.

BUSS 350 special topics 3 cr.
An analysis of contemporary business issues and problems. The course may be repeated for credit when topics vary. Credits depend on the course offered. Prerequisite: Consent of track convener.

MD-MBA Dual Degree

Philosophy

The MD/MBA Dual Degree program is tailored for AUB MD students, providing them with a comprehensive MBA curriculum to complement their medical expertise with business acumen and leadership proficiency. This program emphasizes academic rigor, nurturing critical thinking, and enhancing communication skills through an array of faculty expertise and innovative teaching methods such as experiential learning, case studies, group work, and projects.

Throughout the program, MD-MBA students engage deeply with managerial challenges, including those within the healthcare sector, culminating in a dedicated project. Furthermore, participants benefit from extensive exposure to the business realm and valuable networking opportunities. In essence, this dual degree fosters holistic personal and professional growth, equipping graduates with enhanced competitiveness upon completion.

Criteria for Admission

Matriculated MD students interested in the MD-MBA dual degree, will apply during their year in the MD program. To be considered for admission, the MD student must be in good standing academically (no failed courses or clerkships) and professionally (no disciplinary action on record). The admission criteria for the MD-MBA dual degree program will differ from the requirements of regular MBA students:

- The GMAT requirement and the work experience requirement are waived. The MCAT will replace the GMAT, and MD student's rotations during their MED III will be deemed equivalent to the requisite MBA work experience.

- The admission committee retains the prerogative to invite applicants for interviews to evaluate their leadership potential and ensure their compatibility with the program.

The decision of the committee shall be communicated to the student by the middle of the 3rd year in the MD program.

Degree Format

MD students accepted into the MD-MBA dual degree program will integrate into the MBA cohort, commencing their studies after completing their third year in the MD program. They will be enrolled as full-time students in the business school and are anticipated to undertake a full academic workload each semester, including the summer term.

What sets MD-MBA students apart from their counterparts in the regular MBA program is the required healthcare management project, which begins during the January term of the

MBA program. These students are expected to finalize their MBA requirements by August and then seamlessly transition back to the medical school, except for the final presentation of the project.

The MBA program encompasses a total of 36 credits, while the medical program's Med IV spans 44 working weeks, divided into 11 rotations of 4 weeks each. Students pursuing the dual degree will be categorized by the FM as engaging in the scholarly concentration track (SCT) within the MD program, where their MBA constitutes their scholarly concentration.

Aligned with all SCT students, those pursuing the dual degree will allocate three elective rotations in Med IV (totaling 12 weeks) to their scholarly project. For the dual degree, these 12 weeks will fulfill requirements for both the MD and MBA programs, equivalently contributing 9 credits toward the MBA's total credit count.

Below are the courses and requirements for the MBA with their credits:

Fall Semester, each course for 3 credits
ACCT 301: Financial Reporting and Analysis
BUSS 315: Advanced Business Analysis
DCSN 300: Models for Decision Making
MNGT 306: Leadership and Behavior in Organizations
Winter Term
BUSS 398A: MBA Pre-Project (0-credit)
Spring Semester, each course for 3 credits
FINA 306: Intermediate Corporate Finance
DCSN 310: Operations and Process Management
MKTG 306: Marketing Management
BUSS 349: Advanced Seminar in Strategic Management
Summer Term
A choice of 3 MBA elective courses, 3 credits each
Fall Term
BUSS 398B: MBA Project (0-credit)
Spring Term
BUSS 398: MBA Project (3-credit)

The Master's in Finance (MFIN) Program

Philosophy

The MFIN program is aimed at developing highly qualified individuals wishing to become technical experts in the finance field. Our program provides the region with professionals who are well equipped with knowledge of relevant, cutting-edge financial theories and tools.

Admission to the Program

Normally, there is one admission deadline a year, in March, for enrollment in the fall term. For more details, please refer to the Admissions section of the AUB graduate catalogue under Application Procedures.

Criteria for Admission

To be eligible for admission to the MFIN program, a student must hold a bachelor's degree and must satisfy the requirements of the university for admission to graduate study.

The MFIN program is looking to attract and admit candidates with the following qualifications:

- The applicant must possess an undergraduate degree from an accredited university with an average GPA in the last 60 credits of at least 3.3 or equivalent. For universities that do not follow the credit system, the cumulative average of the applicant will be taken into consideration.

- Students with a non-quantitative background may be asked to take the GMAT or GRE exam. Students with a quantitative background, specifically those coming from the fields of finance, accounting, mathematics, physics, engineering and economics, are exempted from the GMAT or GRE requirement.

- Students not having an undergraduate degree in Business will be required to take at least two prerequisite (i.e. remedial) courses in accounting and finance prior to enrolling in the program.

- Interviews may be conducted with the MFIN applicants whenever deemed necessary.

The Application Process

To apply for admission to the MFIN program, an applicant must submit the following:

- An application form
- Two letters of recommendation
- Official transcripts for all undergraduate and/or graduate coursework
- Proof of English proficiency (please refer to Readiness for University Studies in English - RUSE)
- A GMAT or GRE score for students coming from a non-quantitative non-business background
- A curriculum vitae
- A statement of purpose
- A personal interview
- An application Fee

Program Components

Overview

Students can complete the MFIN program in 12 months starting the fall term provided they pass all core and elective courses, and maintain a cumulative average (GPA) of at least 3.3 in all courses taken for graduate credit. Students coming from non-business backgrounds must also complete all their remedial courses. Failing to maintain a cumulative GPA of 3.3 upon completion of the courses for the program's academic year or obtaining a grade less than C+ in any course will cause a delay in graduation until the program requirements are met. Students can also satisfy all the above requirements if registered part-time over two calendar years.

Program Highlights

- Master's in Finance program (MFIN) is aimed at developing highly qualified individuals with in-depth knowledge and expertise in the finance field.
- The program meets the needs of students who have passion for finance and who are seeking to advance their careers in this field. It equips students with the appropriate range of analytical and research proficiencies and helps them acquire specialized (hard and soft) skills needed to excel as finance professionals.
- Students will develop a knowledge base in all areas of finance, including structured finance, financial markets, commercial and investment banking, portfolio management, equity valuation, corporate finance, energy finance, risk management, private equity, real estate finance, fintech, digital transformation, decentralized finance, and Cryptocurrency drawing on case studies from Lebanon and the MENA region.

- MFIN prepares students to work in a wide range of financial roles including commercial and investment banking, risk management, asset and private wealth management, private equity and venture capital, consulting, auditing, CFO offices of national, regional and multinational institutions and family business among others.

Program Outline

In order to fulfill the MFIN graduation requirements, a student must complete the following on a full-time or part-time basis as tabulated below.

Course Type	Credits Hours (minimum)
Core	18
Electives	12
Total Number of Credits Required for Graduation	30

No project (thesis) will be required.

The Curriculum

The graduate program consists of 6 core courses and 4 electives. The core courses span the various areas of corporate finance, risk analysis and management, banking, investments, portfolio theory, and quantitative finance. The program closely follows the CFA curriculum and covers the material of the three CFA levels and beyond.

The core courses are in the general areas of:

- MFIN 301: Financial Statement Analysis
- MFIN 303: Structured Finance
- MFIN 304: Equity Valuation
- MFIN 305: Quantitative Methods of Finance
- MFIN 306: Portfolio Management and Security Analysis
- MFIN 307: Financial Strategy

Four elective courses may be chosen from the following list:

- MFIN 351: Fixed Income Securities
- MFIN 353: Financial Econometrics
- MFIN 354: Risk Management in Financial Institutions
- MFIN 355: Private Equity
- MFIN 356: Financial Markets in the Middle East Region
- MFIN 357: Energy Finance

- MFIN 358: Real Estate Finance and Investment
- MFIN 359: Entrepreneurial Finance
- MFIN 363: Strategy in Commercial Banking Management
- MFIN 399: Applied Investment Management
- MFIN 350B: Cryptocurrencies and the Blockchain
- MFIN 350C: Project Finance

Students not having an undergraduate degree in Business will be required to take, prior to enrolling in the MFIN program, one prerequisite/remedial course of 3 credits:

- Financial Accounting/Basics of Finance

Program Delivery

The MFIN Program can be completed in three terms (one year) in accordance with the recommended time frame suggested below for students enrolled in the program on a full-time basis.

One Year MFIN Degree Plan		
Course Title	**Normal (Cr.)**	**Core Elective Remedial**
Summer term (Required for Non-BBA Holders)		
Preterm Course: Financial Accounting/Basics of Finance	0	Remedial
Fall term		
MFIN 301: Accounting and Financial Analysis	3	Core
MFIN 303: Derivative Securities	3	Core
MFIN 305: Quantitative Methods of Finance	3	Core
MFIN 306: Portfolio Management and Security Analysis	3	Core
Spring term		
MFIN 304: Equity Valuation	3	Core
MFIN 307: Advanced Corporate Finance	3	Core
Elective I	3	Elective
Elective II	3	Elective
Summer term		
Elective III	3	Elective
Elective IV	3	Elective

Students enrolled in the program on a part-time basis can complete the requirements in six terms (two years).

Two-Year MFIN Degree Plan		
Course Title	**Normal (Cr.)**	**Core Elective Remedial**
Summer term (Required for Non-BBA Holders)		
Preterm Course: Financial Accounting/Basics of Finance	0	Remedial
Year 1 Fall term		
MFIN 301: Accounting and Financial Analysis	3	Core
MFIN 305: Quantitative Methods of Finance	3	Core
Year 1 Spring term		
MFIN 304: Equity Valuation	3	Core
Elective I	3	Elective
Year 1 Summer term		
Elective II	3	Elective
Elective III	3	Elective
Year 2 Fall term		
MFIN 303: Derivative Securities	3	Core
MFIN 306: Portfolio Management and Security Analysis	3	Core
Year 2 Spring term		
MFIN 307: Advanced Corporate Finance	3	Core
Elective IV	3	Elective

Academic Policies

Academic Rules and Regulations

University Academic Rules and Regulations on courses, grades, probation and dismissal apply. The minimum passing grade in a course is (C+). Students in the MFIN program are required to maintain a cumulative GPA of at least 3.3 in all courses to meet graduation requirements.

Academic Advisors

Students should consult with the director of the MFIN program for academic advice.

MFIN Courses Descriptions

Remedial Courses

MFIN 300A divided into two parts:

Financial Accounting 1.5 cr.
The course provides a brief overview of the accounting cycle. It first includes a discussion of the financial statements of a large, diversified international company. Next, it briefly discusses the accounting standards in the U.S. and at the international level. This is followed by an analysis of the accounting framework including objectives behind financial reporting, main users of financial statements, elements of the financial statements, in addition to the assumptions, principles and constraints that apply when reporting the financial position of a firm. The last section of the course covers issues related to the accounting cycle including recording business transactions, preparing trial balance and financial statements, to conclude with closing entries.

Basics of Finance 1.5 cr.
The course is an introduction to business finance (corporate financial management and investments). Participants develop a toolkit to analyze financial decisions based on principles of modern financial theory. The course introduces concepts such as discounted cash flow, corporate capital budgeting and corporate financial policy.

Core Courses

MFIN 301 Accounting and Financial Analysis 3 cr.
The course integrates contemporary corporate financial reporting issues with financial analysis, interpretation and performance evaluation using a case approach. It presents an in-depth discussion of factors affecting analysis of business organizations and business strategy issues, and explores measurement of items on financial statements, disclosures, standard setting issues, financial reporting internationally, financial reporting implications and investment evaluation. Equivalent: ACCT301.

MFIN 303 Derivative Securities 3 cr.
The course covers forwards, options and futures. At the end of the course, students will gain an understanding of the mechanics of derivatives (contingent claims) markets and how derivative products are used and priced. Students will also be introduced to continuous-time financial models and their uses in modeling and valuing contingent claims.

MFIN 304 Equity Valuation 3 cr.
The course provides students with a deep understanding of the relevant issues that financial analysts, firms and investors must deal with when valuing a firm. Topics to be covered will include the role of valuation, discounted cash flow valuation, understanding the basics of financial statements and risk analysis, cost of capital, comparative analysis, valuing private firms and other related topics.

MFIN 305 Quantitative Methods of Finance 3 cr.
The course provides students with a rigorous introduction to the quantitative and statistical tools used in finance. The course begins with a review of the types of financial returns and the mathematical and statistical foundations needed for finance. The course proceeds to regression analysis (single and multiple) and covers hypothesis testing as well as diagnostic checking of regression models in detail. The course concludes with a discussion of time series analysis. Throughout the course, emphasis is placed on understanding and modeling asset returns as well as on testing asset-pricing models.

MFIN 306 Portfolio Management and Security Analysis 3 cr.
The course thoroughly examines portfolio allocation and management. In the first part, the course provides a rigorous introduction to mean-variance portfolio theory, equilibrium

models of expected returns, such as the Capital Asset Pricing Model (CAPM), multi-factor return models, the efficient frontier as well as systematic and unsystematic risk. The course proceeds to discussing measures of portfolio performance, the efficient markets hypothesis as well as active and passive portfolio management in the equity and fixed-income markets. In addition, the course covers topics related to security, industry and macroeconomic analysis. The existence of anomalies and their implications for portfolio construction and management are also discussed from a risk- based and behavioral perspective.

MFIN 307 Advanced Corporate Finance 3 cr.
The course provides students with the conceptual framework necessary to appreciate and understand the problems facing the financial manager. Readings, case analysis and problem-sets focus on the basic tools used by financial analysts and financial decision- makers. This course is devoted to the two basic financial questions that all companies face: (1) where should funds be invested (i.e. investment decisions)? and (2) where should funds be obtained from (i.e. financing decisions)?

Elective Courses

MFIN 350 special topics 3 cr.
An analysis of contemporary finance issues and problems. The course may be repeatedfor credit when topics vary. Credits depend on the course offered. Prerequisite: Consent of track convener.

MFIN 351 Fixed Income Securities 3 cr.
The course provides in-depth analysis of the concepts that are most often encountered in the global market for fixed income securities. The goal of the course is to develop a theoretical and mathematical approach to valuation that will be useful in a wide range of financial applications as it will develop the set of tools required to evaluate virtually any fixed income instrument.

MFIN 353 Financial Econometrics 3 cr
The course introduces the advanced econometric and simulation tools used in empirical finance. The course emphasizes volatility and correlation modeling, testing of trading strategies and asset pricing models as well as testing the random walk hypothesis. The topics covered include tests of the random walk hypothesis, volatility and correlation modeling using Autoregressive Conditional Heteroskedasticity (ARCH) and other models, forecasting asset returns and volatilities, event studies, the econometrics of futures markets as well as some elements of forecasting and simulation.

MFIN 354 Risk Management in Financial Institutions 3 cr.
The course provides a rigorous introduction to quantifying and managing financial risk. Emphasis will be placed on measuring and managing market and credit risk. The course proceeds with an overview of operational risk, liquidity risk as well as the regulations governing risk in financial institutions.

MFIN 355 Private Equity 3 cr.
The course is designed to provide students with a practical understanding of the private equity industry. By private equity we mean investing capital in the equity of private companies to fund growth or public companies to take them private. In both cases the aim is to provide meaningful returns to investors and sometimes substantial returns to the entrepreneurs who started these companies. We will explore how modern private equity firms raise capital, align interests, conduct due diligence, secure leverage, negotiate deals, execute an investment

plan and exit through IPO or M&A. We will also discuss particular issues involved with how this business works in emerging markets, such as our MENA region.

MFIN 356 Financial Markets in the Middle East Region 3 cr.
The course provides an in-depth analysis of Financial Markets in the Middle East region. It discusses issues related to the region's bond and stock markets, Islamic finance and Sukuk structure, family business, asset and wealth management, commercial and investment banking as well as risk management and corporate governance in the region. The course will also cover the latest development in money, finance and banking including fintech, cryptocurrency, decentralized finance, and digital transformation. A special attention will be given to financial and regulatory issues impacting the Middle East markets.

MFIN 357 Energy Finance 3 cr.
In this course, students will develop a comprehensive understanding and thorough knowledge of the dynamics of energy markets and the financial and investment decisions underlying energy projects. The course will start by introducing the characteristics of oil and gas and the different types of transactions and markets, industry structure and terminology, financial statement analysis and risk management in the energy industry. It then establishes the basics of commodity pricing, and covers the most widely used techniques to value real investment opportunities, illustrate financing structures and approaches of energy projects, and explore the hedging mechanisms available to companies and investors exposed to the risks of energy markets.

MFIN 358 Real Estate Finance and Investment 3 cr.
The course examines selected issues in real estate, with focus on finance and investment including techniques for analyzing financial decisions in property development and investment: property income streams, pro-forma analysis, equity valuation, taxes, risk types, sensitivity analysis and portfolio management. The early part of the course will deal briefly with supply and demand aspects, and the relationship between physical assets and real estate securities as assets. It also introduces the fundamentals of mortgage securitization and public markets in real estate securities.

MFIN 359 Entrepreneurial Finance 3 cr.
Students seek to understand the various stages the entrepreneur deals with from conceptual idea, to startup to harvest. The strategies and incentives of the various players and how they maneuver through the business cycle are examined. The course will go in depth in identifying financing needs, structuring multi-staged financings, understanding business models, assessing financial performance and valuing entrepreneurial ventures. From the investor's viewpoint, the course is designed to help managers make better investment and financing decisions in entrepreneurial settings. From the perspective of the entrepreneur, it will examine financial forecasting and planning, financial management of rapidly growing businesses, start-up ventures, developing business plans, aspects of deal negotiation, company valuation, evaluation of alternative sources of financing, venture capital, initial public offering, the decision to harvest and, finally, gain realization.

MFIN 363 Strategy in Commercial Banking Management 3 cr.
The course covers the financial theory and analysis as they apply to the management of financial intermediaries, with special emphasis on banking firms. The student will be introduced to the types of risks faced by financial institutions and analysis of the asset-liability and risk management techniques employed by managers to achieve their risk-return objectives. Examination of the impact of regulation, information technology and globalization on the management of banking institutions as well as ethical issues in the conduct of financial intermediation.

MFIN 399 Applied Investment Course 3 cr.
The course aims to cover a broad and practical body of investment knowledge focused on the CFA program to assist future market practitioners in performing investment decisions within an ever changing and complex investment environment. The first part of the course will consist of portfolio analysis and management theory. The second part will focus on application where students will be involved throughout the portfolio management process from idea generation to investment thesis to portfolio construction to portfolio implementation. The course will also include relevant discussions by practitioners from various industry publications and guest lectures.

Master's in Human Resource Management (MHRM) Program

Philosophy

The Master's in Human Resource Management (MHRM) is a challenging and exciting 16 month program designed to prepare early career practitioners and ambitious graduates, to gain in-depth knowledge and skills in Human Resources Management and Organizational Behavior (OB), and to meet the challenges of HRM globally and in the MENA region. The MHRM program empowers students with professional, research- based skills and competencies necessary for succeeding in the ever-changing context of HRM.

Admission to the Program

Normally, there is one admission deadline a year in March for enrollment in the Fall term. For more details, please refer to the Admissions section of the AUB graduate catalogue under Application Procedures.

Criteria for Admission

To be eligible for admission to the MHRM program, an applicant must hold a university degree recognized by AUB, and must satisfy the requirements of the university for admission to graduate study (including meeting the English proficiency requirements as per the Readiness for University Studies in English (RUSE) of the university).

Admitted applicants will normally have attained the following:

- An undergraduate GPA of at least 3.3 or equivalent in any major. The undergraduate degree must be obtained from a university recognized by AUB. An applicant is considered for admission on probation if s/he has attained a GPA between 3.0 and 3.3.

- A personal interview for MHRM applicants who do not have work experience and/or when deemed necessary.

Admitted participants with non-business undergraduate degrees are required to successfully complete two remedial business courses prior to the commencement of the MHRM program.

The Application Process

To apply for admission to the MHRM program, an applicant must submit the following:

- An application form

- Two letters of recommendation

- Official transcripts for all undergraduate and/or graduate coursework

- Proof of English proficiency (please refer to Readiness for University Studies in English - RUSE).

- A curriculum vitae

- A statement of purpose indicating his/her interest in pursuing an HR specialization

- A personal interview for MHRM applicants who do not have work experience and/or when deemed necessary.

- An application fee

Program Components

Overview

Students can complete the MHRM program in 16 months starting the fall term provided they pass all core and elective courses, and maintain a cumulative GPA of at least 3.3 in all courses taken for graduate credit

Program Highlights

Blend of practice and theory

The MHRM program at OSB offers a blend of practice and theory necessary for developing strategic thinking, evidence-based knowledge, and practical expertise in HRM and OB.

Experts

Our courses are taught by professionals and experts in the fields of HRM and OB who bring forth their renowned experiences and backgrounds to provide you with endless opportunities to learn, practice, and lead.

Faculty

Our faculty brings strong research, practical, and consulting experience in the MENA region and the global economy.

Experience

The program also offers extracurricular experiences that provide students with the opportunity to interact with key players and industry leaders in the HRM and OB field in the region.

Program Outline

Participants are expected to complete the program in 16 months. Admitted students, not having an undergraduate degree in business, will be required to take, prior to enrolling in the MHRM program, two prerequisite courses of 0 credits each in August.

To fulfill the MHRM graduation requirements, a student must take 9 core courses (27 credits) and a field project or an elective course (3 credits).

The Curriculum

The curriculum is constantly being revamped to make sure that we continue to offer relevant, contemporary, and critical HRM skills to our students.

The graduate program consists of 9 core courses and a comprehensive field project that can be replaced by an elective course to be completed in a 16 month period. Courses are offered twice a week in the evening. The courses are as follows: 10 courses- 30 credits (9 courses required- 27 credits and one elective/field project or an elective - 3 credits):

- MHRM 301: Managing the Recruitment Process (3 credits)
- MHRM 302: Human Capital Training and Development (3 credits)
- MHRM 303: Compensation and Performance Management (3 credits)
- MHRM 304: Ethics, inclusion and Labor Law (3 credits)

- MHRM 305: Leadership and Behavior in Organizations (3 credits)
- MHRM 306: Strategic Human Resource Management(3 credits)
- MHRM 308: Human Resource Development (3 credits)
- MHRM 309: Evidence Based HRM – Organizational Research Design and Methods(3 credits)
- MHRM 310: Final Field Project (3 credits)
- MHRM 311: HR Analytics (3 credits)
- MHRM 312: HR Consulting Management (3 credits)

Students not having an undergraduate degree in business may be required to take, prior to enrolling in the MHRM program, at least two prerequisite (remedial) courses of 3 credits each:

- Overview of Accounting and Finance
- The Business Value Chain

Program Delivery

One Year and a half (16 months) MHRM Degree Plan		
Course Title	**Normal (Cr.)**	**Core Elective Remedial**
Summer term (Required for Non-BBA Holders)		
Preterm Course: Financial Accounting/Basics of Finance	0	Remedial
Fall term		
MHRM301: Managing the Recruitment Process	3	Core
MHRM305: Leadership and Behavior in Organization	3	Core
Winter term		
MHRM308: Human Resource Development	3	Core
Spring term		
MHRM304: Ethics, Inclusion and Labor Law	3	Core
MHRM309: Evidence Based HRM- Organizational Research Design and Methods	3	Core
Summer term		
MHRM303: Compensation and Performance Management	3	Core
MHRM311: Human Resource Analytics	3	Core
Fall 2 term		
MHRM302: Human Capital Training and Development	3	Core
MHRM306: Strategic HRM and Change Management	3	Core
MHRM310: (Field Project) or Elective I	3	Elective

Academic Policies

Academic Rules and Regulations

University Academic Rules and Regulations on courses, grades, probation and dismissal apply. The minimum passing grade in a course is (C+). Students in the MHRM program are required to maintain a cumulative average of at least B + in all courses taken for graduate credit.

Academic Advisors

Each student has an academic advisor who normally approves the student's schedule each term. The General University Academic Information section of this catalogue provides further information on academic advisors.

MHRM Courses Descriptions

Remedial Courses

MHRM 300A divided into two parts:

Overview of Accounting 1.5 cr.
This course provides a brief overview of the accounting cycle. It first includes a discussion of financial statements. Next, it briefly discusses accounting standards in the U.S. and at the international level. This is followed by analysis of the accounting framework including the objectives behind financial reporting, main users of financial statements, elements of financial statements, in addition to the assumptions, principles and constraints that apply when reporting the financial position of a firm. The last section of the course covers issues related to the accounting cycle including recording business transactions, preparing trial balance and financial statements, to conclude with closing entries.

Overview of Finance 1.5 cr.
This course is an introduction to business finance (corporate financial management and investments). Participants develop a toolkit to analyze financial decisions based on principles of modern financial theory. The course introduces concepts such as discounted cash flow, corporate capital budgeting and corporate financial policy.

MHRM 300B The Business Value Chain 3 cr.
This course is a holistic, interdisciplinary overview of a business firm, its competitive landscape, objectives, strategy and operations. The course explores the firm's various functions and how they work together and affect one another to form a company's business strategy. Firm strategy is also explored through examination of customer and competitive analysis.

Core Courses

MHRM 301 Managing the Recruitment Process 3 cr.
This course explores how organizations plan for changes in their workforce, create recruitment strategies and develop selection systems to identify the best talent for their businesses. It encompasses planning for, establishing and maintaining a quality work force; identifying critical specifications for filling positions; recruiting a pool of talent; developing methods for selecting from the talent pool and creating desirable person/job and organization fit.

MHRM 302 Human Capital Training and Development 3 cr.
In today's dynamic and competitive business environment, organizations recognize the critical role of human capital in achieving sustainable success. The Training and Development course is designed to equip students with the knowledge and skills necessary to foster a culture of continuous learning and development within organizations. This course explores the theories, strategies, and practical applications of training and development programs. The course also introduces students to principles of employee development with a focus on coaching. It focuses on the history of coaching, coaching models, the importance of evidence-based practice and the use of methods drawn from behavioral science, along with ethical considerations and evaluation.

MHRM 303 Compensation and Performance Management 3 cr.
This course examines the theory of employee performance, compensation and rewards management. It focuses on strategic performance management process, measurement and planning, and link performance to compensation management and practice, criteria used to compensate employees, compensation design issues, and employee benefits. This course is most suited for the HR professional interested in knowledge of the art and science of compensation practice in the broader performance management context and its role in promoting companies' competitive advantage.

MHRM 304 Ethics, Inclusion and Labor Law 3 cr.
This course introduces students to the key concepts and approaches foundational to unpacking ethical and legal challenges in human resource management. Students will explore how to make HR related decisions while keeping in mind the legal and ethical imperatives. In the first part of the course, students will be introduced to analytic tools useful to exploring ethical issues from three perspectives: Managerial, Social Justice, and Critical-Feminist. Both the business and the moral case for engaging in "ethical" HRM strategies and decision-making will be considered, while simultaneously taking into consideration local, and often harsh, geopolitical forces and business markets. The course also provides a space to reflect about the appropriate inclusive HRM policies and practices, and how to build an argumentation for inclusive HR practices rooted from a managerial, social justice, and critical feminist perspective. In the second part of the course, students will be exposed to the philosophy behind labor laws and will focus on the Lebanese labor law and work conditions.

MHRM 305 Leadership and Behavior in Organizations 3 cr.
Leadership and management behavior effectiveness are crucial to organizational performance. This course introduces participants to many of the basic principles of human behavior both in terms of intrapersonal and interpersonal dynamics. The course is effectively divided into two parts. The first part introduces the student to the basic driving principles of employee and group/team behavior. These principles are essential for HR managers to be familiar with when managing individuals and building high performance groups and teams in organizations. Core areas of coverage aligned with this include individual differences in abilities and attitudes, perception, attribution and bias, motivation, group dynamics including teams and communication, power and politics, leadership and organizational culture. The second part of the course sensitizes the student to the principles and power of intrapersonal exploration for leadership development. In this latter part of the course participants will be asked to begin to embark on a journey of self-exploration through self-assessments, feedback interviews and crafting strategic plans for development. Particular attention is given to leadership as a crucial point of group processes, and as a decisive factor in organizational success.

MHRM 306 Strategic Human Resource Management and Change Management 3 cr.
Driven by disruptors of the digital era, human resource management has been undergoing a dramatic shift since the last decade. Senior HR executives are expected to be on par with other c-suite executives and contribute to formulating, developing, and implementing corporate level strategies. The HR function is recognized as a key business unit that plays an important role in strategic and change management processes. Human capital is a crucial requirement for achieving corporate objectives. This course aims, first, to build a solid strategic management foundation and clarify HR's role in the corporate strategy management cycle. Second, this course aims to apply concepts and frameworks learned to real and hypothetical situations that directly implicate strategic HR functions: change management, innovation, and sustainability. The course's orientation is theoretical and managerial, with illustrative case studies, and a simulation activity.

MHRM 308 Human Resource Development 3 cr.
Human Resources Development (HRD) is grounded in the concept of using learning to improve performance through three primary application areas: Training & Development, Organization Development and Career Development. This course is designed to provide an overview of scholarship and practice in the field of HRD. We will take a close look at HRD theory and its conceptualization in diverse contexts. We will then explore each application area to develop an understanding of HRD as a field of professional practice in organizations. This course also provides insight into critical HRD including topics on diversity and inclusion, power and context.

MHRM 309 Evidence based HRM-Organizational Research Design and Methods 3 cr.
This course will focus on research methods most commonly used in organizational research, including key aspects of research design, conducting literature reviews, methodological approaches, data analysis, writing and communicating research, and research ethics. Students will be exposed to both qualitative and quantitative research design and methods including interviews and focus groups, experimental and quasi-experimental research designs, and survey research. This course is also designed to provide students with basic knowledge and skills in data analysis including content analysis, and statistical analysis used in organizational research. The course will stress on the organic links between these various research methods and an overall evidence-based approach to management and HRM specifically.

MHRM 311 HR Analytics 3 cr.
Organizations nowadays are facing unprecedented change and unpredictability, which requires leaders, workers, and HR professionals to recognize the pivotal role that HR analytics play in strategic success. To translate this into practice, they need to believe in the power of predictive people analytics which hold the promise of calculating a “risk-of-leaving”, “last-minute-hiring”, “ready-for succession” rates and many other rates of index for every employee, which varies with their work and life situation, and alerts managers to take preventive action. At the same time, organizations still face the constant incongruity of HR analytics: the significant opportunity it offers versus the persistent challenges of making a real impact on decisions, actions, strategy, and organizational outcomes. That paradox is even amplified by rising ethical issues that require organizations to establish limits on what should and should not be measured and reported about their employees. This course will dive into the realm of HR analytics, providing students with a comprehensive understanding of its transformative potential, challenges, and ethical considerations.

Elective Courses

MHRM 312 HR Consulting Management 3 cr.
This course is designed to introduce the students to the theoretical as well as the practical approaches of the consulting professions with a subsequent emphasis on HR consulting. Effort will be placed on developing proficiencies in a range of skills required to practice consulting. The course is relevant to those who are interested in consulting careers and/or those who would like to understand the mind frame of HR consulting for intrapreneurial purposes. The course relies on invited experts from the field of HRM consulting from multiple firms in the region and internationally and on a hands-on field project to transfer learning into practice.

MHRM 350 special topics 3 cr.
An analysis of contemporary business issues and problems. The course may be repeated for credit when topics vary. Credits depend on the course offered. Prerequisite: Consent of track convener.

Master of Science in Data Analytics (MSBA)

Program Philosophy

The Master of Science in Business Analytics (MSBA) Program prepares the next generation of experts in business analytics. Participants in the program will acquire the necessary knowledge to frame business problems in analytical terms and undergo hands-on training in applying the trendiest, most relevant analytical tools to capture, process and analyze large data sets. The analytical findings will help organizations extract actionable insights to make better informed decisions, recommend strategies to improve performance of operations, create shared value for sustainable growth, gain competitive advantages, identify new opportunities and enable the digital transformation from basic to smart organization. Graduates of the program will develop advanced proficiency in executing and applying business analytics initiatives to challenging business problems in various industry domains including supply chain and operations, project management and marketing. The program aims to help meet the growing industry needs in the MENA region in particular and the world at large for business analytics professionals with the required new skills and expertise.

Admission to the Program

Normally, there is one admission deadline in March for enrollment in the Fall term. For more details, please refer to the Admissions section of the AUB graduate catalogue under Application Procedures.

Criteria for Admission

To be eligible for admission to the MSBA program, a student must hold an undergraduate degree from a recognized university and must meet the Readiness for University Studies in English (RUSE) of the University. The program is open to students from other educational backgrounds including Business, Computer Science, Engineering, Economics, Mathematics, Statistics and so forth.

To be accepted into the MSBA program, the applicant must possess an undergraduate university degree with a Grade Point Average (GPA) of 3.3 or above. An applicant is considered for admission on probation if s/he has attained an average between 3.0 and 3.3.

A personal interview may be conducted with an MSBA applicant when deemed necessary. As per AUB's bylaws, the OSB Graduate Studies Committee shall make the final decision on the admission of applicants to the MSBA program.

The Application Process

To apply for admission to the MSBA program, an applicant must submit the following documents:

- An application form
- Two letters of recommendation
- Official transcripts for all undergraduate and/or graduate coursework
- Proof of English proficiency (please refer to Readiness for University Studies in English - RUSE)
- A curriculum vitae
- A statement of purpose
- A personal interview
- An application Fee

Application form, online submission and frequently asked questions are available at the online graduate application system: https://graduateadmissions.aub.edu.lb.

Program Components

Overview

The MSBA program requires a minimum of 30 credit hours consisting of 6 required core courses (18 credits) and 4 elective specialized courses (12 credits). The 12 credits can be taken in one of two options:

Option 1 includes two core specialized elective courses (6 credits) and a thesis project (6 credits).

Option 2 includes two core specialized elective courses (6 credits); one general elective (3 credits); and a capstone project with experiential learning in industry (3 credits).

Please note if the two core specialized elective courses and thesis or project are taken in a given area, the student is entitled to an MSBA with a concentration title in that area (e.g., supply chain, project management, etc.).

Program Highlights

The program aims at achieving the following objectives:

- Frame business problems in analytical terms: Identify the business requirements, relevant data, needed information technology, competitive edge, value added proposition to the business and performance metrics for success.

- Analytical modeling and solving: Develop advanced analytical modeling and solving skills to best address business problems in various industries; further expose students to new techniques more applicable to the unstructured and streaming nature of big data.

- Analytics communication and management: Learn how to effectively communicate analytical and sometimes complex results to a mixed audience; develop core managing skills more applicable to a business analytics project including planning, team leadership, project management, conflict resolution, negotiation and convincing techniques; create shared value for sustainable performance growth.

Program Outline

Participants will complete the program in a period of 12 months on a full-time basis. The program can also be completed on a part-time basis over a period of 24 months. The program starts with a 2-week boot camp and orientation (prerequisite) in August and continues for 12 months starting in September. In order to fulfill the MSBA program requirements, a student must complete the following on a full time or part time basis as tabulated below.

Course Type	Credit Hours
Core	18
Elective	6
Thesis or Capstone project and Elective	6
Total number of credits required for graduation	30

The Curriculum

The graduate program consists of 6 core courses, 2 electives and a thesis that could be replaced by an elective and a capstone project.

The core courses areas follow:

- MSBA300: Business Understanding in Analytics
- MSBA305: Data Processing Frameworks
- MSBA310: Applied Statistical Analysis
- MSBA320: Optimization & Simulation
- MSBA315: Predictive Analytics and Machine Learning
- MSBA325: Data Visualization & Communication

Elective courses may be chosen from the following list:

- MSBA316: Text Analytics and Natural Language Processing
- MSBA318: Forecasting Analytics
- MSBA319: Big Data Processing and Blockchain Technology
- MSBA335: Supply Chain Management
- MSBA360: Social Media Analytics
- MSBA370A: Data Driven Digital Marketing
- MSBA370B: Consumer Behavior Analytic in MENA
- MSBA375: Strategic Performance Management

Special Topics

- MSBA350A: Health Care Analytics
- MSBA350B: Pricing Analytics

Program Delivery

One Year MSBA Degree Plan		
Course Title	**Normal (Cr.)**	**Core Elective Remedial**
Summer term		
Bootcamp: Python and R	0	Remedial
Fall term		
MSBA300: Business Understanding in Analytics	3	Core
MSBA305: Data Processing Frameworks	3	Core
MSBA310: Applied Statistical Analysis	3	Core
MSBA320: Optimization & Simulation	3	Core
Spring term		
MSBA315: Predictive Analytics and Machine Learning	3	Core
MSBA325: Data Visualization & Communication	3	Core
Elective I	3	Elective
Elective II	3	Elective
Summer term		

Elective III	3	Elective
Capstone project	3	Elective
Or		
Thesis	6	Elective

Two-Year MSBA Degree Plan		
Course Title	**Normal (Cr.)**	**Core Elective Remedial**
Summer term		
Bootcamp: Python and R	0	Remedial
Year 1 Fall term		
MSBA300: Business Understanding	3	Core
MSBA310: Applied Statistical Analysis	3	Core
Year 1 Spring term		
MSBA305: Data Processing Frameworks	3	Core
MSBA315: Predictive Analytics and Machine Learning	3	Core
Year 1 Summer term		
Elective I	3	Elective
Elective II	3	Elective
Year 2 Fall term		
MSBA320: Optimization & Simulation	3	Core
MSBA325: Data Visualization and Communication	3	Core
Year 2 Spring term		
Elective III	3	Elective
Capstone project	3	Elective
Or		
Thesis	6	Elective

Academic Policies

Academic Rules and Regulations

University Academic Rules and Regulations on courses, grades, probation and dismissal apply. The minimum passing grade in a course is C+. Students in the MSBA program are required to maintain a cumulative GPA of 3.3 in all courses taken for graduate credit.

Academic Advisors

Each student has an academic advisor who normally approves the student's schedule each term. The General University Academic Information section of this catalogue provides further information on academic advisors.

MSBA Courses and Course Descriptions

MSBA 000 Boot Camp and Orientation (prerequisite)
Students will be required to attend a two-week long, non-credit applied camp. It introduces students to the major analytical tools used in the program as applied to basic statistics and data visualization. These include, among others, R/R-Studio, Python, SPSS, Excel and Tableau.\

Core Courses

MSBA 300 Business Understanding in Analytics
This course will focus on business understanding and problem framing. This includes analysis of previous findings; identifying stakeholder challenges and the organization ecosystem; understanding innovation essentials and components of the analytics framework to compete on analytics; developing a data strategy for defining key performance metrics, data quality checks, benchmarking indices and data sources; introducing big data concepts and technological infrastructure for processing information; discussing innovative business models, appropriate analytical tools and the necessary leadership role to implement analytics initiatives and prioritize them for budgeting; efficient resource allocation; effective creation of shared values and sustainable performance growth in a business domain.

MSBA 305 Data Processing Framework
The course focuses on the technology processing of data prior to performing data analytics to extract actionable intelligent insights. It covers data preparation, integration and processing using open-source software tools such as Python, Hadoop and Spark based platforms. Topics include identification of the datasets of interest; preparing the data; building data models using SQL and NoSQL databases and performing operations to explore large and complex datasets. It also explores big data and how and when to integrate big data platforms within an enterprise information system. Through guided hands-on tutorials, students will become familiar with data processing techniques using different frameworks.

MSBA 310 Applied Statistical Analysis
This course is designed to familiarize students with various applied statistical methods and tests. It will enable students to gain statistical knowledge and skills needed to solve business problems. In addition to the overview of hypothesis testing methods and exploratory data analysis (EDA), the course covers in-depth a wide range of parametric and non-parametric regression models such as multiple linear regression with interaction terms, multicollinearity diagnostics, variable selection, logistic regression, and classification and regression trees (CART). Students will already have received an early hands-on training as part of the pre-requisite boot camp on using the statistical tools and packages required for this course such as R/R-Studio, Python, Excel, and SPSS.

MSBA 315 Predictive Analytics and Machine Learning
Students in this course will learn about supervised and unsupervised training methods. The focus is on identifying relationships that cannot be found by basic statistics used, for example, in customer satisfaction, branding, machine failure, resource allocation, fraud detection and fraudulent activities. Techniques include nearest neighbors, Naive Bayes, deep learning, text mining, clustering, association rules, regularization and dimensionality reduction. The bias/variance trade-off and model selection is a focal point of the course and will be illustrated from multiple angles. Students will acquire hands-on experience in all techniques taught.

MSBA 320 Optimization and Simulation
This course is an introduction to quantitative models for managerial decision-making in a complex and dynamic business environment. Students learn to develop linear, discrete, non-linear and multi-criteria optimization models; perform sensitivity analysis; analyze decisions under uncertainty; and conduct scenario analysis using simulation. The course introduces students to advanced software tools used in simulation and optimization.

MSBA 325 Data Visualization and Communication
This course introduces students to the latest data visualization techniques and tools to visualize data using dashboards, scorecards and other formats. Students will learn presentation techniques with emphasis on the data story, the visual display of data and smart reporting of results. Students will acquire hands-on skills to create effective information visualization based on different data types and audiences. A mix of coding with out-of-box tools will be explored depending on the visualization goals and context. Presentations leveraging latest technology and software such as Tableau, QlikView or IBM Insights. Other covered topics include web analytics and communication.

MSBA 390 Capstone Project with Experiential Learning in Industry (3 credit hours)
Capstone Project with Experiential Learning in Industry.

MSBA 395 Thesis Project (6 credit hours)

The purpose of this course is two fold:

- The first is industry-oriented, focused on preparing students for the market and to hit the ground running from their first day on the job.

- The second is designed to enable students to deepen their knowledge in the field with the option of pursuing an advanced degree.

In both cases, students will follow the entire lifecycle of framing, modeling, analyzing and communicating results to address a business challenge and present their findings in front of a jury panel composed of academics and industry professionals.

Elective Courses

MSBA 316 Text Analytics and Natural Language Processing

The course covers major concepts and techniques for processing, cleaning, visualizing, and analyzing textual data to extract interesting information, discover knowledge, and support decision-making in business applications. Students will learn fundamental natural language processing techniques (such as tokenization, stemming, lemmatization, part-of-speech tagging, and named entity recognition), text representation (such as classical bag-of-words models, language models, and modern distributed representation of words), text categorization and classification, topic modeling, document summarization, and sentiment analysis. Hands-on labs and projects in parallel to course lectures and readings will allow students to develop practical skills in building foundational text analytics and NLP tools that can be applied to real-world business analytics challenges and problems.

MSBA317 Forecasting Analytics
Time series forecasting is essential for every organization that deals with quantifiable data. It is widely used in retail stores, international financial organizations, energy companies,

banks and lending institutions, and in many other industries. The course enables managers and policy makers to better make informed decisions. This course is a hands-on introduction to quantitative forecasting of time series. Students will learn the most popular forecasting techniques used in practice. The course covers topics such as pre-processing, characterization, and visualizing time series, model performance evaluation, smoothing methods, time series regression models, Box-Jenkins models, autoregressive integrated moving average (ARIMA) models, models with binary outcome, and neural networks for time series.

MSBA 319 Big Data Processing and Blockchain Technology

The course first focuses on blockchain technology and its applications in business. It explores how blockchain brings profound changes to businesses and explains how it transforms businesses structures, functions and roles of the organization. The course then dives into the various methods of blockchain governance that exist in the market place and examines specific features of blockchain to overcome problems that have been difficult to solve in the past using the existing centralized architecture. Topics include: key concepts like hashing, public key cryptography, digital signing, mining, proof-of-work, proof of stake, public vs private vs permissioned blockchain, peer-to- peer transactions, blocks, consensus mechanisms, smart contracts, crypto-asset, distributed resources, decentralized protocol, and the double-spending problem. These concepts will be illustrated using the Bitcoin application and implemented mainly using Ethereum. The course then tackles how to process large data volumes on large computational clusters by introducing advanced features for Spark 2.0. Students will learn how to set up clusters in both batch and real time modes, retrieve big volumes of textual data, analyze streaming data and use the ML API.

MSBA 335 Supply Chain - Fundamentals

This supply chain management course provides understanding of fundamental concepts for supply chain management from both analytical and practical perspectives, including a strategic framework to analyze the design, planning and operations decisions within supply chains. It covers supply chain drivers, supply chain process stages and performance metrics. It focuses on developing supply analytics strategy for competitive advantage, planning the demand and supply of products/services, managing inventory decisions and designing warehouse layout subject to materials handling considerations. Students will acquire hands-on experience in relevant supply chain analytics tools.

MSBA 340 Supply Chain - Logistics

This course provides understanding of the logistics aspect of designing a competitive supply chain strategy. It focuses on the designing and planning of facility locations, transportation system networks and scheduling using analytics and geo-information data to derive decisions; global sourcing and procurement strategies; negotiation techniques and rules of conduct in international trade and freight; assessments and decision techniques for outsourcing and coordinating third-party logistics. It also focuses on the role of information technology in the e-functions of supply chain logistics. Students will acquire hands-on experience in relevant supply chain logistics tools.

MSBA 345 Project Management Fundamentals

This course introduces the core fundamentals including the five process groups (Initiate, Plan, Direct & Execute, Monitor & Control and Close), in addition to the ten knowledge areas according to industry standards (Integration, Scope, Time, Cost, Quality, Human Resources, Communications, Risk, Procurement and Stakeholder Management). The course offers a perspective necessary to having a holistic and integrated view of managing projects in the business world. Students learn how to identify challenges, gather stakeholder requirements, communicate across existing organizational units and bring the necessary resources together in a harmonious manner.

MSBA 350 Project Portfolio Management
The Project Portfolio Management course focuses on the "what and why" issues in project and program management. It shows how Project Portfolio Management is the strategic layer of performance measurement and management undertaken to confirm the alignment of strategies with an organization's investment, mission, vision and goals to achieve desired objectives. It focuses on enhancing the project and program selection through several methods. It unifies the cost-benefit risk-opportunity metrics, enterprise architecture, capital planning, prioritization of resource, investment control, budgeting, project management and management of operations. Models and analytics tools for projects and programs are introduced, including assessments of risk and earned value management. The course also introduces students to some advanced software for project portfolio modeling and analytics tools.

MSBA 365 Customer Analytics
This course introduces marketing research with particular focus on customer analytics harnessing the power of big data analytics. It offers a comprehensive understanding of marketing research and its application to customer analytics, and emphasizes the importance of leveraging big data sources using various customer analytics tools and strategies.

MSBA 370 Data Driven Digital Marketing
This course covers the key concepts and strategies of data-driven digital marketing and growth hacking with real-world applications and case studies. The aim is to demystify the role of data in providing critical marketing insights that can pave and shape marketing strategies. Students will examine the various techniques for search engine optimization and will learn how to implement and manage search-advertising campaigns. They will also learn how to effectively engage with customers across a diverse range of social media platforms and experience the best practices for creating and delivering effective e-mail and mobile marketing campaigns.

MSBA 355 Enterprise Resource Planning
This course focuses on covering the different aspects of Enterprise Resource Planning (ERP) systems, how to manage them and use them for analytical purposes. It shows how ERP systems, when selected and managed successfully, can ultimately support business processes. The focus is on the cross-functional applications that span various departments in enterprise contexts. It emphasizes the following topical areas: overview of an ERP infrastructure, ERP and business processes, management of ERP lifecycles and the use of ERP for business analytics.

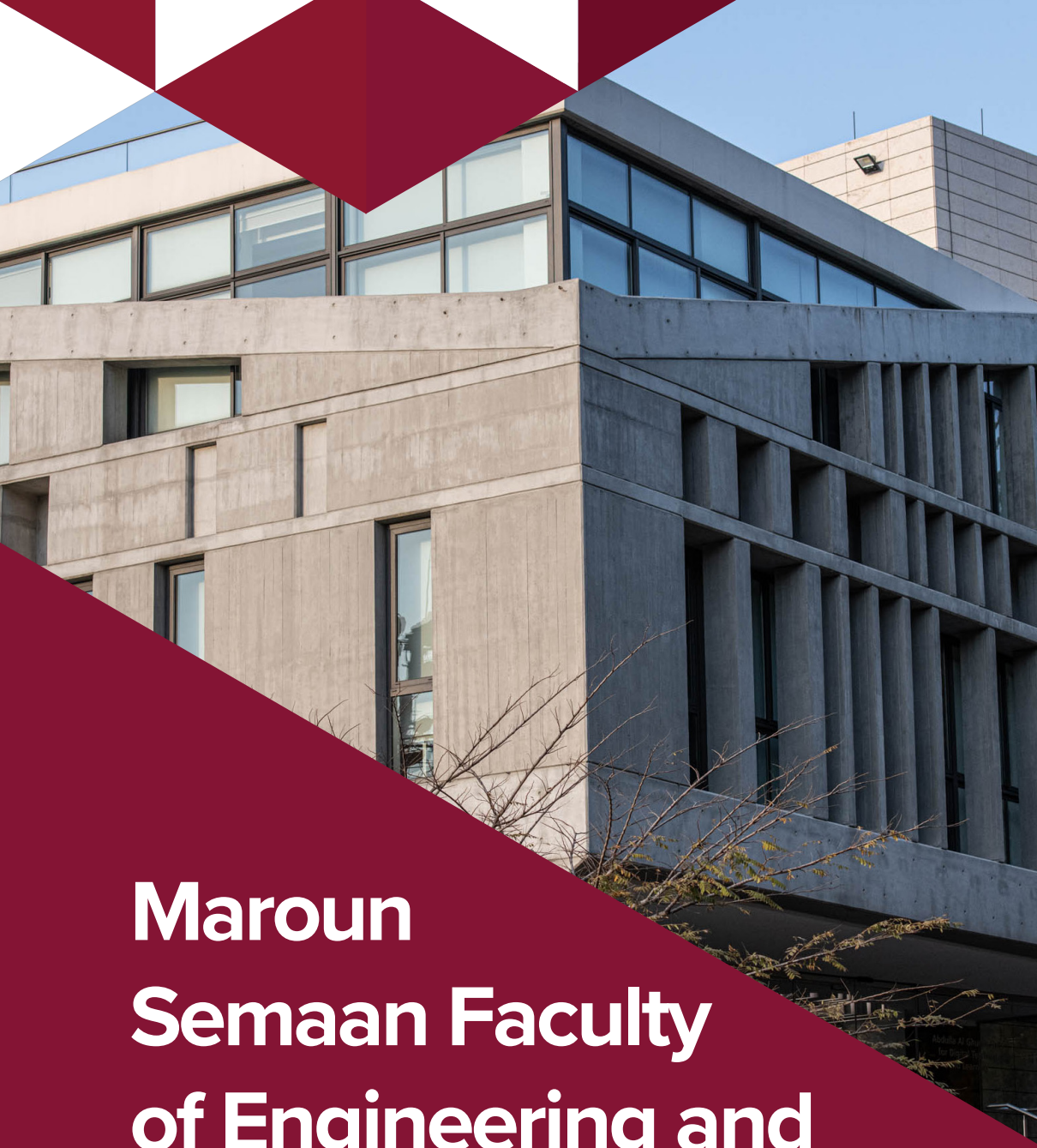
MSBA 360 Social Media Analytics
This course addresses the move towards social media to build intellectual capital, communicate with society, exchange knowledge among a global workforce, and provide the public face of business for marketing and corporate communications. The course explores the role of social media technologies (e.g., X/Twitter) in shaping societal and business trends, and emphasizes analyzing social media data in terms of reach, engagement, influencers, etc. using Python and open source tools. The course also explores social networks in the importance of information propagation in social media.

MSBA 375 Strategic Performance Management
This course covers strategic performance measurement and management to generate applied insights, manage performance efficiency and effectiveness and make informed decisions to sustainably boost growth. The course focuses on modeling and analyzing the performance of an organization. It covers the essentials of a strategic performance

framework, the development of performance metrics, the use of appropriate analytical tools to generate policy recommendations and finally the implementation of strategic recommendations in a real business context (e.g., Human Resources, Finance and Operations Management). Students are required to locate an organization to conduct a strategic performance study. Thus, this module combines the scientific rigor, relevant professional experience and analytics hands-on tools in an applied business domain, using student groups to meet milestones and deadlines.

MSBA 380 Pricing and Revenue Management

The course focuses, at a tactical level, on how to integrate pricing, sales and product design decisions to extract maximal value from any mismatch between supply and demand. It also introduces pricing as a hedging tool in the presence of various risk factors. It is based on data handling and model building, and relies on constrained optimization techniques implemented through Excel and Solver. Effective pricing and capacity management offer powerful levers that companies are increasingly using to squeeze more profits in competitive markets. Through a combination of case studies, lectures, computer games and guest speakers, the course reviews the main methodologies used in each of these areas and surveys current practices in different industries. The ultimate goal is for students to learn to identify and exploit opportunities for revenue optimization in different business contexts.



Maroun Semaan Faculty of Engineering and Architecture (MSFEA)

Graduate Program

Officers of the Faculty

Fadlo R. Khuri	President of the University
Zaher Dawy	Provost
Alan Shihadeh	Dean
Salah Sadek	Associate Dean
Imad El Hajj	Associate Dean
Howeida Al Harithy	Associate Dean
Riad Chedid	Associate Dean
Bradley Jon Tucker	Registrar
Antoine Sabbagh	Director of Admissions
Lokman Meho	University Librarian

Faculty Administrative Support

Ghada Najm	Executive Officer
Alia Kazma Serhal	Student Services Manager
Nagham Kanj	Student Services Officer
Officer Sara Jibbaoui	Financial Officer

Historical Background

The first programs leading to a master's degree in MSFEA were introduced in 1962. Since then other programs have been added to help meet the growing demand for advanced engineering education. Between October 1990 and October 1994, six new master's degree programs were introduced: the Master of Engineering Management (1990), four programs leading to the degree of Master of Engineering with majors in computer and communications engineering, electric power engineering, electronics, devices and systems, and environmental and water resources engineering (1991-1993), and the Master of Mechanical Engineering (1994) with majors in applied energy, materials and manufacturing, or thermal and fluid sciences. In 1998, two programs were added: the Master of Urban Design and the Master of Urban Planning and Policy. In 2014, two master's degree programs were introduced in chemical engineering: the Master of Science degree program and the Master of Engineering degree program. In 2016, a Master of Science degree program in biomedical engineering was introduced.

In 2007, PhD programs started accepting students in three departments of MSFEA: the Civil and Environmental Engineering department (PhD in civil engineering and PhD in environmental and water resources engineering), the Electrical and Computer Engineering department (PhD in electrical and computer engineering), and the Mechanical Engineering department (PhD in mechanical engineering). In 2016, a new PhD program in biomedical engineering was established.

Mission

We offer world-class educational programs that prepare students for the engineering, architecture and design professions. Rooted in the liberal education model, our programs also prepare students to be engaged citizens and leaders, entrepreneurs and researchers who deploy their skills with ingenuity, integrity and a sense of responsibility towards future generations. Our faculty produces transformative knowledge and technology through internationally-recognized research and design, and seeks to leverage the special contexts of Lebanon and the region to define highly novel and relevant research programs. We impact policy and practice through our alumni and by directly engaging industry, government and the public at large.

Master's Degree Programs

The Maroun Semaan Faculty of Engineering and Architecture offers graduate programs leading to the degree of Master of Engineering (ME) with majors in civil engineering, environmental and water resources engineering, electrical and computer engineering, mechanical engineering and chemical engineering. The faculty also offers the degrees of Master of Engineering Management (MEM), Master of Urban Design (MUD), Master of Urban Planning and Policy (MUPP), Master of Mechanical Engineering with a major in applied energy, and Master of Science (MS) with majors in chemical engineering, biomedical engineering and energy studies. MSFEA also offers a Master of Science program in environmental technology as part of the Interfaculty Graduate Environmental Sciences Program.

In addition, a professional diploma in green technologies with majors in energy, buildings and water is offered in the faculty for professionals who wish to enhance their knowledge in the field.

The requirements for admission to the master's programs are those specified for the master's degree in the Admissions section of this catalogue with the following interpretations and additions.

Waiving of Credits

The department or program of the intended major may recommend waiving up to 9 credits of coursework for students who have completed a Bachelor of Engineering (BE) degree and are applying for admissions to a Master of Engineering (ME) program, which is subject to approval by the advisor, chairperson and the MSFEA Graduate Studies Committee. To apply, the student must have completed advanced engineering courses (normally at the 600-level and above) that meet the program requirements with a grade of at least B+. In addition, the total number of transferable credits from BE to ME should not exceed 12. This means that if a student has taken a credit overload during his/her undergraduate BE studies, s/he can waive a maximum of 12 credits.

For the Master of Urban Planning and Policy (MUPP) and the Master of Urban Design (MUD) programs, the Architecture and Design (ArD) Department may recommend waiving up to nine credits of coursework for students who have completed a Bachelor of Architecture degree, and up to six credits of coursework for students who have completed a Bachelor of Landscape Architecture degree.

The ArD Department may also recommend waiving up to six credits of coursework for

students who have completed a Bachelor of Engineering degree and are applying for admission to the MUPP program.

Waiving of credits is subject to approval by the program coordinator, the chairperson, and the MSFEA Graduate Studies Committee. To apply, the student must have completed the advanced course(s) with a grade of at least B+ or equivalent. An advanced course is a course taken during the senior (third) or later year(s) of undergraduate study and deemed equivalent, by program coordinator, chairperson, and MSFEA Graduate Studies Committee, to a course listed under Mandatory Courses or Elective Courses in the MUD/MUPP section of the Graduate Catalogue.

Regulations for Master's Students Taking Undergraduate Courses

Master's level students who are required to take undergraduate courses must obtain a grade of at least C+ in each undergraduate course taken. If a student fails to obtain a grade of C+ in any of these undergraduate courses, the student is allowed to repeat that course only once. Failure to meet the requirements will result in the student being dropped from the graduate program.

Curricula and Courses

The curricula and courses offered in each department are presented in the appropriate sections of this catalogue.

Courses Open to Students from other Faculties

Students from other faculties are allowed to take any course for credit offered by the MSFEA, provided space is available, the prerequisites are satisfied and the student has prior approval of both his/her faculty and the department offering the course.

Doctor of Philosophy (PhD) Programs

The Maroun Semaan Faculty of Engineering and Architecture offers graduate programs leading to the degree of Doctor of Philosophy (PhD) with specializations in biomedical engineering, civil engineering, electrical and computer engineering, environmental and water resources engineering, and mechanical engineering.

Criteria for Regular Admission to PhD Programs

Candidates for a doctoral degree program must hold a master's degree or its equivalent and must demonstrate outstanding academic ability (minimum GPA of 3.7) or its equivalent) at the master's level as well as the potential to conduct scholarly research. Additional specific requirements for each program can be found in the departmental sections of this catalogue. Application to the doctoral program will follow the deadlines set by the Admissions Office. All applicants are required to take the General Exam part of the Graduate Record Examination (GRE) and submit their scores. Students other than AUB graduates and graduates of recognized colleges or universities in North America, Great Britain, Australia and New Zealand must meet the English Readiness for University Study in English (RUSE) set for master's students.

Admission to a PhD program requires the recommendation of the department offering the program and the approval of the MSFEA Graduate Studies Committee.

Criteria for Admission to the Accelerated PhD Programs

To apply to the accelerated program, students must have a GPA of 3.7 or above in their undergraduate work. This applies to the average in the major as well as the cumulative average.

In addition to meeting the requirements described in the General University Academic Information section of the catalogue, there may be specific requirements described in the departmental sections.

Financial Support Available to Graduate Students

The MSFEA offers several types of graduate assistantships to the most qualified applicants to its graduate programs, which include fellowships, graduate research assistantships (GRA), graduate teaching assistantships (GTA), and graduate administrative assistantships (GAA).

Students who receive financial support are expected to maintain a high level of academic performance, satisfactory progress toward a degree and satisfactory performance of the work assignments associated with the aid.

These fellowships, GRAs, GTAs, and GAAs covering tuition are available for students at the graduate level in return for assisting faculty members and departments in teaching and/or research for a specified number of hours per week. Applicants are selected on the basis of their academic record and the needs of the relevant department. For more information, refer to Full-Time Status for University Graduate Assistants and Graduate Research Assistants (page 54).

Applicants opting for the non-thesis track are normally not offered graduate assistantships.

Biomedical Engineering Graduate Program

Coordinator:	Mhanna, Rami (Biomedical Engineering, MSFEA)
Co-coordinator:	Rahal, Elias (Experimental Pathology, Immunology and Microbiology, FM)
Coordinating Committee Members:	Amatoury, Jason (Biomedical Engineering, MSFEA) Daou, Arij (Biomedical Engineering, MSFEA) Darwiche, Nadine (Biochemistry & Molecular Genetics, FM) El Hajj, Albert (Surgery, FM) Khoueiry, Pierre (Biochemistry & Molecular Genetics, FM) Khraiche, Massoud (Biomedical Engineering, MSFEA) Refaat, Marwan (Internal Medicine, FM) Saad, Walid (Chemical Engineering, MSFEA) Zouein, Fouad (Pharmacology and Toxicology, FM)

Background

The Biomedical Engineering Graduate Program (BMEP) is a joint MSFEA and FM interdisciplinary program that offers two degrees: Master of Science (MS) in Biomedical Engineering and Doctor of Philosophy (PhD) in Biomedical Engineering. The BMEP is housed in the MSFEA and administered by both MSFEA and FM via a joint program coordinating committee (JPCC).

The mission of the BMEP is to provide excellent education and promote innovative research enabling students to apply knowledge and approaches from the biomedical and clinical sciences in conjunction with design and quantitative principles, methods and tools from the engineering disciplines to address human health related challenges of high relevance

to Lebanon, the Middle East and beyond. The program prepares its students to be leaders in their chosen areas of specialization committed to lifelong learning, critical thinking and intellectual integrity.

The curricula of the MS and PhD degrees are composed of core and elective courses balanced between biomedical sciences and engineering and between fundamental and applied knowledge.

The curricula include the following three research focus areas:

- **Biomedical Systems:** This focus area includes research directions such as devices, instrumentation, biomechanics, biomaterials, drug delivery systems and tissue engineering.
- **Biomedical Cybernetics:** This focus area includes research directions such as biomedical and health informatics, computational biology, biomedical signal/image processing and biomedical systems engineering.
- **Cardiovascular and Pulmonary Engineering:** This focus area includes research directions such as fluid mechanics, modeling, simulation, imaging, devices, and implants related to both human cardiovascular and pulmonary systems.

A student may select his/her courses to satisfy the requirements of one of the three focus areas.

The MS and PhD degrees are open to students holding degrees from relevant fields of study including basic sciences, biomedical sciences, computer science, engineering, health sciences, and mathematics. Due to the interdisciplinary nature of the program, eight remedial undergraduate courses in sciences, math and engineering have been identified to cover the needed prerequisite knowledge; the remedial courses required by each admitted students are customized on a case-by-case basis depending on the student's undergraduate degree. Remedial undergraduate courses do not count as credit towards the MS or PhD degree completion. Grades on these remedial courses will appear on the transcript as Pass/Fail with a passing grade of C+.

Master of Science in Biomedical Engineering

The BMEP offers a Master of Science (MS) degree in Biomedical Engineering with two options: thesis option and non-thesis option.

Admission Requirements

The application procedures and admission requirements to the MS program follow AUB's General University Academic Information as documented in the Graduate Catalogue. To be considered for admission, applicants must hold a bachelor's degree in a relevant field of study from AUB or its equivalent, or from a recognized institution of higher learning.

Accepted students in the thesis option are eligible to apply to the Graduate Fellowship and Assistantship Program (GFAP).GFAP support cannot be used to cover the tuition for remedial undergraduate courses.

Course Requirements

The MS program consists of 30 credits. The curriculum design is divided into core courses and elective courses in addition to a master's thesis for the thesis option. This program does not provide credit towards New York State licensure.

Core graduate courses: 18 credits of core courses from biomedical sciences and engineering.

Required core courses (18 cr.)		Credits
BIOC 321	Nucleic Acids and Basic Genetics	1
BIOC 322	Protein Biochemistry	1
BMEN 600	Biomedical Engineering Applications	3
BMEN 601	Computational Modeling of Physiological Systems	3
BMEN 672	Hospital Lab Rotation	0
BMEN 673L	Biomedical Engineering Lab	1
EPHD 310	Basic Biostatistics	3
HUMR 310 (A, B, or C)	Biomedical Research Techniques	1
HUMR 314	Research Seminar	1
PHYL 346	Human Physiology	4

Restricted elective graduate courses: 6 credits restricted elective courses customized per focus area and required by both thesis and non-thesis options.

Restricted Elective Courses (6 cr.)		Credits	Systems	Cyber-netics	Cardio-vascular
BIOC 303	Molecular Biology of Cancer	3	X		
BIOC 325	Receptors and Signal Transduction	2		X	
BIOC 326A	Bioinformatics Tools and Applications in Genomics	1		X	
BMEN 603	Tissue Engineering	3	X		X
BMEN 604	Engineering of Drug Delivery Systems	3	X		X
BMEN 605	Biomedical Imaging	3		X	X
BMEN 606	Nanobiosensors	3	X	X	
BMEN 607	Biomechanics	3	X		
BMEN 608	Biomaterials and Medical Devices	3	X		X
BMEN 609	Computational Neuroscience	3	X	X	
BMEN 610	Micro and Nano Neural Interfaces	3	X		
BMEN 611	Computational Modeling in Biomechanics	3	X	X	X
EECE 601 or EECE 602	Biomedical Engineering I or Biomedical Engineering II	3	X	X	X

EECE 603	Biomedical Signal and Image Processing	3		X	X
EECE 605	Neuromuscular Engineering	3	X	X	
EECE 633 or EECE 663 or EECE 667 or EECE 690 or EECE 693	Data Mining or System Identification or Pattern Recognition or Introduction to Machine Learning or Neural Networks	3		X	
HUMR 305	Cell and Tissue Biology	3	X		
PHYL 302	Cardiovascular Physiology	2			R
PHYL 300A	Pulmonary Physiology	1			X

Free elective graduate courses for the non-thesis option: 6 credits additional elective courses. These courses should be taken from engineering and should be approved by the student's advisor and the coordinator of the joint program coordinating committee.

Master thesis for the thesis option: 6 credits master's thesis in biomedical engineering. The thesis requirements follow AUB's General University Academic Information as documented in the Graduate Catalogue.

PhD in Biomedical Engineering

Admission Requirements

The application procedures and admission requirements to the PhD program follow AUB's General University Academic Information as documented in the Graduate Catalogue. To be considered for admission, applicants must hold a bachelor's or master's degree in a relevant field of study from AUB or its equivalent, or from a recognized institution of higher learning.

Acceptance into the PhD program is determined by academic performance as well as an assessment of readiness, potential and ability to develop into independent researchers as judged by interviews by faculty members, a written statement, letters of recommendation, GRE scores, and other means of assessment such as publications and industrial experience.

Accepted students are eligible to receive scholarships that fully cover their tuition fees and provide a monthly stipend.

Degree Requirements

General requirements for master's degree holders: Based on AUB's guidelines, a minimum of 48 credit hours beyond those required for the master's degree, of which a minimum of 18 credit hours must be in graduate level course work and a minimum of 24 credit hours of thesis work, must be taken. Requirements also allow a maximum of 3 credit hours out of the 18 credits of coursework as tutorial course and include a 0-credit comprehensive examination preparation course and a 0-credit thesis proposal preparation course.

General requirements for bachelor's degree holders: Based on AUB's guidelines, a minimum of 78 credit hours beyond those required for the bachelor's degree, of which a minimum of 36 credit hours must be in graduate level coursework and a minimum of 30 credit hours of thesis work, must be taken. Requirements also allow a maximum of 6 credit hours out of the 36 credits of coursework as tutorial courses and include a 0-credit comprehensive examination preparation course and a 0-credit thesis proposal preparation course.

To earn a PhD degree in Biomedical Engineering, the student must complete the following requirements:

- Satisfy the course and research credit requirements
- Satisfy the residence requirement and all other pertinent AUB regulations
- Have at least one international refereed journal article based on the PhD thesis
- Have at least one refereed conference paper based on the PhD thesis
- Have a cumulative GPA of 3.7 or above
- Pass the comprehensive and oral qualifying examinations
- Successfully defend the PhD thesis

The following are the graduate level course requirements for students admitted with a bachelor's degree. The total number of credits is at least 36 credits divided among core, restricted elective and free elective courses. Students admitted with a master's degree can waive as many courses as possible without going below the minimum required 18 credits of coursework.

Core graduate courses: 21 credits of core courses from biomedical sciences and engineering.

Students are required to take two PhD lab rotation courses where each lab rotation is 1 credit (one lab rotation in MSFEA and one lab rotation in FM).

EPHD 310 can be replaced by another advanced level statistics course based on JPCC's approval.

Required core courses (21 cr.)		**Credits**
BIOC 321	Nucleic Acids and Basic Genetics	1
BIOC 322	Protein Biochemistry	1
BIOM 385	Research Ethics	1
BMEN 600	Biomedical Engineering Applications	3
BMEN 601	Computational Modeling of Physiological Systems	3
BMEN 671	PhD Lab Rotation	1 + 1
BMEN 672	Hospital Lab Rotation	0
BMEN 673L	Biomedical Engineering Lab	1
BMEN 675	Approved Experience	0

EPHD 310	Basic Biostatistics	3
HUMR 310 (A, B, or C)	Biomedical Research Techniques	1
HUMR 314	Research Seminar	1
PHYL 346	Human Physiology	4

Restricted elective graduate courses: 9 credits restricted elective courses customized per focus area.

Courses marked as "R" are required, and courses marked as "X" are possible elective options.

Restricted Elective Courses (6 cr.)		**Credits**	**Systems**	**Cyber-netics**	**Cardio-vascular**
BIOC 303	Molecular Biology of Cancer	3	X		
BIOC 325	Receptors and Signal Transduction	2		R	
BIOC 326A	Bioinformatics Tools and Applications in Genomics	1		X	
BMEN 603	Tissue Engineering	3	X		X
BMEN 604	Engineering of Drug Delivery Systems	3	X		X
BMEN 605	Biomedical Imaging	3		X	X
BMEN 606	Nanobiosensors	3	X	X	
BMEN 607	Biomechanics	3	X		
BMEN 608	Biomaterials and Medical Devices	3	X		X
BMEN 609	Computational Neuroscience	3	X	X	
BMEN 610	Micro and Nano Neural Interfaces	3	X		
BMEN 611	Computational Modeling in Biomechanics	3	X	X	X
EECE 601 or EECE 602	Biomedical Engineering I or Biomedical Engineering II	3	X	X	X
EECE 603	Biomedical Signal and Image Processing	3		X	X
EECE 605	Neuromuscular Engineering	3	X	X	
EECE 633 or EECE 663 or EECE 667 or EECE 690 or EECE 693	Data Mining or System Identification or Pattern Recognition or Introduction to Machine Learning or Neural Networks	3		X	

HUMR 305	Cell and Tissue Biology	3	R		
PHYL 300A	Pulmonary Physiology	1			R
PHYL 302	Cardiovascular Physiology	2			X

Free elective graduate courses: 6 credits additional elective courses. These courses should be taken based on the student's specific area of research as approved by the student's advisor.

Course Descriptions

BMEN 600 Biomedical Engineering Applications 3 cr.
Biomedical engineering is an interdisciplinary domain which applies principles of engineering to find solutions for biological and health problems. Biomedical engineering aims to improve our fundamental understanding of biological processes and develop approaches for optimized therapeutic/diagnostic healthcare procedures. The field of biomedical engineering involves the development of materials to replace or enhance the operation of damaged or malfunctioning biological entities, development of diagnostic and therapeutic tools, modeling of biological systems, signal processing and bioinformatics. This course will introduce students to biomedical engineering and provide insight into the various applications in the biomedical engineering field. The course will be divided into modules, and each will be given by a specialist in a certain biomedical engineering area.

BMEN 601/MECH 635 Computational Modeling of Physiological Systems 3 cr.
This course focuses on the quantitative modeling of different physiological systems. It provides students with current concepts of the mathematical modeling, and different quantitative descriptions of cellular and organ physiology. At the subcellular/cellular level, we will examine mechanisms of regulation and homeostasis. At the system level, the course will cover basic aspects of anatomical and pathophysiological features of the nervous, neural, cardiovascular and respiratory systems. Several physiological processes are treated as case studies for increasing complexity in modeling dynamical systems. Prerequisites: MATH 202 and EECE 230 or EECE 231, or consent of instructor.

BMEN 602 Computational Modeling of Cardiovascular and Pulmonary Systems 3 cr.
The need for better understanding the mechanics and tools for computational modeling of cardiovascular and respiratory systems in healthy and diseased conditions is constantly increasing. This is a result of the enormous advances made in the science and engineering of both surgical and therapeutic medicine. This course covers the modeling and simulation of cardiovascular and respiratory systems. It will provide the students with a thorough understanding of the anatomy, physiology and mechanics of cardiovascular and respiratory systems as well as the computational tools for modeling and simulation of cardiac, circulatory and respiratory systems in healthy and diseased conditions.

BMEN 603/CHEN 675/MECH 798J Tissue Engineering 3 cr.
In a world of aging population, an ever-increasing demand for improvement of healthcare services and need for replacement organs and tissues are arising. The limited pool of donors together with the problem of donor organ rejection is a strong driver for engineering tissues and other body parts. Tissue engineering is an interdisciplinary field that uses cells, biomaterials, biochemical (e.g. growth factors) and physical (e.g. mechanical stimulation) signals, as well as their combination to generate tissue-like structures. The goal of tissue engineering is to provide biological substitutes that can maintain, restore or improve the function of damaged organs in the body. This course will introduce interested students to the new field of tissue engineering and provide insight on cutting edge applications in this area.

BMEN 604/CHEN 673 Engineering of Drug Delivery Systems 3 cr.
This course focuses on recent advances in the development of novel drug delivery systems. The fundamentals of drug delivery are discussed. Various strategies to tune and control the release of active agents for optimized therapeutic outcomes are explored. The course covers polymers and techniques used to produce drug nanoparticles, with specific examples of nanoparticle-based drug delivery systems. Prerequisites: CHEN 314 and CHEN 411, or consent of instructor.

BMEN 605 Biomedical Imaging 3 cr.
Biomedical imaging offers an unprecedented view into the structure and function of a living body, and as such plays an essential role in medical practice and research. This course will provide students with an overview of the key concepts underlying the primary diagnostic biomedical imaging modalities, including: ultrasound, x-ray, computed tomography, magnetic resonance and nuclear imaging. In particular, students will gain an understanding of the physical principles and theoretical bases governing the operation of each imaging modality, the technology that translates theory into practice, and the basic methods involved in image formation. Students will also learn about clinical and research applications in imaging. The course includes class sessions, demonstrations, tours and research seminars.

BMEN 606 Nanobiosensors 3 cr.
This course will provide a comprehensive analysis of the field of nanoengineering with a focus on biosensors including common modalities, basic theoretical considerations for sensor operation, physics of detection and applications in research and medical diagnostics. The course will cover the major types of electronic nanobiosensors for biological signal detection (potentiometric, amperometric, and mass based sensors) and their applications in the fields of neural engineering, DNA sequencing and cardiovascular early disease detection. The course will enable students to have a strong grasp of fundamentals of biosensor design, select sensors for various applications and evaluate new and emerging technologies. Prerequisites: EECE 210 (or equivalent) and BIOL 210 (or equivalent); or consent of instructor.

BMEN 607/MECH 633 Biomechanics 3 cr.
A course on the study of the biomechanical principles underlying the kinetics and kinematics of normal and abnormal human motion. Emphasis is placed on the interaction between biomechanical and physiologic factors (bone, joint, connective tissue, and muscle physiology and structure) in skeleto-motor function and the application of such in testing and practice in rehabilitation. The course is designed for engineering students with no previous anatomy/ physiology. Prerequisites: CIVE 210, MECH 320 or CIVE 310; or consent of instructor.

BMEN 608/MECH 634 Biomaterial and Medical Devices 3 cr.
A course that examines the structure-property relationships for biomaterials and the medical applications of biomaterials and devices. The first part of the course focuses on the main classes of biomaterials, metal, ceramic, polymeric and composite implant materials, as well as on their interactions with the human body (biocompatibility). The second part of the course examines the various applications of biomaterials and devices in different tissue and organ systems such as orthopedic, cardiovascular, dermatologic and dental applications. Experts from the medical community will be invited to discuss the various applications. Prerequisite: MECH 340 or consent of instructor.

BMEN 609 Computational Neuroscience 3 cr.
The human brain, perhaps the most complex, sophisticated, and complicated learning

system, controls virtually every aspect of our behavior. The central assumption of computational neuroscience is that the brain computes. What does that mean? Generally speaking, a computer is a dynamical system whose state variables encode information about the external world. In short, computation equals coding plus dynamics. Some neuroscientists study the way that information is encoded in neural activity and other dynamical variables of the brain. Others try to characterize how these dynamical variables evolve with time. The study of neural dynamics can be subdivided into two separate strands. One tradition, exemplified by the work of Hodgkin and Huxley, focuses on the biophysics of single neurons. The other focuses on the dynamics of networks, concerning itself with phenomena that emerge from the interactions between neurons. Therefore computational neuroscience can be divided into three sub- specialties: neural coding, biophysics of neurons, and neural networks. This course will introduce engineers, physicists, computational scientists, mathematicians and other audiences to the neurosciences from the cellular level and the network level as seen from computational lenses. Prerequisites: BIOL 201 (or equivalent) and Math 202, or consent of instructor.

BMEN 610 Micro and Nano Neural Interfaces 3 cr.
Neural interfaces are micro and nano devices that form the connection between the biological neural tissue and the external electronic devices. These devices are designed for mapping, assisting, augmenting, or repairing neural pathways. The course will focus on physical, chemical and neurophysiological principles of neural interfaces, theoretical and functional basis for their design, micro and nano fabrication techniques and applications in neural prosthesis for Brain Machine Interface. Topics covered in class will include; Neural Engineering, Brain Machine Interface, Microfabrication, Nanofabrication, Soft-lithography, Electrokinetics, Electrochemistry, Neural probes, Biocompatibility, Microelectrodes, NeuroMEMS (neuro microelectromechanical systems, BioMEMS (biomedical microelectromechanical systems). Prerequisite: consent of instructor.

BMEN 611/MECH 611 Computational Modeling in Biomechanics 3 cr.
This course is open to engineering, science and medical students wanting a glimpse into the world of computational finite element modeling and simulation to investigate and solve biomedical problems. Students will take a journey through the processes involved in producing a computational finite element model in the biomedical field; starting at construction of model geometry from medical imaging data (CT/MRI), through to model creation, simulation and visualization using finite element analysis software (ANSYS Workbench). Students will also be exposed to a selection of experimental lab techniques in biomechanics and physiology to acquire data required for model development and validation. In pursuit of developing an appreciation for the areas covered, the course will incorporate a mix of theory, demonstrations, practice, real-world modeling applications and research seminars.

BMEN 671 PhD Lab Rotation 1 cr.
PhD students in Biomedical Engineering are required take two laboratory rotations (1 credit each) in different faculty research laboratories within the MSFEA and/or FM. Students may also enroll in a third elective laboratory rotation. This aims to familiarize students with potential thesis mentors and expose them to different research environments.

BMEN 672 Hospital Lab Rotation 0 cr.
MS and PhD students in Biomedical Engineering are required to do a lab rotation in the Medical Engineering Department at AUB Medical Center (AUBMC). This aims to familiarize students with the typical activities and responsibilities of a biomedical engineer in a working environment and expose them to different equipment and tools.
Prerequisite: consent of instructor.

BMEN 673L Biomedical Engineering Lab 1 cr.
This laboratory course aims to introduce students to the practical issues in the areas of biomedical instrumentation design and biological signal processing. A particular emphasis will be placed on signal transduction, electronic circuit design for recording and conditioning physiological signals. The lab will introduce hand-on laboratory experiments on biomedical sensors, analog signal amplifiers and filters, digital acquisition and transmission, and basic digital filtering. In addition, some experiments cover topics that demonstrate the various levels of complexity that characterize biological signals. Signal processing tools include spectral and cepstral analysis, de-noising and artifact removal, filter banks and wavelet decompositions, Hilbert transforms, and information-theoretic measures. Pre-requisite: Consent of instructor.

BMEN 675 Approved Experience 0 cr.
Approved Experience.

BMEN 796 Special Project in Biomedical Engineering 3 cr.
Special Project in Biomedical Engineering.

BMEN 797 Special Topics in Biomedical Engineering 1 cr.
Special Topics in Biomedical Engineering.

BMEN 798 Special Topics in Biomedical Engineering 3 cr.
Special Topics in Biomedical Engineering.

BMEN 799T MS Comprehensive Exam 0 cr.
Every term.

BMEN 799 MS Thesis 6 cr.
Every term. Prerequisite: BMEN 799T.

BMEN 980 Qualifying Exam Part I: Comprehensive Exam 0 cr.
Every term

BMEN 981 Qualifying Exam Part II: Defense of Thesis Proposal 0 cr.
Every term. Prerequisite: BMEN 980.

BMEN 982 PhD Thesis 3 cr.
Every term. Taken while total required credit hours have not been completed.

BMEN 983 PhD Thesis 6 cr.
Every term. Taken while total required credit hours have not been completed.

BMEN 984 PhD Thesis 9 cr.
Every term. Taken while total required credit hours have not been completed.

BMEN 985 PhD Thesis 12 cr.
Every term. Taken while total required credit hours have not been completed.

BMEN 986 PhD Thesis 0 cr.
Every term. Taken while total required credit hours have not been completed.

BMEN 987 PhD Thesis Defense 0 cr.
Every term. Prerequisite: BMEN 981.

BIOC 303 a Molecular Biology of Cancer 15.0; 1 cr.
A course that deals with the regulatory mechanisms of tumor cell growth and cancer formation at the cellular, molecular, genetic and epigenetic levels. This course includes a discussion of recent developments in the intra- and/or inter-cellular mechanisms involved in cellular proliferation, cell death and resistance to cancer therapeutics. The 1-credit elective course is open to all graduate students in basic Biomedical Sciences, Biomedical Engineering and Biology. Second term.

BIOC 303 b Molecular Biology of Cancer 30.0; 2 cr.
A course that deals with more advanced topics in tumor biology, such as invasion and metastasis, cancer stem cells and animal models. The 2-credit elective course is recommended for graduate students whose research interest can benefit from a thorough knowledge of tumor biology. BIOC 303 is a prerequisite for BIOC 303 b. Students can register for both BIOC 303 a and BIOC 303 b. Second term.

BIOC 321 Nucleic Acids and Basic Genetics 15.0; 1 cr.
This course discusses the principles of nucleic acid structure and function in eukaryotes. It includes the information for basic genetics in terms of genome structure as well as the diversity of gene regulation. Required from MS and PhD students in biomedical Sciences. requires consent of coordinator for other graduate disciplines. First term.

BIOC 322 Protein Biochemistry 10.10; 1 cr.
This course deals with the biochemistry of proteins including their basic units, different structures, folding process and protein-protein interactions. It focuses on how changes at the structural level modify function. The course also covers the principles of protein purification and sequencing, and introduces students to protein database, molecular modeling and systems biology. Required from MS and PhD students in biomedical sciences. Requires coordinator approval for other graduate disciplines. First term.

BIOC 325 Receptors and Signal Transduction 25.10; 2 cr.
This course covers classical pathways involved in receptor signaling and activation of downstream targets and the molecular mechanisms involved. It deals with the inter- and intracellular communication, from the generation of signaling molecules through the cellular responses. Required from MS and PhD students in biomedical sciences. Requires consent of coordinator for other graduate disciplines. First term.

BIOC 326A Bioinformatics Tools and Applications in Genomics 1 cr.
This course will discuss the relationships among sequence, structure and function in biological networks, as well as advances in modeling of quantitative, functional and comprehensive ge¬nomics analyses. It will assess computational issues arising from high-throughput techniques recently introduced in biomedical sciences, and cover very recent developments in computa¬tional genomics, including genome structural variant discovery, epigenome analysis, cancer genomics and transcriptome analysis.

BIOM 385 Research Ethics 15.0; 1 cr.
This course introduces the fundamentals of responsible conduct of research, emphasizing the ethical practice of human research. The course recaps history of ethical principles, the development of research codes of conduct and ethical practices, familiarizes students with the different kinds of ethical issues that they might come across throughout their careers and allows scholars to reflect critically on what it means to be an ethical and responsible researcher. Summer term.

EECE 601 Biomedical Engineering I 3 cr.
This course includes an introduction to: general instrumentation configuration and performance of instrumentation systems; types and characteristics of transducers; sources and characteristics of bioelectric signals; types and characteristics of electrodes; temperature regulation and measurement; cardiovascular system, measurements and diagnostic equipment; blood instruments; patient care and monitoring; and electrical safety of medical equipment. Prerequisites: BIOL 210 or BIOL 202 or PHYL 246, and EECE 210; or PHYS 228 and PHYS 228L; or consent of instructor.

EECE 603 Biomedical Signal and Image Processing 3 cr.
Fundamentals of digital signal processing as implemented in biomedical applications. It provides a concise treatment of the tools utilized to describe deterministic and random signals as the basis of analyzing biological signals: data acquisition; imaging; denoising and filtering; feature extraction; modeling. The course is tightly coupled with a practical component through laboratory projects. Examples include the auditory system, speech generation, electrocardiogram, neuronal circuits and medical imaging. Students should have reasonable software skills in Matlab. Prerequisites: STAT 230 and EECE 340, or equivalent; or consent of instructor.

EECE 633 Data Mining 3 cr.
This course is an introduction to data mining. Data mining refers to knowledge discovery from huge amounts of data to find non-trivial conclusions. Topics will range from statistics to machine learning to database, with a focus on analysis of large data sets. The course will target at least one new data mining problem involving real data for which the students will have to find a solution. Prerequisite: EECE 330 or consent of instructor.

EECE 663 System Identification 3 cr.
This course introduces the basic mathematical tools to fit models into empirical input-output data. General time-series modeling and forecasting, such as stock prices, biological data and others. Topics include nonparametric identification methods: time and frequency response analysis; parametric identification: prediction error, least squares, linear unbiased estimation and maximum likelihood; convergence, consistency and asymptotic distribution of estimates; properties and practical modeling issues: bias distribution, experiment design and model validation

EECE 667 Pattern Recognition 3 cr.
The course provides an overview of the algorithms used in machine learning. The course discusses modern concepts for model selection and parameter estimation, decision-making and statistical learning. Special emphasis will be given to regression and classification for a supervised mode of learning. Students will be assigned typical machine learning problems to investigate as projects.

EECE 690 Introduction to Machine Learning 3 cr.
The course provides an overview of machine learning theory and algorithms that learn from experience to predict or control yet to be seen instances. The course discusses the intuition and the theory of some selected modern machine learning concepts as well as practical know-how to successfully apply them to new problems. It covers topics in supervised learning such as parametric/ non-parametric, generative/ discriminative algorithms for classification and regression and in unsupervised learning for clustering, dimensionality reduction and reinforcement learning. The course also includes case studies and applications so that students can gain practice on regularization, model selection, parameter estimation, Bayesian networks, hidden Markov models, support vector machines, reinforcement learning, neural networks and deep learning. Students

cannot receive credit for both EECE 664M and EECE 633 and 667. Prerequisites: EECE 330, and MATH 218 or MATH 219, and STAT 230 or STAT 233 or consent of instructor.

EECE 693 Neural Networks 3 cr.
The course provides a comprehensive foundation to artificial neural networks and machine leaning with applications to pattern recognition and data mining; learning processes: supervised and unsupervised, deterministic and statistical; clustering; single layer and multilayer perceptrons; least-mean-square, back propagation and Al-Alaoui algorithms; radial-basis function networks; committee machines; principal component analysis; self-organizing maps; and current topics of interest.

EPHD 310 Basic Biostatistics 2.2; 3 cr.
An introductory biostatistics course that covers basic concepts in statistical methods. The course demonstrates methods of exploring, organizing and presenting data. The course presents the foundation of statistical inference from estimation, to confidence interval and testing of hypothesis. Applications include comparing population means or proportions via data obtained from paired or independent samples, one-way ANOVA. Also, it introduces simple linear regression, correlations, logistic regression and nonparametric methods for data analysis.

HUMR 305 Cell and Tissue Biology 30.33; 3 cr.
Consists of the first half of Basic Histology, HUMR 209, covering cells and tissues. Open to graduate students outside the department.

HUMR 310 Biomedical Research Techniques 1 cr. (A, B, or C)
A guided laboratory course in research methods used in cell biology and physiology. HUMR 310A covers Cell Biology Techniques; HUMR 310B covers Genomics and Proteomics; HUMR 310C covers Mouse Models and In Vivo Studies. Used in cell biology and physiology.

HUMR 314 Research Seminar 0.32; 1 cr.
Presentation and discussion of timely research topics designated by members of the department.

PHYL 302 Cardiovascular Physiology 31.6; 2 cr.
Presents the cardiovascular system with clear reference to pathophysiological and clinical events. Didactic lectures and seminar sessions define physiological concepts and emphasize structure-function relationships. Laboratory sessions familiarize the student with instrumentation and techniques in the cardiovascular field. Open to all graduate students in the department.

PHYL 346 Human Physiology for Paramedical and Undergraduate Students 48; 4 cr.
Outlines fundamental principles of human physiology and the mechanisms governing the function of different body organs. Prerequisites: BIOC 246 and BIOL 201 (or BIOL 210).

Diploma in Humanitarian and Public Health Innovations

The Diploma in Humanitarian Engineering and Public Health Innovations is a joint FHS/MSFEA interdisciplinary diploma.

The Diploma is open to professionals as well as AUB students currently enrolled in graduate programs from all majors wishing to gain academic knowledge and skills in the field of Humanitarian Engineering and Health Innovations. The program is a multidisciplinary offering that provides graduate students and professionals with the skills required to find innovative design solutions for challenges faced in humanitarian settings by taking into consideration two complementary perspectives, public health perspective and engineering perspective.

Learning Outcomes of the Diploma

Students who complete the diploma will be able to:

1. Apply participatory needs assessment tools and analyze the different dimensions of a public health problem
2. Apply formal design methods to develop practical, feasible, scalable, and sustainable humanitarian engineering and public health innovations and interventions
3. Apply skills required to manage complex projects while working in multidisciplinary teams
4. Demonstrate entrepreneurial skills to take a solution/intervention from prototype to product
5. Articulate and adhere to ethical standards in the process followed and, in the intervention, designed
6. Present and document a problem and its solution to a diverse target audience

Requirements for the Diploma

It is composed of 15 credits of course work, that include:

- HEHI 301, “Foundations of Humanitarian Engineering and Public Health Innovations”

- HEHI 302, “Capstone: Humanitarian Engineering and Public Health Innovations”

- One design course from the following list: AGSC 330, ARCH 344, CHEN 619, CHEN 798A , CIVE 552, CIVE 601, CIVE 628, CIVE 686, EECE 675 , ENMG 663, ENMG 698E, ENSC 633, ENST 300, FSEC 310, FSEC 315, LDEM 633, NFSC 306, PBHL 303, URDS 664, URPL 641

- One ethics course from the following list: MHRM 304 , PSYC 305

- One social entrepreneurship course from the following list: ENMG 654, ENTM 320, MFIN 359

HEHI 301 - “Foundations of Humanitarian Engineering and Public Health Innovations”; 3 crs.
This is a multidisciplinary course that covers fundamentals of designing solutions for health challenges faced by disadvantaged populations. It introduces tools for identifying humanitarian and/or development needs and designing practical, scalable and sustainable solutions and interventions. The course is offered to students from all majors. Students will be exposed to health and health system challenges in addition to design fundamentals including participatory needs assessment, formal multidisciplinary design processes, and relevant technologies and tools with real world applications and case studies.

HEHI 302 - “Capstone: Humanitarian Engineering and Public Health Innovations Capstone”; 3 crs.
The capstone project course is an interdisciplinary service-learning design course focused on development and humanitarian engineering solutions for health challenges. The capstone is divided into two sub-courses, HEHI 302A (1cr.) and HEHI 302B (2cr.), and must be registered in 2 consecutive semesters. In the capstone, students apply all tools learned in HEHI 301. Students work in multidisciplinary teams with disadvantaged communities, under joint supervision of at least two mentors from MSFEA, FHS, and other faculties.
Prerequisite: HEHI 301

If the student has achieved one or more of the core competencies in Ethics or Entrepreneurship through previously passed undergraduate or graduate courses, only one elective course can be waived. The student will have to register at least one course from the approved list of Design courses, and another course from either the list of Ethics courses or the list of Entrepreneurship courses.

If the student has achieved two or all of the core competencies through undergraduate courses, only one course can be waived, and the student will have to register at least one course from the approved list of Design courses, and another course from either the list of Ethics courses or the list of Entrepreneurship courses

Thesis/capstones of graduate students can be counted towards the fulfillment of the diploma.

Students interested to enroll in the diploma are encouraged to inform the coordinators of the program at healthengineering@aub.edu.lb to benefit from adequate advising on study plans and ensure completion of all requirements.
The diploma is planned to include arrangements to encourage on-going graduate students to enroll with no or limited additional credit burdens. It is composed of 15 credits of graduate course work.

Eligibility Criteria

For professionals:

To be eligible for admission to the diploma program, an applicant must hold an undergraduate university degree recognized by AUB with an average of at least 75 or demonstrate “reasonable potential for academic success”.

For AUB students:

To be eligible for admission to the diploma program, an applicant must be in good academic standing. Applications are reviewed by the Steering Committee of the Humanitarian Engineering Initiative, and admissions recommendations are voted on by both MSFEA and FHS Graduate Studies Committee.

Registration Process

Professionals who want to pursue the diploma submit an application to the Office of Admissions.

Current AUB graduate students need to fill out a petition form for completion of diploma.

Artificial Intelligence and Data Science Graduate Professional Diploma – Online

Coordinator:	Elbassuoni, Shady (Computer Science, FAS)
Program Teaching Faculty:	Abu Salem, Fatima (Computer Science, FAS) Alhakim, Abbas (Mathematics, FAS) Assaf, Rida (Computer Science, FAS) Awad, Mariette (Electrical and Computer Engineering, MSFEA) D. Muller, Hans (Philosophy, FAS) El Asmar, Khalil (Health Sciences, FHS) Elbassuoni, Shady (Computer Science, FAS) El Khoury, Sabine (Mathematics, FAS) Makary, Mireille (Business, OSB) Saghir, Mazen (Electrical and Computer Engineering, MSFEA) Taleb, Sirine (Business, OSB)

General Description

The Online Professional Graduate Diploma in Artificial Intelligence & Data Science is the first of its kind in the MENA region, providing you with the skills needed to design and implement AI and Data Science applications. Unlike other online programs, this diploma uncovers AI and Data Science concepts in several contexts while focusing on regionally relevant applications and the integration of ethics as a core component. Students from all backgrounds interested in being part of this exciting field in tech can join this diploma.

The diploma is a joint program offered by the Maroun Semaan Faculty of Engineering and Architecture (MSFEA) and the Faculty of Arts and Sciences (FAS) in collaboration with faculty members from Suliman S. Olayan School of Business (OSB) and the Faculty of Health Sciences (FHS).

Eligibility

The program is intended for fresh graduates and working professionals from all backgrounds interested in joining the fastest growing field in tech and seeking to enhance their knowledge and skills in the fields of AI & Data Science. To be eligible for this program, applicants should have an undergraduate bachelor's degree or its equivalent from AUB or other recognized institutions of higher learning. In addition, students must demonstrate basic proficiency in computer programming, statistics, linear algebra and calculus. Students who do not have this background can take three preparatory credits that do not count towards the degree requirements of the diploma prior to taking the required diploma courses.

These 3 courses are:

- Introduction to Python Programming (1 credit)
- Statistics (1 credit)
- Mathematics of Machine Learning (1 credit)

Student admission recommendations require the approval of the faculty graduate studies committee (FGSC).

Admission Requirements

Applicants should have an undergraduate bachelor's degree or its equivalent from AUB or other recognized institutions of higher learning. Applicants to this diploma may provide evidence for RUSE by submitting a satisfactory and valid score for one of the following tests: AUB-EN, TOEFL, IELTS(Academic), or Duolingo.

Test	Minimum Score	Validity
AUB-EN	32	1 year
TOEFL iBT	80	2 years
IELTS (Academic)	6.5	2 years
Duolingo	120	2 years

Important Note: applicants who have graduated from a university where English is the primary language of instruction may be exempted from demonstrating RUSE (Readiness for University Study in English).

Structure and Program Requirements

The AI & Data Science diploma will require the successful completion of 12 credits (7 courses) as follows:

- 4 mandatory (core) courses
- 3 elective courses, as offered by the program

Course Requirements

Core Courses

Students are required to complete the following 7.5 credits of core courses:

Course	Credits
Data Science	2
Machine Learning	2
Deep Learning	2
AI Ethics	1.5

Elective Courses

Students are required to complete the following 4.5 credits by choosing 3 elective courses:

Course	Credits
Arabic Natural Language Processing	1.5
AI for Health	1.5
Business Analytics	1.5
Data Analytics for Public Policy	1.5

Course Descriptions

Prerequisite Courses

Mathematics of Machine Learning 1 cr.
This is a preparatory course that provides students with the mathematical background needed for data science and machine learning. Students will be introduced to the concepts of linear algebra and calculus used in machine learning and data science.

Introduction to Python Programming 1 cr.
This course is a preparatory course that covers the fundamental constructs of the Python programming language and introduces some useful applications. The course assumes no background or experience with programming and aims to train students to write python code, which is necessary for them to develop AI applications using many currently popular Data Science and Machine Learning libraries.

Statistics 1 cr.
This is a preparatory course that covers the fundamental concepts of probability and statistics central to the methods used in machine learning and data science.

Core Courses

Machine Learning 2 cr.
This course covers the mathematical underpinnings of machine learning and the practical know-how needed to effectively train, test, and deploy machine-learning models to real-world problems.

Data Science 2 cr.
This introductory course explores the output expected of data scientists and equips students with the ability to learn from data to gain predictions and insights. Through real-world examples of wide interest, several facets of the data science pipeline and lifecycle using both the R and Python programming languages will be introduced.

Deep Learning 2 cr.
This course provides an overview of deep learning methods and their related applications. It focuses on applied deep learning and includes lab assignments, practical use cases, as well as a project that explores the applications in deep learning.

AI Ethics 1.5 cr.
This course critically examines the various ethical issues related to AI such as safety and security, privacy, transparency, accountability, bias and fairness, and reviews the technical methods to identify and address these issues.

Elective Courses

Arabic Natural Language Processing 1.5 cr.
This course focuses on Arabic natural language processing (NLP) and covers its foundational concepts such as tokenization, part-of-speech tagging, syntactic parsing, word sense disambiguation, and semantic representations. It also uncovers NLP's applications including information retrieval, machine translation, sentiment and emotion analysis, dialogue systems, and question answering.

AI for Health 1.5 cr.
This course will expose students to AI applications in epidemiology and healthcare provision. Throughout this course students will learn to apply the proper AI technique to data science projects in the context of health and epidemiology. The course will cover AI and its related technologies, such as Machine Learning, Deep Learning, Natural Language Processing, and Computer Vision. In addition, the course will also touch on the ethical considerations of using AI in health, and how to integrate AI into existing health systems. After completing this course, students will be equipped to identify, analyze, and solve data-driven healthcare problems using AI.

Business Analytics 1.5 cr.
This course explores the growing important role of data in business and covers the key concepts of customer analytics with quantitative strategies to answer different business questions. The aim is to demystify the role of data and AI in impacting customer behavior. Students will learn about AI-powered applications that can enhance the customer journey. The course utilizes relevant theory, empirical analysis, and practical examples to develop the key learning points. By the end of this course, students will have the ability to envision how data, AI and Machine Learning can be used to enhance the business. The course utilizes relevant theory, empirical analysis, and practical examples to develop the key learning points.

Data Analytics for Public Policy 1.5 cr.
This course aims to expand on previously acquired principles in machine learning and data science to work through applications that demonstrate social impact and datadriven decision-making in the field of public policy. Using publicly available datasets and a mix of tools covering exploratory analysis, predictive analytics, spatial analytics, and NLP, this course will walk students through real-life, practical examples that demonstrate the effectiveness of those techniques in the public realm.

Project Management Graduate Professional Diploma – Online

Coordinator:	Khoury, Hiam (Civil and Environmental Engineering, MSFEA)
Program Teaching Faculty:	Bdeir, Fadl (Industrial and Engineering Management, MSFEA) Demachkieh, Farah (Civil and Environmental Engineering, MSFEA) Kalash, Mayssa (Electrical and Computer Engineering, MSFEA) Khoury, Hiam (Civil and Environmental Engineering, MSFEA) Kiomjian, David (Civil and Environmental Engineering, MSFEA) Maddah, Bacel (Industrial and Engineering Management, MSFEA) Moukadem, Imad (Industrial and Engineering Management, MSFEA) Srour, Issam (Civil and Environmental Engineering, MSFEA) Saad, Youssef (Industrial Engineering and Management)

General Description

The online Project Management diploma is a program that provides students with a complete understanding of managing complex projects and equips them with the needed skills to organize, plan, and execute projects within a set budget and timelines. The program establishes and/or further advances the know-how in resource management, finance, risk analysis and mitigation, and project delivery approaches.

Eligibility

The program is intended for professionals and individuals interested in and/or involved in project management. To be eligible for this program, applicants should have an undergraduate bachelor's degree or its equivalent from AUB or other recognized institutions of higher learning. Student admission recommendations require the approval of the faculty graduate studies committee (FGSC).

Admission Requirements

Applicants should have an undergraduate bachelor's degree or its equivalent from AUB or other recognized institutions of higher learning. Applicants to this diploma may provide evidence for RUSE by submitting a satisfactory and valid score for one of the following tests: AUB-EN, TOEFL, IELTS(Academic), or Duolingo

Test	Minimum Score	Validity
AUB-EN	32	1 year
TOEFL iBT	80	2 years
IELTS (Academic)	6.5	2 years
Duolingo	120	2 years

Important Note: applicants who have graduated from a university where English is the primary language of instruction may be exempted from demonstrating RUSE. (Readiness for University Study in English).

Structure and Program Requirement

The PM diploma will require the successful completion of 12 credits (6 courses) as follows:

- 1 mandatory (core) course
- 5 elective courses, as offered by the program

Course Requirements

Core Courses

Students are required to complete the following 4 credits of core courses:

Course	Credits
Fundamentals of Project Management	2

Elective Courses

Students are required to complete the following 10 credits of core courses:

Course	Credits
Project Planning Scheduling and Control	**2**

Project Deliverance and Contracts (now: Procurement and Supply Chain in Project Management)	2
Accounting & Finance for Project Managers	2
Project Leadership & Communication	2
Lean Concepts	2
Agile Software Project Management (now: Software Project Management)	2
Disputes Resolution on Projects (now: Conflict Resolution in Project Management)	2
Project Risk Management	2
PMP® Certification Exam Preparation Course	2

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Course Descriptions

Core Courses

Fundamentals of Project Management 2 cr.
This course exposes students to the fundamentals of project management principles and practices. Students will acquire the necessary tools, and techniques to plan, execute, and control projects to deliver successful outcomes. The course will introduce students to project charter development, scope selection, delivery strategies, project planning, cost estimation, project controls, staffing, and quality management. The course exposes students to the principles of agile project management.

Elective Courses

Project Planning Scheduling and Control 2 cr.
Explore technical and managerial challenges of project management and address issues related to project selection techniques, project planning, budgeting, risk analysis, resource management, project monitoring, and termination. Understand how project management decisions are reached, what tradeoffs are made, and how outcomes depend on the underlying situation.

Procurement and Supply Chain in Project Management 2 cr.
Learn to tackle issues related to the various approaches that may be suitable for the delivery of large construction projects. Understand the risks inherent in the undertaking of large projects and comprehend how certain identified risks can be addressed through the proper formation of project contracts.

Accounting & Finance for Project Managers 2 cr.
Acquire the basics of financial accounting, the investment process, and financial markets, and gain a flavor of Financial Engineering applications such as pricing and portfolio structuring of bonds, capital budgeting, cash matching, dynamic investment management,

and firm valuation. This course will prepare you to handle more complex financial instruments with uncertain cash flows, such as stocks, options, and futures.

Project Leadership & Communication 2 cr.
This course will help future and practicing project managers become better team leaders by sharpening their skills and improving their knowledge in key areas of leadership, communication, motivation, expectation setting, and problem-solving. Participants will be equipped with practical knowledge, skills, and tools that empower them to lead teams effectively for different skills.

Lean Concepts 2 cr.
Get introduced to the fundamental Lean principles, practices, and tools and their application to a wide range of organizations and sectors to improve quality, financial performance, and customer satisfaction. Learn about the Toyota Production System that underlay the Lean concepts, the Lean Six Sigma principles to project management, and many process improvement techniques.

Software Project Management 2 cr.
Understand the fundamental principles underlying software management and economics through an overview of traditional software development and management strategies, contrasted with iterative and incremental development techniques covering the full spectrum of agile methods, including Scrum, extreme programming, lean and feature-driven development.

Conflict Resolution in Project Management 2 cr.
Understand construction contract conditions governing claims and disputes, with a focus on claim evolvement and administration, Alternative Dispute Resolution (ADR) methods, and amicable settlement.

Project Risk Management 2 cr.
Engage in an active discovery of risk management principles and develop an awareness of the challenges, the tools, and the process of designing and implementing a risk management program, with application to industry projects.

PMP® Certification Exam Preparation Course 2 cr.
This course exposes students to the Project Management Body of Knowledge in its latest revision (2021) and to the newly introduced Standard for Project Management, both as issued by PMI. It equips students with the requisite knowledge, skills, and competencies to sit for the PMP® Certification Exam. For this purpose, students will also be exposed to a large number of exam preparation questions. The course will fulfill the 35 learning hours required as a pre-requisite for PMP® certification. Students will need to acquire the PMBOK® 2021 edition and extensively practice exam questions prior to sitting for the test.

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UX/UI Graduate Professional Diploma – Online

Coordinator:	Berro, Maher (Architecture and Design, MSFEA)
Program Teaching Faculty:	Al Batlouni, Dana (Dean's Office, MSFEA) Berro, Maher (Architecture and Design, MSFEA) Saber, Romy (Architecture and Design, MSFEA)

General Description

Step into the world of User Experience (UX) and User Interface (UI) design through our comprehensive UX/UI Professional Diploma. This program is built on the solid foundation of 'human centric design' principles, offering skill-focused training that spans from in-depth user research to the crafting of sitemaps and wireframes.

Benefit from an engaging program that combines self-paced online modules with interactive live sessions led by regional industry experts.

Eligibility

This program is intended for:

- A professional working in tech and design agencies.
- A graphic/UI designer or instructional designer looking to enhance their expertise.
- An entrepreneur aiming to transform their concept(s) into concrete prototypes for investor presentations.
- A young professional seeking to gain a new highly in-demand skill.

To be eligible for this program, applicants should have an undergraduate bachelor's degree or its equivalent from AUB or other recognized institutions of higher learning. Student admission recommendations require the approval of the faculty graduate studies committee (FGSC).

Admission Requirements

Applicants should have an undergraduate bachelor's degree or its equivalent from AUB or other recognized institutions of higher learning. Applicants to this diploma may provide

evidence for RUSE (Readiness for University Study in English) by submitting a satisfactory and valid score for one of the following tests: AUB-EN, TOEFL, IELTS(Academic), or Duolingo.

Test	Minimum Score	Validity
AUB-EN	32	1 year
TOEFL iBT	80	2 years
IELTS (Academic)	6.5	2 years
Duolingo	120	2 years

Important Note: applicants who have graduated from a university where English is the primary language of instruction may be exempted from demonstrating RUSE (Readiness for University Study in English).

Structure and Program Requirements

The UX/UI diploma will require the successful completion of 13 credits (7 courses) for non-designers and 12 credits (6 courses) for designers:

Course Requirements

Course	Credits
Prerequisite for Non-designers - Design Principles	1
Design Research for Innovation and Change	2
Interaction Design I - Methodologies and UX Processes	2
Interaction Design II - Web & Mobile User Experience	2
Interaction Design III - Designing Intuitive User Interfaces for Web & Mobile	2
Interaction Design IV - Conducting Usability Testing and Optimization	2
UX Management Strategy and Tactics	2

Course Descriptions

Design Principles 1 cr.
Creating intuitive visual designs, user interfaces (UI), and design elements is essential to emphasize the utility of any product, integrate and evoke users' motions when interacting with or using the product and its interface. This online course aims to prepare beginners and non-designers to have a critical eye while exploring design theories, tools, and practices. This online course aims to prepare beginners and non-designers to develop a critical eye while exploring design theories, tools, and practices. It brings a design-centric approach to products and teaches the principles of designs from the perspective of a non-designer looking to enhance their skills' set and collaborate on interactive projects. The course outlines the main principles of design, demonstrates the stages of designs, teaches the best design practices, and provides insights on how to start understanding design through the lenses of designers.

Design Research for Innovation and Change 2 cr.
The ever-changing nature of today's organizations and the evolving needs of individuals in response to 21st-century complex challenges call for innovative and human-centered problem-solving approaches. This online course is tailored to support aspiring entrepreneurs and professionals interested in exploring innovation practices within organizations. The course is carefully crafted to provide students with human-centered design research methods and creative problem-solving tools. Its primary goal is to enhance participants' capacity to frame stakeholders' needs, identify opportunities for organizational change, and ultimately generate innovative and viable solutions to address these challenges.

Interaction Design I - Methodologies and UX Processes 2 cr.
This course introduces students to the fundamentals of User Experience (UX) design and the processes involved in designing interactive products. It covers the principles, methodologies, and processes of UX design, teaching students to apply human-centered design and design thinking methods to create effective user experiences using empathy at the core. Starting with research, learners engage in heuristic analysis, develop information architecture, generate sitemaps, conduct card-sorting, create personas, map user journeys, draft user cases and scenarios, identify user flows, and delve into wireframing and low-fidelity prototyping.

Interaction Design II - Web & Mobile User Experience 2 cr.
This course empowers students to design user-focused interfaces in a professional format. It covers the core principles and distinctions in designing for web versus designing for mobile. Students learn to identify, focus, and improve interaction design, information architecture, usability, and user journeys. Leveraging an iterative process rooted in human behavior, psychology, mental models, and cognitive science, they acquire the skills to design purposeful and context-aware interfaces.

Interaction Design III - Designing Intuitive User Interfaces for Web & Mobile 2 cr.
In this course, students delve into the essentials and industry standards of user interface design (UI). It emphasizes the pivotal role of UI and provides an overview of its fundamental theories and concepts. The course facilitates the discovery of UI elements and components, along with the main tools and techniques used. Students gain proficiency in methods for analyzing, critiquing, designing, and tailoring user interface solutions for both web and mobile applications as well as heuristic evaluation to reflect and measure business, users, and usability goals.

Interaction Design IV - Conducting Usability Testing and Optimization 2 cr.
This course tackles usability testing and optimization as methods to evaluate and enhance the user experience. With a focus on achieving ease of use, efficiency, effectiveness, and user satisfaction, students learn how to plan, test, and optimize the usability testing for the interface or product at hand. They closely examine all features, interactive components, and visual elements with a representative group of the target audience. They learn the process of determining, analyzing, reporting, and ultimately ensuring an optimal user experience, ensuring that the target users can effortlessly and intuitively engage with the user interfaces.

UX Management Strategy and Tactics 2 cr.
In this course, students learn the intricacies of UX management and the specific strategies essential for effective project management. Beyond design thinking, they explore how UX strategy influences businesses and explore various methodologies within product development, user experience functions, and organizational models. They learn how to use acquired principles and concepts such as visibility, desirability, findability, constraints, mental models, mapping, and feedback, as effective strategies within organizations and/or projects processes.

Entrepreneurship & Innovation Graduate Professional Diploma – Online

Coordinator:	Tabsh, Hisham (Suliman S. Olayan School of Business - Dean's Office)
Program Teaching Faculty:	Batlouni, Dana (Maroun Semaan Faculty of Engineering and Architecture - Dean's Office) Daou, Alain (Suliman S. Olayan School of Business - Dean's Office) Itani, Mona (Suliman S. Olayan School of Business - Dean's Office) Khaouli, Leila (Suliman S. Olayan School of Business - Dean's Office) Makarem, Yasmine (Suliman S. Olayan School of Business - Dean's Office) Salamoun, Randa (Suliman S. Olayan School of Business - Dean's Office) Tabsh, Hisham (Suliman S. Olayan School of Business - Dean's Office) Tannir, Lina (Suliman S. Olayan School of Business - Dean's Office) Zablith, Fouad (Suliman S. Olayan School of Business - Dean's Office)

General Description

The Online Graduate Professional Diploma in Entrepreneurship & Innovation is a joint program between the Suliman S. Olayan School of Business (OSB) and the Maroun Semaan Faculty of Engineering and Architecture (MSFEA) at AUB aiming to:

- Empower aspiring entrepreneurs to succeed in the regional ecosystem by innovating and scaling regionally.

- Equip intrapreneurs with design thinking tools to successfully drive change within their organization.
- Provide startup consultants with the tools and knowledge to become better advisors.
- Introduce all learners with business ideas to potential financing sources.

Eligibility

The course is intended for:

- Fresh graduates & professionals interested in developing an entrepreneurial mindset
- Aspiring Entrepreneurs seeking to bring their business idea to life
- Startup Consultants looking to enhance their knowledge of the ecosystem to become better advisors
- Intrapreneurs who want to innovate and drive change within their organization & are looking to develop their design thinking & leadership skills

Admission Requirements

Applicants should have an undergraduate bachelor's degree or its equivalent from AUB or other recognized institutions of higher learning. Applicants to this diploma may provide evidence for RUSE (Readiness for University Study in English) by submitting a satisfactory and valid score for one of the following tests: AUB-EN, TOEFL, IELTS(Academic), or Duolingo.

Test	Minimum Score	Validity
AUB-EN	32	1 year
TOEFL iBT	80	2 years
IELTS (Academic)	6.5	2 years
Duolingo	120	2 years

Important Note: applicants who have graduated from a university where English is the primary language of instruction may be exempted from demonstrating RUSE (Readiness for University Study in English).

Course Requirements

Course	Credits
Design Research for Innovation and Change	2
Introduction to the Lean Startup	2
Foundations of Entrepreneurial Management	2
Regional Entrepreneurial Ecosystems	2

Strategic Communication for Entrepreneurs	2
Capstone Project	2

Course Descriptions

Design Research for Innovation and Change 2cr.
This course aims to support aspiring entrepreneurs and professionals exploring intra-organizational innovation practices. The course is designed to equip the students with human-centered design research methods and creative problem-solving tools. The objective of this course is to develop the participants' ability to frame stakeholders' needs and ultimately generate innovative and feasible solutions to address these needs.

Introduction to the Lean Startup 2 cr.
The course helps students to understand and experience the mindset of an entrepreneur by providing them with several cases and examples that are both international and regional in addition to exposure to real entrepreneurs through guest speaking and mentorship sessions. In addition to applying the startup methodology and the business planning process, the students will be exposed to the investment cycles of startups and learn briefly about angel investment, venture capital, and valuation. The case studies and examples will feature innovation driven SMEs.

Foundations of Entrepreneurial Management 2 cr.
The Entrepreneurial Management course, developed by OSB and MSFEA is designed to provide students with the management foundations and equip them with tools and frameworks needed by startups. The course takes a 360-degree approach by providing a holistic perspective of the different management functions and innovation principles that will be discussed at a high level. It is divided into six modules being: management and leadership; marketing; finance; human resources management; operations; and strategy. In the course students will learn how to build a financial model and then use this information to value the venture using discounted cash flow techniques. The course is designed as a series of workshops using a case study approach incorporating innovation. It will be coordinated by an instructor but each of the modules will be facilitated by a thematic expert.

Regional Entrepreneurial Ecosystems 2 cr.
In this course, students will better understand the metaphor of the ecosystem as it applies in the entrepreneurial context. They will be exposed to the main components of an ecosystem based on renowned theories and exemplary international cases. They will get to meet several ecosystem players in various countries in the Arab world and get to assess the maturity of each ecosystem and reflect on what could be enhanced.

Strategic Communication for Entrepreneurs 2 cr.
About nine in ten startup ideas fail. One of the reasons behind this failure is attributed to the inability of entrepreneurs to effectively communicate their idea to internal and external stakeholders. Communication is key at the different stages of a startup lifecycle. Whether an entrepreneur is seeking funds to support their business, secure the buy-in of their team to motivate and grow their idea, or negotiate with different stakeholders. This course aims to develop the communication skills of entrepreneurs. More specifically, participants will have the opportunity to understand the fundamentals of effective pitching and storytelling, develop effective data-driven visuals to maximize impact, and explore how to negotiate in different contexts. Participants are expected to explore communication strategies, techniques, and activities that can be applied to their projects and startup ideas.

Capstone Project 2 cr.
After having successfully completed the five proposed courses of the Entrepreneurship and Innovation program that give students a holistic understanding of consumer needs, target audience, and starting their own business, students are required to complete a capstone project. They are expected to integrate the entrepreneurship and innovation knowledge acquired in the core courses to develop their existing startup idea (if they have one) or an idea they develop through this course. At the end of the course, students are expected to pitch their startup idea to a jury consisting of faculty members and field experts.

School of Architecture and Design

Founding Director of the School of Architecture and Design:	Al-Harithy, Howayda
Graduate Programs Coordinator	Fawaz, Mona
Architecture Track Convener:	Yeretzian, Aram
Graphic Design Track Convener:	Gharbieh, Ahmad
Landscape Architecture Track Convener:	Abunnasr, Yaser
Professors:	Al-Harithy, Howayda; Fawaz, Mona; Harb, Mona; Musfy, Leila; Talhouk, Salma; Zurayk, Rami
Associate Professors:	Abunnasr, Yaser; Aramouny, Carla; Ghaibeh, Lina; Gharbieh, Ahmad; Najjar, Karim
Assistant Professors:	Acikgoz, Umit; Al-Akl, Nayla; Dreksler, Beata; Khoury, Yara; Patt, Trevor; Traboulsi, Jana; Yeretzian, Aram
Assistant Professors of Practice	Fayad, Nicolas; Frem, Sandra
Adjunct Professors:	Tabet, Jad; Makhzoumi, Jala
Adjunct Associate Professor:	Trovato, Maria Gabriella
Senior Lecturers:	Abboud, Rania; Abdalhay Alkhayat, Nadine; Al-Kadi, Makram; Alamuddine, Hana; Balaa, Lara; Berro, Maher; Braidy, Michele; Boyadjian, Rafi; Charafeddine, Leen; El-Imam, Hatem; Fayad, Farah; Gemayel, Imad; Genz, Bettina; Hassan, Sinan; Jamal, Sany; Kosermelli, Simone; Mallat, Bernard; Shaiban, Houssam; Yamout, Nadine
Lecturers:	Abi Hanna, Ghita; Bacha, Karim; Bacho, Omar; Badran, Noura; Basbous, Monica; Baz, Joan; Apelian, Khajag; Bou Chedid, Rana; Hanna, George; Hassoun, Nour; Issa, Maha; Bou Nasr, Roland; Khouja, Ahmad; Khoury, Greta; Melhem, Wissam; Moussawer, Karim; Muhsen, Dana; Nader, Halim; Youssef, Shawki; Zahzah, Abdul-Rahman
Senior Instructors:	Badran, Zeina; Fidawi, Maya; Saksouk Sasso, Abir
Instructors:	Al Baalbaky, Ahmad; Fabian, Monika; Faour, Batoul, Farah, Karim; Mezher, Fouad; Kanaan, Mohamad; Kattan, Sarah-Rita; Ohannessian, Shoghag; Saber, Romy; Traboulsi, Tanya
Lab Instructors:	Azzi, Ghinwa; Khalil, Mirella

Graduate Programs

Master of Urban Design (MUD)

Master of Urban Planning and Policy (MUPP)

General Information

The MUPP and MUD programs offer graduate degrees to students interested in acquiring the necessary skills to tackle the challenges of contemporary urbanization while upholding the principles of livability, ecological sustainability and equity. The programs prepare students to be highly qualified, well-rounded professionals who are able to address the multi-faceted issues of today's built environmentswhile; focusing on Lebanon and its region. The two-year curriculum combines theoretical and methodological seminar courses designed to secure a command of the tools of intellectual inquiry with hands-on studio courses articulated around real-life exercises. Through these courses, students learn to analyze urban contexts and formulate interventions in the form of projects and/or policies. At the end of the first semester of enrollment, students select a research-based or professional-based track in concertation with the Programs Coordinator.

The MUPP-MUD graduates work in a wide range of positions within the private, non-profit and, less frequently, public sector. Most occupy leading positions in the region where they have contributed to forwarding innovative and visionary ideas about the practices of planning and design.

Mission Statements

Master of Urban Design

The Master of Urban Design program aims at preparing highly qualified, well-rounded professionals who are able to deal with the multifaceted design challenges in today's urban environments in Lebanon and the region. The program emphasizes mastery of the design tools necessary for the effective practice of urban design. Students are exposed to a multidisciplinary understanding of contemporary urban challenges that trains them to position the design profession amidst other city professions. They learn to integrate design tools with policy strategies and institutional analysis. The Master of Urban Design has adopted the studio-based approach to professional education as the main context of learning. The program accepts university graduates and practitioners from design fields and prepares them to occupy leading professional roles in design and planning firms and in public and non-profit agencies.

Master of Urban Planning and Policy

The Master of Urban Planning and Policy program aims to prepare highly qualified, well-rounded professionals who are able to address the multifaceted issues of urban planning and policymaking in today's urban environments in Lebanon and the region. The program is designed to provide a broad professional education in urban planning. Emphasis is placed on the development of multidisciplinary analytical skills necessary to address

contemporary urbanization as well as mastery of the tools and approaches adopted in the contemporary practice of urban planning and policymaking. The program guides students in defining a specific area of expertise within the wider practice of urban planning and in locating their expertise in relation to other city professions. The program welcomes university graduates with professional degrees and/or degrees in the social sciences and prepares them to occupy leading professional roles in the public, private and non-profit sectors.

Program Structure and Agenda

The two graduate programs span over two years of full-time enrollment. The MUPP program requires students to take a total of 30 credits of which 9 are to be taken in a sub-discipline of specialization where planning and policymaking skills are applied and at least 6 in applied studio format. The MUD track requires students to take a total of 33 credits of which at least 12 are to be taken in applied design studios. The two programs share a common core of 21 credits consisting of three core courses (Research Methods, Planning Theory and Policy, and Urbanism), and one planning/design workshop. In addition, all students enrolled in the MUPP/MUD programs are required to register for the 0-credit "City Debates" seminar at least twice during their university enrollment.

Following their first semester of enrollment, MUPP and MUD students will be admitted, into a research (thesis) or a professional (non-thesis) track. The track selection is made on the basis of the student's interest in developing research or professional skills. Students enrolled in the research track develop a final thesis (6cr), through which they advance the understanding of urban and regional planning and design practices. Students on the professional track take an additional advanced planning and design workshop or urban and landscape studio (6cr.) where they expand their command of professional tools, including the write-up of a professional report.

Common Core MUPP/MUD

Core Courses

URPL 630	Research Methods	3
URPL 631	Introduction to Planning Theory and Policy	3
URPL 633	Urbanism	3
URPL 661	Planning & Design Workshop	6
URPL 660	City Debates Seminar (to be taken twice)	0
URPL 662	Comprehensive Exam in the Field	0
		Total 15

Research Track

URPL 662 Or URDS 603	Thesis	6

Professional Track

URPL 661A Or URDS601A	Advanced Planning and Design Workshop Advanced Landscape and Urban Design Studio	6

MUPP Courses

MUPP students are required to take three courses (9 credits) in a field of applied social science or engineering (such as sociology, economics, public administration, civil or environmental engineering) leading toward a concentration area such as urban policy, community development, transportation, housing or environmental sustainability. Other options may be agreed upon with the MUPP/MUD academic advisor.

	Three courses in area of concentration	9
		Total 9

MUD Courses

MUD students are required to take one additional core course, one design studio and two approved electives (12 credits).

URDS 632	From Urban Design to Landscape Urbanism	3
URDS 601	Landscape and Urban Design Studio	6
One approved elective		3
		Total 12

Program Agenda

The typical course load for the Urban Planning and Policy and Urban Design programs is normally distributed over two years as shown below. Course distribution is subject to approval of the academic advisor.

Urban Planning and Policy

First Year

Fall term		**Credits**
URPL 630	Research Methods	3
URPL 631	Introduction to Planning Theory and Policy	3
		Total 6
Spring term		**Credits**
URPL 632	Urbanism	3
URPL 661	Planning and Design Workshop	6
URPL 660	City Debates Seminar	0
		Total 9

Second Year

Fall term		**Credits**
	One Concentration Area Elective	3
	One Concentration Area Elective	3
URPL 662	Comprehensive Exam in the Field	0
		Total 6
Spring term		**Credits**
URPL 661A	Advanced Planning and Design Workshop (Professional Track) OR	6
URPL 663	Urban Planning Thesis (Research Track)	
	One Concentration Area Elective	3
URPL 660	City Debates Seminar	0
		Total 9

Urban Design

First Year

Fall term		Credits
URPL 631	Introduction to Planning Theory and Policy	3
URDS 601	Landscape and Urban Design Studio	6
		Total 9
Spring term		**Credits**
URDS 632	From Urban Design to Landscape Urbanism	3
URPL 661	Planning and Design Workshop	6
URPL 660	City Debates Seminar	0
		Total 9

Second Year

Fall term		Credits
URPL 630	Research Methods	6
URDS 601A	Advanced Landscape and Urban Design Studio (Professional Track) OR	3
	One Approved Elective (Research Track)	3
URDS 603	Comprehensive Exam in the Field	0
		Total 6 (R) or 9 (P)
Spring term		**Credits**
URPL 632	Urbanism	3
URPL 660	City Debates Seminar	0
	One Approved Elective (Professional Track) OR	3
URDS 604	Urban Design Thesis (Research Track)	6
		Total 9 (P) or 9 (R)

Admission Qualifications

Applicants who meet all the AUB and MSFEA regulations governing admission to graduate study, including acceptable AUB Readiness for University Studies in English (refer to the Readiness for University Studies in English (RUSE) page 38), and who hold the equivalent of an undergraduate degree in architecture, landscape architecture, environmental design, urban or regional planning, engineering, public health, economics, public administration, sociology or other social science degree, may be admitted to the Master of Urban Planning and Policy Program as regular graduate students.

Applicants who meet all the AUB and MSFEA requirements governing admission to graduate study, including acceptable AUB Readiness for University Studies in English (RUSE) (refer to the Readiness for University Studies in English (RUSE) page 38), and who hold the equivalent of a professional Bachelor of Architecture or a Bachelor of Landscape Architecture degree, may be admitted to the Master of Urban Design Program as graduate students.

The school of Architecture and Design may recommend waiving up to nine credits of course work for students who have completed a Bachelor of Architecture degree and are applying for admission to the Master of Urban Planning and Policy or the Master of Urban Design programs.

The school of Architecture and Design may further recommend waiving up to six credits of coursework for students who have completed a Bachelor of Landscape Architecture degree and are applying for admission to the Master of Urban Planning and Policy or the Master of Urban Design programs. The Department of Architecture and Design may also recommend waiving up to six credits of coursework for students who have completed a Bachelor of Engineering degree and are applying for admission to the Master of Urban Planning and Policy program.

Waiving of credits is subject to approval by the program coordinator, chairperson, and the MSFEA Graduate Studies Committee. To apply, the student must have completed the advanced courses with a grade of at least B+ or equivalent.

Course Descriptions

Mandatory Courses

Each of the following courses is required for MUPP/MUD students. Non-majors must secure approval of the program advisor and the instructor concerned to enroll in any of the courses listed below.

URDS 601 Landscape and Urban Design Studio 6 cr.
The aim of this course is to build on students' knowledge and skills for improving the quality of the physical urban environment, and reinforcing the identity of place through design intervention. Students investigate a selected study area in terms of its morphological evolution and unique physical features, alongside a clear reading of the

social, institutional and economic dynamics impacting urban form. Through a critical assessment of development and planning processes, students articulate a set of design guidelines on sector, subsector and block levels. The outcome consists of scale drawings and 3D representations with an explicative written report emphasizing design problematic, methodology, recommendations and implementation framework.

URDS 601A Advanced Landscape and Urban Design Studio 6 cr.
This course is for students on the professional MUD track. The aim of this course is to build on students' knowledge and skills for improving the quality of the physical urban environment, and reinforcing the identity of place through design intervention. Students investigate a selected study area in terms of its morphological evolution and unique physical features, alongside a clear reading of the social, institutional and economic dynamics impacting urban form. Through a critical assessment of development and planning processes, students articulate a set of design guidelines on sector, subsector and block levels. The outcome consists of scale drawings and 3D representations with an explicative written report emphasizing design problematic, methodology, recommendations and implementation framework. Students enrolled in this course are expected to develop individual professional reports at the end of the course in which they describe and develop an individual project with its analysis, diagnosis, and intervention. Pre-requisites: MUD students enrolled in this course must have completed at least 24 credits, including URDS 601 and URPL661.

URDS 603 Comprehensive Exam 0 cr.
This is a 0-credit course. Grading mode: Pass/Fail; Type: Urban Design Comprehensive Exam.

URDS 604 Urban Design Thesis 6 cr.
Supervised research and design is conducted individually by the student leading first to a thesis proposal approved by the Graduate Studies Committee and culminating in a final thesis in urban design. A thesis is expected to test either an approach/tool in the local context or inform a conception/theorization of a particular planning and/or design issue on the basis of a grounded investigation. All theses need to lead to practical recommendations and/or a well-formulated proposal for an intervention that can be qualified as contributions to the field of urban design.

URPL 630 Research Methods 3 cr.
This course trains students to develop the research skills needed for the practice of urban planning and design. It takes them through the process of formulating and elaborating the research required for grounding and guiding the planning of their design thesis proposals. Students learn to identify an issue characterizing a particular urban condition and to problematize this issue vis-à-vis relevant conceptual frameworks. They are introduced to research design and qualitative and quantitative methods of inquiry. Students also learn to analyze the data and articulate substantiated findings on the basis of which urban planning, policy and/or design goals, guidelines and strategies can be formulated.

URPL 631 Introduction to Planning Theory and Policy 3 cr.
This course is designed to introduce students enrolled in the Urban Design or Urban Planning and Policy programs to current debates and practices in the field of urban planning and design in lower income countries. It looks at how, where and by whom interventions in the city are being generated and how the goals of such interventions have evolved over the past decades. The course is conducted in seminar format where students learn to discuss and interpret approaches and test their applicability to the local and regional context of the Middle East. Special value is placed on allowing students to articulate their own positions as future professional urban planners and/ or urban designers.

URPL 632 Urbanism 3 cr.
This is an introductory course to contemporary debates in the field of urban studies within the social sciences and their implications for the practices of architecture, urban design and urban planning. Special emphasis is placed on understanding processes of place making (that is looking at the forces behind the production of space) and the influence of place on its dwellers (that is seeing how places/spaces influence/dictate how people act). Course readings and class discussions will pay particular attention to the relevance of these theoretical debates to the regional geographic context, including numerous case studies about the Middle East. The course is open to graduate students in the MUPP/MUD program as well as to senior undergraduates and graduates interested in urban studies throughout the University.

URPL 660 City Debates Seminar 0 cr.
The yearly seminar titled City Debates addresses various urban issues. In particular, it tackles ongoing planning and design concerns from a multidisciplinary perspective related to Lebanon's post-war development in its regional context. Spring term. Annually.

URPL 661 Planning and Design Workshop 6 cr.
This course seeks to introduce students to the actual practice of urban planning and design. It engages them in a cyclical process of documenting and analyzing a real-life setting; "framing" issues to be addressed (problems and assets) in a multidisciplinary way; and conceptualizing, formulating and developing interventions that work across small and large scales. Students become familiar with local planning tools and learn how to borrow and adapt experiences and approaches developed elsewhere. They also learn how to work in multidisciplinary teams, talk across the various disciplines of design and planning (e.g. landscaping, traffic, land use), and translate and communicate their ideas to stakeholders.

URPL 661A Advanced Planning and Design Workshop 6 cr.
This course is for students on the professional MUPP track. This course seeks to introduce students to the actual practice of urban planning and design. It engages them in a cyclical process of documenting and analyzing a real-life setting; "framing" issues to be addressed (problems and assets) in a multidisciplinary way; and conceptualizing, formulating and developing interventions that work across small and large scales. Students become familiar with local planning tools and learn how to borrow and adapt experiences and approaches developed elsewhere. They also learn how to work in multidisciplinary teams, talk across the various disciplines of design and planning (e.g. landscaping, traffic, land use), and translate and communicate their ideas to stakeholders.

Students enrolled in this course are expected to develop individual reports at the end of the course in which they describe and develop an individual project with its analysis, diagnosis, and intervention.

Pre-requisites: MUPP students enrolled in this course must have completed at least 21 credits, including URPL661.

URPL 662 Comprehensive Exam 0 cr.
This is a 0-credit course. Grading mode: Pass/Fail; Type: Planning Comprehensive Exam.

URPL 663 Planning Thesis 6 cr.
Supervised research conducted individually by the student leading to a thesis proposal approved by the Graduate Studies Committee and culminating in a final thesis in urban planning and policy. A thesis is expected to build on a real case study context, and either test an approach/tool in the local context or inform a conception/theorization of a particular

planning and/or design issue on the basis of grounded investigation. All theses need to lead to practical recommendations and/or a well-formulated proposal for an intervention that can be qualified as contributions to the fields of urban planning and policy.

URDS 632 Urban Design to Landscape Urbanism 3 cr.
This course explores the changing conception of city space examining the shifts in environmental design theory and practice from the 1970s until now. The class covers the foundation of urban design as a traditional discipline while opening up to emerging design ideologies and tactics in response to contemporary urban mutations. The course will appeal to students in architecture, landscape architecture and physical planning who are interested in crossing the boundaries between disciplines and exploring new potentialities in design thinking.

Elective Courses

MUPP/MUD elective courses are open to graduates and senior undergraduates from all AUB departments.

ARCH 032/URDS 634 Contested Urban Heritage/ Reconstructed Cityscapes 3 cr.
The seminar focuses on urban heritage and the politics of its identification, conservation, and representation in relation to processes of nation building and postwar reconstruction in the Arab World. The principal theoretical position recognizes heritage as an intrinsically contested notion. The seminar is interdisciplinary in its approach and aims at understanding urban heritage, not only as a historical product, but as a negotiated entity that is reproduced everyday through the dynamics of city life; social, economic and political. Issues such as collective memory, invented traditions, constructed identities, heritage tourism, cultural consumption and sacred scapes are debated and examined through case studies that include Jerusalem, Beirut, Cairo, Riyadh, and Dubai.

URPL 637/ARCH 036 Illegal Cities 3 cr.
This seminar is designed as an introduction for students enrolled in Architecture, Urban Planning and Policy, and Urban Design to the ongoing debates about the relationship between law and the building process, specifically looking at its actual materialization in illegal/informal settlements. The course is based on a combination of lecture/seminar sessions in which various theorizations of the city/law nexus are explored and on field studies/class discussions in which the applications of these theories are investigated using a local case study.

URPL 641 Introduction to GIS and Spatial Analysis for Planning and Architecture 3 cr.
This course offers an introduction to geographic information systems (GIS) as applied to urban and regional planning, community development and local government. Emphasis is placed on learning GIS technology and spatial analysis techniques through extensive hands-on exercises using real-world data sets, such as the census of population and housing. The course includes a small project on an urban planning problem involving the selection of appropriate methods, the use of primary and secondary data, computer- based modeling and spatial analysis.

URPL 664 Urban Land Use Planning 3 cr.
This course examines the theory and practice of land use planning as it has developed within the wider practice and theorization of planning. The course explores ways in which land use controls have been developed and managed in different institutional and regional

contexts, unraveling the different conceptualizations of planning that support each of them. Special emphasis is placed on the case of Lebanon where the practice of land use planning is explored through a detailed introduction to planning institutions, agencies and regulations.

URPL 665/ARCH 062 Development and Planning Policies 3 cr.
The course examines local and regional development and spatial planning projects and policies. It investigates policy governance and institutional setup of projects, the role of professional expertise, as well as spatial impacts, socio-economic and political impacts on cities and regions. Using case-study analysis, students learn how the built environment's growth and development is being managed across different contexts by a constellation of stakeholders negotiating conflicting interests, often yielding unequally distributed benefits and costs.

URPL 666 Transportation Planning and Policy 3 cr.
The course focuses on transportation policy and planning for transportation facilities and services as well as the interaction between transportation and built, natural and social environments. The course's intent is to provide students with the necessary knowledge for analyzing transportation problems in the field, as well as the policy framework for examining the broader social, economic and environmental implications of alternative transportation planning decisions. The course discusses policy-making and policy instruments, considers alternative institutional arrangements for policy development and implementation, and evaluates the efficacy of different policy interventions. The interaction between technical analysis and policy-making is also addressed.

URPL 668 Heritage Management Policies 3 cr.
The course explores how different threads of professional practice can be engaged in heritage protection, valuation and administration. It examines the different stakeholders and their roles in heritage preservation, ranging from local authorities, antiquities departments, the courts, local businesses, NGOs, regional and international organizations, UNESCO, etc. The course focuses on regulatory framework and tools of urban heritage preservation; economic and social valuation of urban heritage; site management and integrated approaches; as well as the role and agency of different stakeholders and negotiation frameworks.

URDS 664 Ecological Landscape Design and Planning 3 cr.
The course, which is an introduction to the theory and methodology of ecological landscape design and planning, aims to introduce the holistic approach of landscape ecology and its application to the sustainable management of natural and cultural landscapes/ecosystems. The course syllabus is planned to prioritize Mediterranean ecosystems and landscapes and equally to promote interdisciplinary collaboration in research and project management.

Department of Civil and Environmental Engineering

Chairperson:	Mabsout, Mounir
Professors:	Basha, Habib; Hamad, Bilal; Harajli, Muhamad; Mabsout, Mounir; Najjar, Shadi; Sadek, Salah; Srour, Issam
Associate Professors:	Abou Zeid, Maya; Hantouche, Elie; Khoury, Hiam; Salam, Darine
Assistant Professors:	Bilbeisi, Rana; Dabaghi, Mayssa; Yehya, Alissar; Yeretzian, Aram (jointly with ArD)
Part-Time Professor:	Ayoub, George
Adjunct Professors:	Abdul Malak, Mohamed-Asem; Alameddine, Ibrahim; El Fadel, Mutasem; Kaysi, Isam
Senior Lecturer:	Basha, Hisham
Part-Time Senior Lecturer:	Fawwaz, Youssef
Part-Time Lecturers:	Al Naghi, Hani; Demachkieh, Farah; El Meski, Fatima; Elsouri, Amer; Hatem Mousallem, Manal; Malaeb, Lilian; Nader, Halim
Part-Time Instructor:	Abboud, Pamela; Hage Ali, Nadine
Laboratories:	Al Hassanieh, Dima; El Khatib, Helmi; El Zein, Leticia; Zayyat, Ramez

Graduate Programs

Master of Engineering and Master of Science Programs

The Department of Civil and Environmental Engineering (CEE) offers the degree of Master of Engineering (ME) with the following majors and concentrations:

- Major: Civil Engineering (CE) Concentration: Construction Engineering and Management, Geotechnical, Materials, Structural and Transportation

- Major: Environmental and Water Resources Engineering (EWRE) Concentration: Environmental Engineering and Water Resources Engineering

Also offered is a program leading to the degree of Master of Science (MS) in Environmental Science with the following major:

- Major: Environmental Technology (ET)

The master's degree programs equip students with the necessary tools for professional practice and/or the pursuit of higher education.

Doctor of Philosophy Programs

The Department of Civil and Environmental Engineering (CEE) offers the degree of Doctor of Philosophy (PhD) with the following majors and concentrations:

- Major: Civil Engineering (CE) Concentration: Construction Engineering and Management, Geotechnical, Materials and Transportation
- Major: Environmental and Water Resources Engineering (EWRE) Concentration: Environmental and Water Resources

Master of Engineering (ME)

General Information

The Department of Civil and Environmental Engineering offers two graduate programs leading to the ME degree:

- Thesis Program
- Non-Thesis Program

The Thesis Program prepares students through course work and provides them with significant research experience in their selected area of concentration. All graduate students must satisfy either the thesis or the non-thesis program requirements. The program will be indicated on the student's transcript.

Admission Requirements

To be eligible for admission to the graduate program, a student must hold a bachelor's degree in Civil Engineering or a related field. Students with a bachelor's degree in majors other than Civil Engineering must fulfill the prerequisite course requirements as set by the department. Students must also satisfy the requirements of the university and the Maroun Semaan Faculty of Engineering and Architecture for admission to graduate study, as specified in the relevant sections of this catalogue.

Bachelor of Engineering holders from a 5-year equivalent engineering program may obtain a waiver for 9 credits of relevant graduate level courses from their BE degree as long as they maintain a minimum grade of 3.3 (B+) or its equivalent in each of these courses.

Bachelor of Science holders must complete an additional 18 credits of engineering courses

prior to enrollment in the master's program and must achieve a GPA of at least 3.3 (B+) in these courses. No credit toward the graduate degree is given for these courses.

A minimum of one calendar year of residence is required for graduation. The student must also satisfy all relevant Maroun Semaan Faculty of Engineering and Architecture (MSFEA) and AUB requirements.

Major: Civil Engineering (CE)

The objectives of the CE program are to:

1. Convey state-of-the-art knowledge in the specialized field of choice;
2. Develop sophisticated scientific computational and experimental research skills; and
3. Encourage independent and creative thinking.

Thesis Program Requirements

In order to fulfill the graduation requirements in the CE Thesis Program, a student must complete a minimum of 24 credit hours of graduate courses and a thesis (6 credits) based on independent research, equivalent to at least 6 credit hours. The required course work is distributed as follows:

- A minimum of four graduate courses (12 credit hours) in the field of concentration
- A maximum of two graduate courses (6 credit hours) in a relevant CEE field
- A maximum of two graduate courses (6 credit hours) of relevant electives in a related field in engineering or science (Math, Physics, Chemistry, Biology, Geology, Economics)
- Comprehensive Exam (CIVE 799T)
- Thesis (CIVE 799)
- Seminar course (CIVE 600)

The courses that fall in the elective category must be pre-approved by the department. Up to two senior level civil engineering courses (CIVE 600 series), taken at the undergraduate level, can be counted towards the master's degree.

Non-Thesis Program Requirements

In order to fulfill the graduation requirements in the Non-Thesis Program, a student must complete a minimum of 33 credit hours of graduate courses. The required course work is distributed as follows:

- A minimum of five graduate courses (15 credit hours) in the field of concentration
- A maximum of three graduate courses (9 credit hours) in a relevant CEE field
- A maximum of three graduate courses (9 credit hours) of relevant electives in a related field in engineering or science (Math, Physics, Chemistry, Biology, Geology, Economics)
- Comprehensive Exam (CIVE 799T)
- Seminar course (CIVE 600)

The courses that fall in the elective category must be pre-approved by the department. Up to three senior level civil engineering courses (CIVE 600 series), taken at the undergraduate level, can be counted towards the master's degree.

Major: Environmental and Water Resources Engineering (EWRE)

The objectives of the EWRE program are to:

1. Convey state-of-the-art knowledge in the specialized field of choice;
2. Develop sophisticated scientific computational and experimental research skills; and
3. Encourage independent and creative thinking.

Thesis Program Requirements

In order to fulfill the graduation requirements in the EWRE Thesis Program, a student must complete a minimum of 24 credit hours of graduate courses and a thesis (6 credits) based on independent research, equivalent to at least 6 credit hours. The required course work is distributed as follows:

- A minimum of two core graduate courses (6 credit hours) in the area of specialty
- A minimum of two graduate elective courses (6 credit hours) in the area of specialty

- A minimum of two graduate courses (6 credit hours) in the minor area
- A maximum of two graduate elective courses (6 credit hours) in a related field in engineering or science (Math, Physics, Chemistry, Biology, Geology, Economics)
- Comprehensive Exam (CIVE 799T)
- Thesis (CIVE 799)
- Seminar course (CIVE 600)

The courses that fall in the elective category must be pre-approved by the department. Up to two senior level civil engineering courses (CIVE 600 series), taken at the undergraduate level, can be counted towards the master's degree.

Non-Thesis Program Requirements

In order to fulfill the graduation requirements in the Non-Thesis Program, a student must complete a minimum of 33 credit hours of graduate courses. The required course work is distributed as follows:

- A minimum of three core graduate courses (9 credit hours) in the area of specialty
- A minimum of three graduate elective courses (9 credit hours) in the area of specialty
- A minimum of three graduate courses (9 credit hours) in the minor area
- A maximum of two graduate elective courses (6 credit hours) in a related field in engineering or science (Math, Physics, Chemistry, Biology, Geology, Economics)
- Seminar course (CIVE 600)
- Comprehensive Exam (CIVE 799T)

The courses that fall in the elective category must be pre-approved by the department. Up to three senior level civil engineering courses (CIVE 600 series), taken at the undergraduate level, can be counted towards the master's degree.

Specialization: Environmental Engineering

Minor: Water Resources Engineering

- Core Courses: CIVE 550, CIVE 551, CIVE 552, CIVE 553, CIVE 555
- Elective Courses: CIVE 645, CIVE 650, CIVE 651, CIVE 652, CIVE 653, CIVE 654, CIVE

655, CIVE 656, CIVE 657, CIVE 751, CIVE 755

Specialization: Water Resources Engineering

Minor: Environmental Engineering

- Core Courses: CIVE 541, CIVE 542, CIVE 640, CIVE 641, CIVE 642
- Elective Courses: CIVE 644, CIVE 645, CIVE 647, CIVE 648, CIVE 656, CIVE 740

Master of Science (MS)

Major: Environmental Technology (ET)

The Department of Civil and Environmental Engineering offers a graduate program leading to the degree of Master of Science in Environmental Technology (ET). The program is part of the Interfaculty Graduate Environmental Sciences Program (IGESP) and is open to non-engineering students who hold a degree in basic sciences. For more details, on the IGESP program, refer to the Interdisciplinary Research Centers and Programs section of this catalogue.

In order to fulfill the graduation requirements in the MS Program, a student must complete a minimum of 24 credit hours of graduate courses and a thesis equivalent to 6 credit hours, or 27 credit hours of graduate courses and a project course equivalent to 3 credit hours.

The required course work is distributed as outlined below:

- Two courses selected from the following sequences:
  - No more than one course from the ENVH program (3 cr.) ENSC 640/ENHL 310, ENSC 641/ENHL 312, ENSC 642/ENHL 314
  - No more than one course from the ECOM program (3 cr.) ENSC 630/LDEM630, LDEM 301, LDEM 302
  - No more than one course from the ENVP program (3 cr.) ENSC 650/PSPA 316
- A minimum of three graduate core courses (9 cr.) in Environmental Engineering
- A minimum of two graduate elective courses (6 cr.) in Environmental Engineering
- Experimental Design and Statistical Methods course (3 cr.) (CIVE 602)
- Comprehensive Exam (ENSC 695)

- Thesis (ENSC 699) or Project (ENSC 697)
- Seminar course (CIVE 600)

Doctor of Philosophy (PhD)

General Information

The PhD programs offered by the CEE department train graduate students to address and solve current problems in civil and environmental engineering. PhD students are trained to be future educators and proficient researchers geared to assume leadership roles in their profession.

The objectives of the PhD program are to:

- cultivate expertise in concentration areas of Civil and Environmental Engineering,
- develop research skills necessary for the formulation and solution of challenging problems,
- and acquire teaching expertise through assistance in class lectures and laboratory sessions.

Admission Requirements

To be eligible for admission to the PhD program, a candidate must:

- hold a master's degree in Civil and Environmental Engineering or a related discipline from AUB or another recognized institution of higher learning (for admission in the regular track), or a bachelor's degree in Civil Engineering or a related discipline (for admission in the accelerated track). A minimum cumulative course GPA of 3.7, or its equivalent, is required for admission.
- submit a complete application including a statement of interest, transcripts of academic records from all institutions attended after high school, a curriculum vitae and three letters of recommendation,
- provide scores for the General Exam part of the Graduate Record Examination (GRE),
- demonstrate proficiency in the English language if English is not the native language (refer to the catalogue section on Readiness for University Study in English (RUSE),
- and complete an interview either in person or by phone (for non-AUB students).

The application to the doctoral program will follow the deadlines set by the Office of Admissions at AUB. Admission decisions for the PhD program are made upon the

recommendations of the CEE department and the MSFEA Graduate Studies Committee, with the approval of the AUB Board of Graduate Studies.

Regular PhD Program Requirements

The regular PhD program requires a minimum of 24 credit hours of course work beyond the master's degree and 24 credit hours of thesis work. The course work consists of:

- a minimum of 12 credits in the area of concentration, (major courses),
- 6 credits in a related area, (minor courses),
- and 6 credits in an area other than the candidate's field of research, which can be taken inside or outside the department, (elective courses).

Accelerated PhD Program Requirements

The accelerated PhD program requires a minimum of 36 credit hours of course work beyond the bachelor's degree and 42 credit hours of thesis work. The course work consists of:

- a minimum of 21 credits in the area of concentration, (major courses),
- 9 credits in a related area, (minor courses),
- and 6 credits in an area other than the candidate's field of research, which can be taken inside or outside the department, (elective courses).

Candidacy Requirements

Qualifying Exam Part I: Comprehensive Exam

All students admitted to the PhD program must successfully complete a written comprehensive examination administered by the department. The purpose of the comprehensive exam is to ascertain the student's knowledge in his/her field of specialization and related areas. The written exam will cover major topics from within the concentration area and related fields. Normally, a student on the regular track will take the comprehensive exam no later than 18 months after enrollment in the PhD program and after completing a minimum of 15 credits of courses. A student on the accelerated track will usually take the comprehensive exam no later than 24 months after enrollment in the PhD program and after completing a minimum of 30 credits of courses. Students who do not pass the comprehensive exam may, upon the recommendation of the department, take it for a second time the following term. Failing the exam a second time will result in the student's discontinuation from the graduate program. See Qualifying Exam Part I: Comprehensive Exam under General University Academic Information section.

Qualifying Exam Part II: Defense of Thesis Proposal

See Qualifying Exam Part II: PhD Thesis Defense under General University Academic Information section.

Admission to Candidacy

See Admission to Candidacy under General University Academic Information section.

Thesis Requirements

Refer to General University Academic Information section.

Thesis Committee

See PhD Thesis Committee under General University Academic Information section.

Thesis Defense

See PhD Thesis Defense under General University Academic Information section.

PhD Publication Requirements

See PhD Publications Requirements under General University Academic Information section.

Residency Requirements

See Residency Requirements under General University Academic Information section.

Graduation Requirements

To earn a PhD degree in the Department of Civil and Environmental Engineering, a student must fulfill the following graduation requirements:

- Attain a minimum cumulative GPA of 3.7 (A-) in 24 credits (regular program) or 36 credits (accelerated program) of course work taken at the PhD level
- Attain a minimum grade of 3.3 (B+). for courses taken at the PhD level

- Pass the PhD thesis defense
- Satisfy the minimum residency requirements
- Have at least two publications according to one of the following options: (1) in two internationally refereed journals, (2) in two international conferences, or (3) in one internationally refereed journal and one international conference.
- Satisfy all pertinent AUB regulations

Sample Study Program

A typical program of study for a PhD student is shown below.

Year	Semester	Course	Credits	Total	Timeline
1	Fall	Major course	3		
		Major course	3		
		Minor course	3	9	
	Spring	Major course	3		
		Major course	3		
		Minor course	3	18	
	Summer	Thesis	9	27	
2	Fall	Elective Course	3		
		Elective Course	3	33	Comprehen-sive Exam
	Spring	Thesis	9	42	
	Summer	Thesis	6	48	
3	Fall	Thesis	0	48	
	Spring	Thesis	0	48	Proposal Defense
4	Fall	Thesis	0	48	
	Spring	Thesis	0	48	Thesis Defense

PhD in Civil Engineering (CE)

The concentration areas and specialized tracks of the PhD programs in CE are consistent with the fields of expertise and research interests of the faculty members and the existing research and laboratory facilities. The specialty areas are as follows:

Structural and Materials Engineering

- Advanced design and behavior of concrete, steel structures and fiber-reinforced composites
- Strengthening and rehabilitation of structural systems, and structural health monitoring
- Advanced concrete technology including plain, hot-weathered and high-strength concrete
- Petrographic, chemical, and mechanical properties of sands and aggregates
- Seismic evaluation and assessment, and earthquake engineering design
- Numerical modeling and computer-aided structural engineering

Construction Engineering and Management

- Pre-project planning and design management for construction projects
- Construction estimating, planning and scheduling
- Construction technologies, methods, equipment and safety
- Construction project delivery, management and contracts
- Construction contract administration and dispute resolution
- IT and BIM applications in construction
- Construction systems analysis and lean applications
- Sustainability issues related to building design and construction
- Construction business environment and risks

Geotechnical Engineering

- Land reclamation and site improvement
- Geographic Information Systems (GIS) used in decision-making and expert tool applications
- Geo-environmental engineering with reference to waste disposal and site contamination
- Geotechnical earthquake engineering, geo-hazards and risk assessment

- Behavior of soils

Transportation Systems

- Urban transportation planning and modeling (transport and mobility considerations in urban universities, characterization of uncontrolled traffic conditions and walkability in urban areas, travel demand modeling)
- Public transport (operational planning and market arrangement implications in mass transit systems)
- Transportation and the environment (modeling and estimation of traffic induced emissions)
- Road safety (modeling and simulation of aggressive driver behavior)
- Maritime transport (maritime shipping, optimization of container terminal operations)
- Project evaluation (feasibility assessment and project delivery of transport infrastructure projects)

PhD in Environmental and Water Resources Engineering (EWRE)

The PhD program in EWRE focuses on the following courses and research topics:

- Water and wastewater treatment systems
- Solid and industrial waste treatment/management
- Air quality management and air pollution control
- Environmental and water resources management and planning
- Water quality modeling
- GIS and IT applications for environmental and water resources management
- Watershed modeling and management
- Hydrologic systems analysis
- Hydraulic systems analysis

- Environmental biotechnology and bioremediation
- Fate and impact of emerging environmental contaminants
- Biofuels and bioenergy

Course Descriptions

Structural Courses

CIVE 610 Numerical Methods in Structural Analysis 3 cr.
A course that introduces the matrix approach for the modeling and analysis of structural systems; computer modeling/analysis using specialized software (SAP2000); computer implementation and code development; nonlinear analysis of frames. Prerequisites: CIVE 411 and EECE 231.

CIVE 611 Bridges 3 cr.
A course that discusses types of bridges; influence lines; loads and their distribution on bridges; serviceability of bridges; methods of design of bridge deck, superstructure and substructure. Prerequisite: CIVE 311.

CIVE 612 Advanced Steel Design 3 cr.
A course that investigates stability, column strength, beam-columns, composite steel-concrete construction, plate buckling, plate girders, torsion, combined torsion and bending, eccentrically loaded connections, influence of connection stiffness on moment demand and general moment connection. Prerequisite: CIVE 412.

CIVE 613 Prestressed Concrete 3 cr.
A course on material characteristics, prestress losses, working strength design procedures, composite construction, ultimate flexural strength and behavior, shear design and continuous prestressed concrete members. Prerequisite: CIVE 413.

CIVE 614 Special Topics in Concrete 3 cr.
A course that reviews reinforced concrete (R/C) design; torsion in R/C members; wind load on structures; earthquake load and seismic design of structures; design of shear walls; design of corbels, brackets and deep girders; circular and rectangular water tanks; and spherical, conoidal, and ellipsoidal domes. Prerequisite: CIVE 414.

CIVE 615 Strengthening and Rehabilitation of Concrete Structural Systems 3 cr.
A course on assessment of materials and structural deficiency using field test or analytical methods; repair and strengthening materials; strengthening and repair techniques; strengthening of structural members in flexure, shear and axial load; and upgrading of gravity load-designed buildings for earthquake load resistance. Prerequisites: CIVE 311 and CIVE 413.

CIVE 616 Earthquake Engineering 3 cr.
A course that examines the nature of earthquake ground motion, seismic hazard evaluation in engineering practice, response analysis of structures and effect of soil conditions on structural response and behavior under earthquake ground motion and design of

structures under earthquake loading. Prerequisite: CIVE 411.

CIVE 710 The Finite Element Method 3 cr.
A course that introduces basic elements, interpolation and shape functions, variational formulation methods, Galerkin and weighted residual methods, isoparametric elements, numerical integration, error estimation and modeling issues, and finite elements in structural dynamics. Prerequisite: CIVE 610.

CIVE 711 Advanced Mechanics of Solids 3 cr.
A course that covers theories of stress and strain; generalized Hook's law; modes of failure and failure criteria; energy principles and applications; torsion; beams on elastic foundations; introduction to the theory of plates; thin-wall and thick-wall cylinder. Prerequisite: CIVE 411.

CIVE 712 Structural Dynamics 3 cr.
A course on analysis of vibration of single degree, multi-degree and infinite degree of freedom systems; free and forced vibration response; analysis of dynamic response by approximate methods; introduction to earthquake engineering. Prerequisite: CIVE 411.

CIVE 713 Behavior of Reinforced Concrete Members 3 cr.
A course on building codes; limit state design; mechanical characteristics of concrete and steel reinforcement; creep and shrinkage; flexure: moment-curvature and force-deformation relationships; columns: axial force-moment-curvature relationships; shear: mechanisms of shear resistance and truss analogy; bond and anchorage of reinforcement. Prerequisite: CIVE 414.

CIVE 714 Seismic Design of Reinforced Concrete Structures 3 cr.
A course on the seismic behavior and design of reinforced concrete structures; introduction to concepts of seismic design and performance-based earthquake engineering; mechanical behavior of steel reinforcement, concrete and confined concrete under monotonic and cyclic loading; seismic behavior, analysis and design of reinforced concrete elements and systems; design of special structural/shear wall systems; design of special moment resisting frames. Prerequisites: CIVE 411 and CIVE 414.

Construction Engineering and Management Courses

CIVE 520 Construction Contract Administration 3 cr.
The course deals with contract documents, with focus on specifications structure, procedural requirements, specifying methods and the basis for unit rate estimation. It covers the engineer's roles along with contract administration issues. Prerequisite: CIVE 421.

CIVE 522 Building Construction and Estimating 3 cr.
A course that exposes students to different building systems (concrete, masonry, steel, waterproofing, mechanical and electrical, etc.) and how to price them by choosing the best materials and methods. The use of drawings and specifications will also be covered. Prerequisites: CIVE 400 (site work) and CIVE 421.

CIVE 524 Logistics, Technologies and Productivity Concepts 3 cr.
The course covers construction site layout, team organization, information flow and complexities. Focus is on productivity improvement approaches, data gathering for analysis of construction operations, issues related to process innovation and automation.

CIVE 525 Design of Temporary Support Structures 3 cr.
A course that covers design and construction of temporary support structures used in the construction industry, including concrete formwork, scaffolding, caissons, cofferdams and dewatering systems.

CIVE 620 Pre-Project Planning and Feasibility Analysis 3 cr.
A course that covers the studies needed to make a go-ahead decision, including assimilation of client needs, surveys of project area and infrastructure conditions, scope validation, team development, project planning and cost estimation, and financial feasibility. Prerequisite: CIVE 421 or equivalent.

CIVE 621 Design Management for Large Projects 3 cr.
The course covers the characteristics of the design phase, design team selection, and design services agreement formation and negotiation. It focuses on value engineering and management, constructability considerations and project cost management during design.

CIVE 622 Advanced Topics in Construction Management (Blended) 3 cr.
A course that focuses on the construction phase of a project's life cycle. Topics include: site organization structure, construction safety, labor management, materials procurement systems, site information management, scheduling, project controls and sustainability. Prerequisite: CIVE 421 or equivalent.

CIVE 623 Construction Project Management 3 cr.
The course offers an extended overview of project management. It covers integrated planning-estimating-scheduling concept; project time, budget and quality baselines; materials management and subcontracting issues; and integrated project cost-time control. Prerequisite: CIVE 421 or equivalent.

CIVE 624 Building Information Modeling 3 cr.
A course that covers Building Information Model (BIM) use and benefits in design and construction. It addresses collaborative design, clash detection, level of development (LOD), BIM contracts, automated code checking, simulation, BIM and lean applications, and integrated project delivery.

CIVE 625 IT Applications in Construction 3 cr.
A course that covers computing tools impacting the construction industry such as mobile sensing, instrumentation and information systems to support field engineering tasks and computerized systems applications to perform specific functions, such as estimating, scheduling and cost control.

CIVE 626 Lean Construction Methods and Applications (Blended) 3 cr.
A course on lean theory, production control, value stream mapping, process improvement, project definition, lean design, integrated project delivery, advanced lean scheduling, risk assessment, budget under uncertainty and project monitoring. Prerequisite: CIVE 421.

CIVE 627 Construction Systems Analysis and Simulation 3 cr.
A course that covers planning and simulation modeling of construction operations, design of efficient processes, construction productivity and resource use considerations, production system design, construction supply chain management and analysis of construction systems.

CIVE 628 Sustainable Building Design and Construction 3 cr.
A course that covers principles of sustainable design and construction, including life- cycle assessment, economic and environmental impacts, carbon footprint, and green building rating systems such as LEED and BREEAM.

CIVE 629 Construction Business Management 3 cr.
A course that covers the principles of business management of construction companies and projects including financial management, accounting, costs and profits management, cash flows management, evaluation of sources of construction funding and financial decisions analysis. Prerequisite: CIVE 370.

CIVE 720 Construction Technology for Tall Buildings 3 cr.
A course on the latest construction practices and processes for tall buildings from foundation to roof. It covers advanced methods, materials, equipment and systems used for the construction of tall buildings, as well as principles of sustainable construction. Prerequisite: CIVE 422.

CIVE 721 Advanced Scheduling Analysis 3 cr.
A course that provides advanced techniques in construction scheduling. It examines monitoring, updating and controlling the project schedule. It introduces the methods used in performing forensic scheduling analysis. Prerequisite: CIVE 423.

CIVE 722 Project Deliverance and Contracts 3 cr.
The course offers an overview of project delivery organizations, risk considerations and contracts. It covers the elements of construction contracts, with emphasis on contract formation, substantial completion and close-out processes. Prerequisite: CIVE 421 or equivalent.

CIVE 723 Dispute Resolution on Projects 3 cr.
The course covers construction contract conditions governing claims and disputes. Focus is on claim evolvement and administration (including issues dealing with time barring, notification and substantiation) and ADR methods and amicable settlement. Prerequisite: CIVE 421.

CIVE 724 Mediation of Engineering Disputes 3 cr.
This course focuses on the use of mediation for resolving construction related disputes. Topics include: dispute avoidance in construction, alternative dispute resolution techniques, and the mechanics of mediation and negotiation. Prerequisite: CIVE 520.

CIVE 725 Construction Decisions Under Uncertainty 3 cr.
A course that covers construction project and organization decisions for the uncertain future. The course addresses decision theory, competitive bid analysis, probabilistic modeling and simulation, and multiple regression analysis in managing construction. Prerequisite: STAT 230.

Geotechnical Courses

CIVE 631 Applied Foundation Engineering 3 cr.
A course on braced excavations, retaining structures, deep foundations, slope stability and computer applications. Prerequisite: CIVE 431.

CIVE 632 Soil Behavior 3 cr.
A course on soil mineralogy, soil formation and composition; influence of geological factors on properties; colloidal phenomena in soils; soil structure; analysis of conduction phenomena (hydraulic, diffusive, thermal and electrical); compressibility, strength and deformation properties. Prerequisite: CIVE 430.

CIVE 633 Soil and Site Improvement 3 cr.
A course that covers compaction, admixture stabilization, foundation soil treatment, reinforced soil and composite materials, and material sites reclamation. Prerequisite: CIVE 430.

CIVE 634 Shear Strength of Soils 3 cr.
A course that covers stresses within a soil mass, tests to measure stress strain properties, stress-strain relationships, shear strength, drained and undrained conditions, constitutive models, and failure criteria applications. Prerequisite: CIVE 430.

CIVE 635 Earth Dams 3 cr.
A course that examines hydraulic dams, rolled earth dams, homogenous dams, thin core dams, filters, causes of dam failures, see page control and seismic stability of dams Prerequisite: CIVE 430.

CIVE 636 Geotechnical Earthquake Engineering 3 cr.
A course on causative mechanisms and characteristics of earthquakes; evaluation dynamic soil properties local site response; seismic soil-structure interaction; evaluation and mitigation of soil liquefaction; seismic code provisions and additional current topics. Prerequisite: CIVE 430.

Water Resources Courses

CIVE 541 Engineering Hydrology 3 cr.
A course that outlines hydrologic principles, rainfall-runoff analysis, flood routing, frequency analysis and ground water hydrology. Prerequisites: CIVE 340 and MATH 202.

CIVE 542 Urban Hydrology 3 cr.
A course that covers design rainfall, infiltration, overland flow, channel flow, storm sewer hydraulics, stormwater detention and simulation models. Prerequisite: CIVE 440.

CIVE 640 Advanced Hydraulics 3 cr.
A course that covers closed conduit flow, water distribution systems, transient analysis, open channel flow, flood control, culvert hydraulics and design of various hydraulic structures. Prerequisite: CIVE 440.

CIVE 641 Surface Water Hydrology 3 cr.
A course on design storm, rainfall-runoff modeling, flood routing, reservoir routing,

simulation models and stochastic hydrology. Prerequisite: CIVE 541 or equivalent.

CIVE 642 Groundwater Hydrology 3 cr.
A course that deals with properties of groundwater, Darcy's law, steady groundwater flow, unsteady groundwater flow, well hydraulics, unsaturated flow, sea-water intrusion and numerical modeling. Prerequisite: CIVE 541.

CIVE 644 Coastal Engineering 3 cr.
A course on small-amplitude wave theory (linear theory); finite-amplitude wave theory (nonlinear theory); conoidal wave theory; solitary wave theory; wave refraction, diffraction and reflection; wave forces and interaction with man-made structures; and design of maritime structures, e.g., breakwaters. Prerequisite: CIVE 440.

CIVE 645 Surface Water Quality Modeling and Management 3 cr.
An introductory course on surface water quality pollution problems in streams, rivers, lakes, reservoirs and estuaries with a focus on both the quantitative modeling aspects of surface water quality and the management and policy aspects of it. Both mechanistic and empirical models for assessing the status of surface water bodies are introduced.

CIVE 647 Water Resource Systems: Planning and Management 1 cr.
A course that introduces principles demonstrating steps in engineering policy planning as it applies to water resources management. Emphasis will be placed on systems and socio-economic analysis, conflict management and concepts in strategic assessment.

CIVE 648 Climate Change and Water Resources 3 cr.
An introductory course on global climate change and its potential impacts on water resources and related sectors. It explores drivers of climate change, greenhouse gases emissions and mitigation efforts, and adaptation options with emphasis on Integrated Water Resources Management.
CIVE 740 Transport Phenomena in Surface and Subsurface Waters 3 cr.
A course on advection, diffusion and dispersion of pollutants; transport in rivers and estuaries; transport in groundwater; numerical modeling; design of wastewater discharge system.

Environmental Courses

CIVE 550 Water Treatment and Laboratory 3 cr.
A course that examines the quality and principles of municipal and industrial water treatment processes and methods of testing for physical, chemical and biological parameters. Prerequisite: CIVE 251 and CIVE 251L or CHEM 202 and CHEM 203 or equivalent, or consent of instructor.

CIVE 551 Wastewater Treatment and Laboratory 3 cr.
A course that examines the quality and principles of municipal wastewater treatment processes and methods of testing for physical, chemical and biological parameters. Prerequisite: CIVE 252 or BIOL 209, or BIOL 210 or equivalent, or consent of instructor.

CIVE 552 Waste Management and Treatment 3 cr.
A course on engineering principles, practices and techniques for the management of solid wastes: sources, composition, properties, impacts, generation, storage, collection and transport, processing, resource recovery and disposal.

CIVE 553 Environmental Biotechnology 3 cr.
A course that examines current and emerging environmental biotechnologies used for environmental quality evaluation, monitoring and remediation of contaminated environments, and provides students with working knowledge of the science that underpins them: CIVE 252 or BIOL 209, or BIOL 210 or equivalent, or consent of instructor.

CIVE 555 Air Quality Management 3 cr.
A course on the principles, practices and techniques for the management of air pollution: Types, sources, properties, impacts, standards, control technologies, atmospheric dispersion, emissions and indoor air quality.

CIVE 650 Water and Sewage Works Design 3 cr.
A course that examines the design of water and wastewater schemes, including design reports and a literature search on the development of conventional treatment processes. Prerequisite: CIVE 550 or CIVE 551, or consent of instructor.

CIVE 651 Processes in Water and Wastewater Treatment 3 cr.
A course on sedimentation, filterability, permeability and fluidization, ion exchange, aeration, flotation, membrane filtration and aerobic digestion. Experimental applications of processes. Prerequisites: CIVE 251 and CIVE 252, or equivalents; or consent of instructor.

CIVE 652 Landfill Engineering Design 3 cr.
A course on solid waste disposal with emphasis on design development of landfill elements, site selection and characterization, gas extraction and management, leachate collection and management, liners, covers, closure and post-closure monitoring. Prerequisite: CIVE 552.

CIVE 653 Environmental Chemistry and Microbiology 3 cr.
A course that deals with organic, inorganic and physical chemistry; chemical equilibrium; reaction kinetics; acidity, alkalinity; composition, morphology and classification of micro-organisms; energy, metabolism and synthesis; growth, decay and kinetics; and biological water quality indicators. Prerequisites: CIVE 251 and CIVE 252, or equivalents; or consent of instructor.

CIVE 654 Environmental Bioremediation 3 cr.
A course that discusses the application of biological treatment for the remediation of contaminated environments and highlights current engineering methods/design used to enhance biodegradation.

CIVE 655 Air Pollution and Control 3 cr.
A course that examines processes and design equipment for the control of particulates and gaseous emissions. Prerequisite: Consent of instructor.

CIVE 656 Environmental Impact Assessment 3 cr.
A course on procedures of assessing/preparing/reviewing/presenting environmental impacts of developmental projects/facilities: industrial facilities, waste management/ disposal, wastewater treatment, transportation, dams and reservoirs, irrigation/ drainage schemes, coastal zone developments, natural resource management, etc. Prerequisite: E4 status or consent of instructor.

CIVE 657 Methods of Environmental Sampling and Analysis 3 cr.
A course on sampling techniques and instrumental methods in environmental sciences; determination of pollutants in water, air and soil; analytical techniques; adaptation of procedures to specific matrices; case studies. Prerequisites: CIVE 251 and CIVE 252, or equivalents; or consent of instructor.

CIVE 658 Industrial Waste Management 3 cr.
A course on engineering principles, practices and techniques for the management of industrial hazardous wastes: sources, generation and properties. Impacts and auditing of industrial facilities. Basic treatment processes and disposal methods. Site remediation. Prerequisite: E4 status or consent of instructor.

CIVE 659 Environmental and Water Conflict Management 3 cr.
A course on the development of case studies in environmental and water conflict management taught under a framework of role-play of opponents' perspective and decision-making thereof.

CIVE 751 Wastewater Reclamation and Reuse 3 cr.
A course that examines environmental issues in water reuse, risk assessment, water reclamation technologies, storage of reclaimed water, usage of reclaimed water, and planning of wastewater reclamation and reuse. Prerequisite: CIVE 551.

CIVE 755 Air Pollution Modeling 3 cr.
A course that deals with mathematical models, air pollution meteorology, plume rise, dispersion and atmospheric chemistry, meteorological models, as well as Gaussian, statistical and other special application models. Prerequisite: CIVE 555 or consent of instructor.

Transportation Courses

CIVE 661 Urban Transportation Planning I 3 cr.
An introductory course on methods and models used in transportation planning with emphasis on the urban context. Topics include travel patterns in urban areas, data requirements for planning and data collection techniques, transportation/land-use interaction, travel demand and network models, transport supply options and evaluation techniques. Prerequisite: CIVE 461.

CIVE 662 Traffic Engineering 3 cr.
A course that outlines traffic engineering studies, traffic control of signalized and unsignalized intersections, signal control hardware and maintenance, arterial performance and operations, and network optimization. Prerequisite: CIVE 460.

CIVE 663 Transportation Systems Analysis 3 cr.
A course that introduces methods, models and applications of transportation systems analysis focusing on both supply/performance and demand/economics. Prerequisite: CIVE 460.

CIVE 664 Design and Management of Transport Operations 3 cr.
A course on probabilistic and optimization methods for designing efficient operations in freight carrier, airline, transit and traffic modes. Topics include crew and vehicle scheduling in freight, airline, transit modes; vehicle routing and facility location problems in carrier systems; runway and air traffic operations; and reliability in transit services. Prerequisites: CIVE 460 and STAT 230, or equivalents.

CIVE 665 Transportation Economics 3 cr.
A course that investigates the application of economic principles to the evaluation of projects and policies in the transport sector such as transport project benefits, costs and financing, and pricing in the transport sector. Prerequisite: CIVE 461.

CIVE 666 Public Transportation 3 cr.
A course on public transportation modes and services; single route, network and strategic planning; tasks involved in system operations; management of public transportation organizations; privatization issues. Prerequisite: CIVE 460 or CIVE 461.

CIVE 761 Urban Transportation Planning II 3 cr.
A course that examines advanced topics in urban transportation planning, transportation systems management techniques, travel demand analysis and discrete choice modeling of travel demand. Prerequisite: CIVE 661.

CIVE 762 Traffic Flow Theory 3 cr.
A course on characteristics of traffic flow, density and speed; models describing traffic flows; hydrodynamic analogue; and computer simulation models. Prerequisite: CIVE 460.

Materials Courses

CIVE 670 Concrete Technology 3 cr.
A course that examines Portland cements; aggregates; pozzolans; proportioning normal concrete mixtures; pumping concrete; consolidating, finishing and curing concrete; durability; testing hardened concrete; high-strength concrete; light and heavy weight concretes; and hot and cold weather concreting.

CIVE 671 Pavement Engineering 3 cr.
A course that examines highway and airport pavement design, flexible and rigid pavement types and wheel loads, stresses in flexible and rigid pavements, pavement behavior under moving loads and soil stabilization. The course covers empirical, mechanistic-empirical and mechanistic design methodologies. Prerequisite: CIVE 461.

CIVE 672 Highway Materials and Construction 3 cr.
A course that covers various materials constituents in highway pavement structures with emphasis on asphalt concrete, aggregate-soil mixtures, geotextiles and bituminous liquids. Materials properties, design, quality control and methods of construction will be described. Prerequisite: STAT 230.

CIVE 673 Pavement Management Systems 3 cr.
A course that covers the principles of pavement management including types of pavement systems, common distresses and their assessment, pavement evaluation and rating systems, in addition to performance prediction and life cycle analysis. Various field assessment methods in addition to non-destructive and accelerated tests will be discussed and demonstrated. Maintenance and rehabilitation techniques will be compared with emphasis on selection of the most efficient, environment- friendly and cost-effective approaches. Students will utilize computer applications using GIS, regional and international inventory data and relevant software packages. Pre or corequisite: CIVE 671 or CIVE 672.

CIVE 770 Viscoelastic Behavior of Construction Materials 3 cr.
A course that covers viscoelastic behavior of construction materials, particularly asphalt concrete and polymer composites. The course deals with basic concepts in material characterization, rheology, time-temperature superposition principles, and linear and

nonlinear viscoelastic models.

Multidisciplinary Courses

CIVE 601 GIS and Geospatial Data Modeling 3 cr.
A course that examines the concepts and principles of Geographic Information Systems (GIS). It provides coverage of state-of-the-art GIS methods and tools: spatial and terrain analysis, geostatistical analysis, time series analysis and development of GIS integrated models.

CIVE 602 Experimental Design and Statistical Methods 3 cr.
A course that covers the main steps required to efficiently plan, conduct, analyze and interpret results from experimental and observational studies. The course focuses on statistical inference and modeling. Topics covered include ANOVA, t-tests, regression models and non-parametric tests. The course involves working within a statistical modeling environment.

CIVE 603 Numerical Modeling 3 cr.
A course that deals with ordinary differential equations: initial-, boundary- and characteristic-value problems; partial differential equations: steady state, time dependent and oscillatory problems; techniques: Runge-Kutta, shooting, iterative and finite difference methods. Prerequisite: MATH 251.

CIVE 681 Evaluation of Cost Alternatives 3 cr.
A course that covers the basic principles of economic evaluations using fundamental concepts of time value of money to compare cost alternatives related to construction, design and real property development.

CIVE 682 Infrastructure Systems Management 3 cr.
A course on modeling and optimization methods and their application to inspection, performance prediction and maintenance decision-making for the management of infrastructure systems.

CIVE 683 Reliability Based Design of Civil Systems 3 cr.
A course that covers applications of reliability theory in assessing the safety and reliability of civil systems in the presence of uncertainty; decision-making and risk analysis; definition of the probability of failure; modeling uncertainty in resistance and load; load and resistance factor design (LRFD) in structural and geotechnical engineering; basics of design code calibration.

CIVE 684 Environmental Geotechnics 3 cr.
A course on geotechnical practice in environmental protection and restoration; influence of physical and chemical processes in soils on the evaluation of contaminant distribution; design of waste containment systems, slurry walls and soil stabilization; the applicability and use of geosynthetics; and technologies for site restoration and cleanup. Prerequisite: CIVE 430.

CIVE 685 Environmentally Sustainable Renewable Energy Sources 3 cr.
A course that covers basic principles, potentials and limitations of various renewable energy sources and technologies, including solar energy, hydroelectricity, wind energy, bio-

energy, fuel cells, batteries and supercapacitors. Sustainability and impact of renewable energy sources on the environment will be discussed. Prerequisite: CIVE 251 or CHEM 202.

CIVE 686 Environmentally Responsive Buildings 3 cr.
A course that enhances knowledge about the past present and future conditions of the built environment. The course starts with a general overview of global / regional environmental, social and economic issues. Then, focusing on the built environment, students are introduced to climate responsive and environmentally friendly concepts in planning and design. The impact of using construction materials and their environmental impact throughout the building's lifecycle will also be discussed. Students will gain critical knowledge through interactive lectures, case study analysis and the proposal of concepts relating to a particular theme. Upon completing the course, students will be equipped with the necessary knowledge that will enable them to make informed project related design decisions in their careers.

CIVE 688 Engineering Sustainability 3 cr.
Sustainability is the grand challenge of our time especially with the UN SDG (Sustainable Development Goals) 2030 Agenda. This course addresses the basics of sustainability and its practical application in engineering to confront the main challenges of our planet, including climate change, resource depletion, social justice, environmental and health protection. The goal of the course is to introduce students to systems thinking and sustainable design principles with a focus on the effect of human activities and engineering projects on natural systems and societies. The course teaches students to use the four pillars of sustainability (human, economic, social, environmental) as a holistic approach for engineering practices. It also provides the necessary scientific tools for sustainability assessment of products and systems. Students will be also introduced to the current challenges, active debates, and unresolved research questions in sustainability.

Special Courses

CIVE 600 Seminar in Civil and Environmental Engineering 0 cr.
A seminar that consists of current research or applied civil and environmental engineering projects presented by faculty members, graduate students, or invited speakers.

CIVE 690 Special Projects 3 cr.
Special Projects

CIVE 691 Special Topics in Civil and Environmental Engineering 3 cr.
Special Topics in Civil and Environmental Engineering

CIVE 692 Advanced Topics in Civil and Environmental Engineering 3 cr.
Advanced Topics in Civil and Environmental Engineering

CIVE 799 ME/MS Thesis 6 cr.
ME/MS Thesis

CIVE 980 Qualifying Exam I: Comprehensive Exam 0 cr.
Qualifying Exam I: Comprehensive Exam

CIVE 981 Qualifying Exam II: Thesis Proposal Defense 0 cr.
Qualifying Exam II: Thesis Proposal Defense

CIVE 982 PhD Thesis 3 cr.
PhD Thesis

CIVE 983 PhD Thesis 6 cr.
PhD Thesis

CIVE 984 PhD Thesis 9 cr.
PhD Thesis

CIVE 985 PhD Thesis 12 cr.
PhD Thesis

CIVE 986 PhD Thesis 0 cr.
PhD Thesis

CIVE 987 PhD Thesis Defense 0 cr.
PhD Thesis Defense

Baha and Walid Bassatne Department of Chemical Engineering and Advanced Energy

Chairperson:	Ahmad, Mohammad
Professor:	Ahmad, Mohammad
Associate Professors:	Al-Hindi, Mahmoud; Azizi, Fouad; Saad, Walid; Zeaiter, Joseph
Assistant Professors:	Ghorayeb, Kassem; Maalouf, Elsa
Instructor:	Itani, Adnan
Assistant Instructor:	El Berjawi, Mohammad

General Information

The Baha and Walid Bassatne Department of Chemical Engineering and Advanced Energy offers the degrees of Master of Engineering in Chemical Engineering (Thesis/Non-Thesis) and Master of Science in Chemical Engineering (Thesis/Non-Thesis).

Master of Engineering (ME), Major: Chemical Engineering

The Baha and Walid Bassatne Department of Chemical Engineering and Advanced Energy fosters a community of scholars among its faculty members and graduate students, who have an interest in advancing knowledge and contributing to the profession.

The ME Thesis program will be open to students with a Bachelor of Engineering (BE) in Chemical Engineering or other related disciplines.

The student must complete a minimum of 21 credit hours of courses and a 9 credit-hour thesis (30 credit hours in total) on a full- or part-time basis. A minimum of one calendar year of residence is required for graduation from this program.

Students who have a Bachelor of Engineering in a degree other than chemical engineering will be accepted as ME in chemical engineering and should take CHEN 417 and CHEN 470.

The required 30 credit hours of courses and thesis are distributed as follows:

- 3 credits of applied mathematics
- 6 credits of chemical engineering core required courses
- 6 credits of chemical engineering electives
- 6 credits of non-chemical engineering electives
- 9 credits of thesis work
- 0 credit of Seminar (when offered)
- 0 credit of Thesis Proposal (CHEN 799T/TR)

ME Non-Thesis Program Requirements

The ME Non-Thesis program will be open to students with a Bachelor of Engineering (BE) in Chemical Engineering or other related disciplines.

The student must complete a minimum of 33 credit hours of courses on a full- or part-time basis. A minimum of one calendar year of residence is required for graduation from this program.

Students who have a Bachelor of Engineering in a degree other than chemical engineering will be accepted as ME in chemical engineering and should take CHEN 417 and CHEN 470.

The required 33 credit hours of courses and thesis are distributed as follows:

- 3 credits of applied mathematics
- 6 credits of chemical engineering core required courses
- 12 credits of chemical engineering electives
- 9 credits of non-chemical engineering electives
- 3 credits of Special Topics/ Project
- 0 credit of Seminar when offered

The courses of each category are detailed below:

Applied Mathematics Course

The math course or math-oriented course offered by other departments must be approved by the graduate advisor. Additional math courses may be counted as non-chemical engineering electives. Acceptable courses include but are not limited to:

CIVE 710	The Finite Element Method	3 cr.
MATH 350/ CMPS 350	Discrete Models for Differential Equations	3 cr.
MATH 351/ CMPS 351	Optimization and Nonlinear Problems	3 cr.
CMPS 354	The Finite Element Method	3 cr.
ENMG 604	Deterministic Optimization Models	3 cr.
MECH 630	Finite Element Methods in Mechanical Engineering	3 cr.
MECH 663	Computational Fluid Dynamics	3 cr.

Core Required Courses

CHEN 611	Transport Phenomena	3 cr.
CHEN 617	Chemical Reactor Analysis and Design	3 cr.

Special Courses and Thesis

A student should register for the Thesis Proposal (CHEN 799T) and pass it before being allowed to register for his/her thesis. If a student fails CHEN 799T, s/he must register for CHEN 799TR and take the exam during the next term (excluding summer). Once completed, the student can register for CHEN 799, then CHEN 799 (A-E) in subsequent terms until the completion of his/her independent research.

With the exception of CHEN 797, students are not allowed to take any of the listed special courses and Thesis more than once. The Seminar course is compulsory and students should register it every term (excluding summer).

Students must register for the following to complete their thesis requirements:

CHEN 799T/799TR	Thesis Proposal	0 cr.
CHEN 799	Thesis	9 cr.
CHEN 799A/B/C	Thesis	(9cr., 0 billing) 9 cr.
CHEN 799D/E	Thesis	(9 cr., 1 billing)
CHEN 797	Seminar	0 cr.

Chemical Engineering Elective Courses:

Students can choose courses from the following list:

Please note that students can only credit 600-level (or above) courses in the department.

CHEN 610	Materials Design and Characterization	3 cr.
CHEN 612	Desalination	3 cr.
CHEN 613	Membrane Separation Processes	3 cr.
CHEN 614	Environmental Engineering Separation Processes	3 cr.
CHEN 615	Advanced Mass Transfer Processes	3 cr.
CHEN 618	Colloid and Interface Science	3 cr.
CHEN 619	Sustainability Science: Human and Environment Interaction	3 cr.
CHEN 620	Reaction Engineering and Reactor Design II	3 cr.
CHEN 630	Sustainable Biorefinery Processes	3 cr.
CHEN 651	Advanced Process Control	3 cr.
CHEN 670	Advanced Process Flow-sheeting	3 cr.
CHEN 672	Polymer Science	3 cr.
CHEN 673	Engineering of Drug Delivery Systems	3 cr.
CHEN 674	Process Operations and Diagnosis	3 cr.
CHEN 675	Tissue Engineering	3 cr.
CHEN 690	Reservoir Engineering	3 cr.
CHEN 696	Reservoir Modeling	3 cr.
CHEN 779	Special Projects	3 cr.
CHEN 796	Engineering Literature Critique	1 cr.
CHEN 798	Special Topics in Chemical Engineering I	3 cr.
CHEN 798A	Waste Minimization in the Process Industry	3 cr.
CHEN 798B	Special Topics in Chemical Engineering II	3 cr.

Non-Chemical Engineering Elective Courses:

Students can choose courses from the following list:

Please note that students can only credit 600-level (or above) courses in the Maroun Semaan Faculty of Engineering and Architecture (or at an equivalent level in other faculties).

BMEN 600	Biomedical Engineering Applications	3 cr.
BMEN 601	Computational Modeling of Physiological Systems	3 cr.
BMEN 605	Biomedical Imaging	3 cr.
BMEN 606	Nano Biosensors	3 cr.
CIVE 602	Experimental Design and Statistical Methods	3 cr.
CIVE 651	Processes in Water and Wastewater Treatment	3 cr.

CIVE 652	Landfill Engineering Design	3 cr.
CIVE 654	Environmental Bioremediation	3 cr.
CIVE 655	Air Pollution and Control	3 cr.
CIVE 656	Environmental Impact Assessment	3 cr.
CIVE 658	Industrial Waste Management	3 cr.
CIVE 710	The Finite Element Method	3 cr.
CIVE 740	Transport Phenomena in Surface and Subsurface Waters	3 cr.
CIVE 755	Air Pollution Modeling	3 cr.
CMPS 350	Discrete Models for Differential Equations	3 cr.
CMPS 351	Optimization and Non-Linear Problems	3 cr.
CMPS 354	The Finite Element Method	3 cr.
EECE 601	Biomedical Engineering I	3 cr.
EECE 602	Biomedical Engineering II	3 cr.
EECE 663/ MECH 656	System Identification	3 cr.
EECE 671	Environmental Aspects of Energy Systems	3 cr.
EECE 672	Energy Planning and Policy	3 cr.
EECE 675	PV and Wind Electric Energy Systems	3 cr.
ENMG 601	Management Theory	3 cr.
ENMG 602	Introduction to Financial Engineering	3 cr.
ENMG 603	Probability and Decision Analysis	3 cr.
ENMG 604	Deterministic Optimization Models	3 cr.
ENMG 611	Supply Chain Design and Management	3 cr.
ENMG 612	Advanced Supply Chain Design and Management	3 cr.
ENMG 616	Advanced Optimization Techniques	3 cr.
ENMG 622	Simulation Modeling and Analysis	3 cr.
ENMG 623	Stochastic Models and Applications	3 cr.
ENMG 633	Advanced Topics in Project Management	3 cr.
ENMG 654	Technology-Based Entrepreneurship	3 cr.
ENGM 659	Introduction to System Dynamics	3 cr.
ENMG 663	Product Design and Development	3 cr.
MATH 350	Discrete Models for Differential Equations	3 cr.
MATH 351	Optimization and Non-Linear Problems	3 cr.
MECH 603	Solar Energy	3 cr.
MECH 606	Aerosol Dynamics	3 cr.
MECH 607	Micro-Flows Fundamentals and Applications	3 cr.

MECH 609	Experimental Methods in Fluid Dynamics	3 cr.
MECH 627	Polymers and Their Properties	3 cr.
MECH 630	Finite Element Methods in Mechanical Engineering	3 cr.
MECH 634	Biomaterial and Medical Devices	3 cr.
MECH 663	Computational Fluid Dynamics	3 cr.
MECH 672	Modeling Energy Systems	3 cr.
MECH 674	Energy Economics and Policy	3 cr.
MECH 678	Solar Electricity	3 cr.
MECH 701	Principles of Combustion	3 cr.
MECH 747	Nonlinear Finite Element Analysis	3 cr.
MECH 751	Simulation of Multiphase Flows	3 cr.
MECH 760	Advanced Fluid Mechanics	3 cr.
MECH 761	Convection Heat Transfer	3 cr.
MECH 764	Advanced Topics in Computational Fluid Dynamics	3 cr.
MECH 765	Advanced Finite Volume Techniques	3 cr.
MECH 766	Turbulent Flow and Transport	3 cr.
MECH 767	Heat Conduction	3 cr.
MECH 768	Transport Through Porous Media	3 cr.
MECH 773	Numerical Methods in Energy Technology	3 cr.
MECH 798A	Fundamentals of Energy and Resource Recovery	3 cr.

Master of Science (MS),

Major: Chemical Engineering

The Baha and Walid Bassatne Department of Chemical Engineering and Advanced Energy fosters a community of scholars among its faculty members and graduate students, who have an interest in advancing knowledge and contributing to the profession.

The MS Thesis program is open to students with a Bachelor of Science (BS) in Chemical Engineering or other related disciplines. Additionally, it is also open to students with a Bachelor of Science degree in chemistry, biology, mathematics or physics.

The student must complete a minimum of 37 credit hours of courses and 9 credit hours of thesis work (46 credits in total) on a full- or part-time basis. A minimum of two calendar years of residence is required for graduation from this program.

The minimum required 46 credit hours of courses and thesis are distributed as follows:

- 3 credits of applied mathematics

- 12 credits of core required courses
- 13 credits of chemical engineering electives
- 9 credits of non-chemical engineering electives
- 9 credits of thesis work
- 0 credit of Seminar (when offered)
- 0 credit of Thesis Proposal (CHEN 799T/TR)

MS Non-Thesis Program Requirements:

The MS Non-Thesis program is open to students with a Bachelor of Science (BS) in Chemical Engineering or other related disciplines. Additionally, it is also open to students with a Bachelor of Science degree in chemistry, biology, mathematics or physics.

The student must complete a minimum of 46 credit hours of courses on a full- or part- time basis. A minimum of two calendar years of residence is required for graduation from this program.

The minimum required 46 credit hours of courses and thesis are distributed as follows:

- 3 credits of applied mathematics
- 12 credits of core required courses
- 16 credits of chemical engineering electives
- 12 credits of non-chemical engineering electives
- 3 credits of Special Topics/project
- 0 credit of Seminar when offered

The courses that fall in each category are detailed below:

Applied Mathematics Course:

The math course or math-oriented course offered by other departments must be approved by the graduate student advisor. Additional math courses may be counted as non-chemical engineering electives. Acceptable courses include but are not limited to:

CIVE 710	The Finite Element Method	3 cr.
MATH 350/ CMPS 350	Discrete Models for Differential Equations	3 cr.
MATH 351/ CMPS 351	Optimization and Nonlinear Problems	3 cr.
CMPS 354	The Finite Element Method	3 cr.
ENMG 604	Deterministic Optimization Models	3 cr.
MECH 630	Finite Element Methods in Mechanical Engineering	3 cr.
MECH 663	Computational Fluid Dynamics	3 cr.

Core Required Courses:

CHEN 570	Process Synthesis and Optimization	3 cr.
CHEN 571	Chemical Product Design	3 cr.
CHEN 611	Transport Phenomena	3 cr.
CHEN 617	Chemical Reactor Analysis and Design	3 cr.

Special Courses and Thesis:

A student should register for the Thesis Proposal (CHEN 799T) and pass it before being allowed to register for his/her thesis. If a student fails CHEN 799T, s/he must register for CHEN 799TR and take the exam during the next term (excluding summer). Once completed, the student can register for CHEN 799, then CHEN 799 (A-E) in subsequent terms until completion of his/her independent research.

With the exception of CHEN 797, students are not allowed to take any of the listed special courses and Thesis more than once . The Seminar course is compulsory and students should register it every term(excluding summer).

Students must register for the following to complete their thesis requirements.

CHEN 799T/ CHEN 799TR	Thesis Proposal	0 cr.
CHEN 799	Thesis	9 cr.
CHEN 799A/B/C	Thesis	(9cr, 0 billing)
CHEN 799D/E	Thesis	(9 cr., 1 billing)
CHEN 797	Seminar	0 cr.

Chemical Engineering Elective Courses:

Students can choose courses from the following list:

Please note that students can only credit 600-level (or above) courses in the department.

CHEN 610	Materials Design and Characterization	3 cr.
CHEN 612	Desalination	3 cr.
CHEN 613	Membrane Separation Processes	3 cr.
CHEN 614	Environmental Engineering Separation Processes	3 cr.
CHEN 615	Advanced Mass Transfer Processes	3 cr.
CHEN 618	Colloid and Interface Science	3 cr.
CHEN 619	Sustainablity Science: Human and Environment Interaction	3 cr.
CHEN 620	Reaction Engineering and Reactor Design II	3 cr.
CHEN 630	Sustainable Biorefinery Processes	0 cr.
CHEN 651	Advanced Process Control	3 cr.
CHEN 670	Advanced Process Flow-sheeting	3 cr.
CHEN 672	Polymer Science	3 cr.
CHEN 673	Engineering of Drug Delivery Systems	3 cr.
CHEN 674	Process Operations and Diagnosis	3 cr.
CHEN 675	Tissue Engineering	3 cr.
CHEN 690	Reservoir Engineering	3 cr.
CHEN 696	Reservoir Modeling	3 cr.
CHEN 779	Special Projects	3 cr.
CHEN 796	Engineering Literature Critique	1 cr.
CHEN 798	Special Topics in Chemical Engineering I	3 cr.
CHEN 798A	A Waste Minimization in the Process Industry	3 cr.
CHEN 798B	Special Topics in Chemical Engineering II	3 cr.

Non-Chemical Engineering Elective Courses:

Students can choose courses from the following list:

Please note that students can only credit 600-level (or above) courses in the Maroun Semaan Faculty of Engineering and Architecture (or at an equivalent level in other faculties).

BMEN 600	Materials Design and Characterization	3 cr.
BMEN 601	Computational Modeling of Physiological Systems	3 cr.
BMEN 605	Biomedical Imaging	3 cr.
BMEN 606	Nano Biosensors	3 cr.
CIVE 602	Experimental Design and Statistical Methods	3 cr.
CIVE 651	Processes in Water and Wastewater Treatment	3 cr.

CIVE 652	Landfill Engineering Design	3 cr.
CIVE 654	Environmental Bioremediation	3 cr.
CIVE 655	Air Pollution and Control	3 cr.
CIVE 656	Environmental Impact Assessment	3 cr.
CIVE 658	Industrial Waste Management	3 cr.
CIVE 710	The Finite Element Method	3 cr.
CIVE 740	Transport Phenomena in Surface and Subsurface Waters	3 cr.
CIVE 755	Air Pollution Modeling	3 cr.
CMPS 350	Discrete Models for Differential Equations	3 cr.
CMPS 351	Optimization and Non-Linear Problems	3 cr.
CMPS 354	The Finite Element Method	3 cr.
EECE 601	Biomedical Engineering I	3 cr.
EECE 602	Biomedical Engineering II	3 cr.
EECE 663 / MECH 656	System Identification	3 cr.
EECE 671	Environmental Aspects of Energy Systems	3 cr.
EECE 672	Energy Planning and Policy	3 cr.
EECE 675	PV and Wind Electric Energy Systems	3 cr.
ENMG 601	Management Theory	3 cr.
ENMG 602	Introduction to Financial Engineering	3 cr.
ENMG 603	Probability and Decision Analysis	3 cr.
ENMG 604	Deterministic Optimization Models	3 cr.
ENMG 611	Supply Chain Design and Management	3 cr.
ENMG 612	Advanced Supply Chain Design and Management	3 cr.
ENMG 616	Advanced Optimization Techniques	3 cr.
ENMG 622	Simulation Modeling and Analysis	3 cr.
ENMG 623	Stochastic Models and Applications	3 cr.
ENMG 633	Advanced Topics in Project Management	3 cr.
ENMG 654	Technology-Based Entrepreneurship	3 cr.
ENGM 659	Introduction to System Dynamics	3 cr.
ENMG 663	Product Design and Development	3 cr.
MATH 350	Discrete Models for Differential Equations	3 cr.
MATH 351	Optimization and Non-Linear Problems	3 cr.
MECH 603	Solar Energy	3 cr.
MECH 606	Aerosol Dynamics	3 cr.

MECH 607	Micro-Flows Fundamentals and Applications	3 cr.
MECH 609	Experimental Methods in Fluid Dynamics	3 cr.
MECH 627	Polymers and Their Properties	3 cr.
MECH 630	Finite Element Methods in Mechanical Engineering	3 cr.
MECH 634	Biomaterial and Medical Devices	3 cr.
MECH 663	Computational Fluid Dynamics	3 cr.
MECH 672	Modeling Energy Systems	3 cr.
MECH 674	Energy Economics and Policy	3 cr.
MECH 678	Solar Electricity	3 cr.
MECH 701	Principles of Combustion	3 cr.
MECH 747	Nonlinear Finite Element Analysis	3 cr.
MECH 751	Simulation of Multiphase Flows	3 cr.
MECH 760	Advanced Fluid Mechanics	3 cr.
MECH 761	Convection Heat Transfer	3 cr.
MECH 764	Advanced Topics in Computational Fluid Dynamics	3 cr.
MECH 765	Advanced Finite Volume Techniques	3 cr.
MECH 766	Turbulent Flow and Transport	3 cr.
MECH 767	Heat Conduction	3 cr.
MECH 768	Transport Through Porous Media	3 cr.
MECH 773	Numerical Methods in Energy Technology	3 cr.
MECH 798A	Fundamentals of Energy and Resource Recovery	3 cr.

Science Majors

Students who have a Bachelor of Science degree in chemistry, biology, mathematics or physics will be accepted as prospective graduate students in the MS program.

It is the responsibility of these students to have completed the equivalent of both MATH 218 and MATH 251 prior to joining the program.

If MATH 251 is not taken, the student has to take EECE 231/CMPS 200 first, then in the next term, the student has to register MATH 251 to pass graduate courses.

Students will also have to pass the following courses with a minimum cumulative GPA of 3.2 or 80 before joining the MS program:

- Required core chemical engineering courses: CHEN 311, CHEN 312, CHEN 314, CHEN 411 and CHEN 417 .
- One of the following three courses is required: CHEN 351, CHEN 451, CHEN 470.

Engineering Majors

Students who have a Bachelor of Engineering other than chemical engineering will have to take the following: CHEN 417 and CHEN 470.

Course Descriptions

CHEN 570 Process Synthesis and Optimization 3 cr.
An introduction to the design and synthesis of the large scale production and processing of materials such as water, chemicals, petroleum products, food, drugs and waste. The course introduces principles of optimization: continuous, linear and nonlinear, and mixed-integer linear and nonlinear problems. Applications will address heat exchanger network synthesis, energy system designs, distillation and separation system selection, and optimization and design under uncertainty. Prerequisites: CHEN 411, CHEN 451 and CHEN 470.

CHEN 571 Chemical Product Design 3 cr.
This course covers the application of the design process of products based on chemical technology. It covers the entire design process from initial identification of product needs to the generation and selection of product ideas and culminates in the manufacture of a new product. Prerequisite: CHEN 470.

CHEN 610 Materials Design and Characterization 3 cr.
This course is designed for chemical engineering students who want to gain knowledge and technical exposure with modern analytical instrumentation used in research and industry. The course will cover the theoretical and scientific aspects involved in analytical applications including: spectroscopy, chromatography, X-ray diffraction etc. It also encompasses laboratory sessions for sample preparation and instrumental operation, analytical method optimization and data interpretation. At the end of the course, students will become familiar with various analytical instruments and methods, and they will be able to decide on the appropriate instrument to carry out specific laboratory analysis. Prerequisites: CHEN 410 and CHEM 219.

CHEN 611 Transport Phenomena 3 cr.
This course covers the application of the principles of momentum, heat and mass transfer to steady state and transient problems; molecular concepts; transport in turbulent flow; boundary layer theory; and numerical applications. Prerequisite: CHEN 411 or MECH 412.

CHEN 612 Desalination 3 cr.
A course that will provide an in-depth coverage of the commonly used thermal and membrane-based desalination technologies. Fundamental thermodynamic and transport processes which govern desalination will be developed. Environmental, sustainability and economic factors which may influence the performance, affordability and more widespread use of desalination systems for fresh water production and reuse will be highlighted. Renewable energy technologies coupled with desalination processes will be reviewed. A team-based student project will be assigned to design a reverse osmosis membrane desalination plant (brackish water, seawater or treated sewage effluent) using conventional or alternative energy sources. Prerequisite: CHEN 411 or MECH 412.

CHEN 613 Membrane Separation Processes 3 cr.
The course will provide a general introduction to membrane science and technology:

transport mechanisms, membrane preparation and boundary layer effects. The course will also cover the various types of membranes used in industry: microfiltration, ultrafiltration, reverse osmosis, electro-dialysis and pervaporation. Prerequisites: CHEN 312 and CHEN 411.

CHEN 614 Environmental Engineering Separation Processes 3 cr.
This course includes a discussion of the unit operations associated with environmental engineering separation processes of solid-liquid, liquid-liquid, and gas-liquid systems; general use, principles of operation and design procedures for specific types of equipment. Prerequisite: approval of instructor.

CHEN 615 Advanced Mass Transfer Processes 3 cr.
This course will cover a review of molecular and turbulent diffusion and mass transfer coefficients, mass transfer equipment design including absorption and cooling towers, adsorption and ion exchange. Prerequisite: CHEN 411 or MECH 412.

CHEN 617 Chemical Reactor Analysis and Design 3 cr.
This course covers design for optimum selectivity; stability and transient behavior of the mixed flow reactor; non-ideal flow and balance models; fixed and fluidized bed reactors; and multiphase flow reactors. Prerequisite: CHEN 417.

CHEN 618 Colloid and Interface Science 3 cr.
This course will aim at introducing the basic concept of colloid and interface science, properties, behavior and interactions. It explores the application of surface and colloid chemistry principles to technologies involving particulate dispersions, emulsions, foams, aerosols, water-soluble polymers, wetting, flocculation, flotation, separation, and stabilization. The goal is to provide a background in surface and colloidal science and give the student a solid framework for applying knowledge in colloid and surface science to the solution of practical problems and the development of new technologies.Prerequisite: CHEN 314 or MECH 414.

CHEN 619 Sustainability Science: Human and Environment Interaction 3 cr.
Sustainability is the grand challenge of our time especially with the UN SDG (Sustainable Development Goals) 2030 Agenda. This course addresses the basics of sustainability science and its challenges to promote economic growth and address social needs, while tackling climate change and environmental protection. The goal of the course is to introduce students to the four pillars of sustainability (human, economic, social, environmental) and help them incorporate its principles and models into engineering design practices. Students will be also introduced to current challenges, active debates and unresolved research questions in sustainability.

CHEN 620 Reaction Engineering and Reactor Design II 3 cr.
The course presents advanced concepts of reaction engineering and reactor design. The course covers fundamentals of heterogeneously catalyzed chemical reactions including kinetics and transport processes. The Reactor design part of the course focuses on the modeling of catalytic reactors. Prerequisite: CHEN 417.

CHEN 630 Sustainable Biorefinery process 3 cr.
This course provides students with an understanding of the principles, technologies and design of sustainable bioprocesses and biorefineries. In this course we will focus on techniques and processes needed to efficiently disentangle, separate and convert different biomass based feedstock into biofuels and high value chemicals. We will also explore the design of a biorefinery taking into account feedstock and the desired product. The design

will be evaluated with respect to sustainability and economic criteria. The students will have the opportunity to work in a team on a feasibility/ simulation/ experimental project. Prerequisite: CHEN 417.

CHEN 651 Advanced Process Control 3 cr.
This course covers the mathematical modeling and computer simulation of process dynamics and control. Prerequisite: CHEN 451.

CHEN 670 Advanced Process Flow-Sheeting 3 cr.
This course highlights the engineering tools used during the lifecycle of chemical plants from the Front-End and Engineering Design (FEED) stage to operation. Flow- sheeting tools will be used for analysis, dynamic modeling for startup-shutdown and control dynamics, and plant-wide optimization for plant performance improvement. Prerequisite: CHEN 570.

CHEN 672 Polymer Science 3 cr.
This course is a broad technical overview of the nature of synthetic macromolecules, including the formation of polymers and their structure, structure-property relationships, polymer characterization and processing, and applications of polymers. The course tends to focus on thermoplastic polymers and elastomers. Prerequisite: MECH 340.

CHEN 673/ BMEN 604 Engineering of Drug Delivery Systems 3 cr.
This course focuses on recent advances in the development of novel drug delivery systems. The fundamentals of drug delivery are discussed. Various strategies to tune and control the release of active agents for optimized therapeutic outcomes are explored. The course covers polymers and techniques used to produce drug nanoparticles, with specific examples of nanoparticle-based drug delivery systems. Prerequisites: CHEN 314 or MECH 414, and CHEN 411 or MECH 412.

CHEN 674 Process Operations and Diagnosis 3 cr.
This course covers troubleshooting, fault detection and diagnostics in key chemical processes. Statistical tools such as Principle Component Analysis, Fisher Discriminant Analysis, Partial Least Squares and Canonical Variate Analysis methods are studied. Analytical and knowledge-based approaches are also covered. Processes and case studies include: gas-oil separation (GOSP), natural gas processing (AGR, NGL, SRU, fractionation, amine scrubbing), crude oil refining (CDU, VDU, delayed cocking, fluid catalytic cracking) and power plants. Prerequisites: CHEN 451 and CHEN 570.

CHEN 675/ BMEN 603 Tissue Engineering 3 cr.
Tissue engineering is an interdisciplinary field that uses cells, biomaterials, biochemical (e.g. growth factors) and physical (e.g. mechanical stimulation) signals, as well as their combination to generate tissue-like structures. The goal of tissue engineering is to provide biological substitutes that can maintain, restore or improve the function of damaged tissues in the body.

CHEN 690 Reservoir Engineering 3 cr.
This course will cover both fundamental and applied reservoir engineering concepts. It aims at understanding the rock and fluid properties and how these properties interact to affect production from a hydrocarbon reservoir. From a practical aspect, the course will focus on classical reservoir engineering, reservoir drive mechanisms, well testing and well test analysis as well as the use of reservoir simulation to assist the reservoir engineer at different stages of a hydrocarbon reservoir lifecycle. Students cannot receive credit for both CHEN 690 and PETR 421. Prerequisites: CHEN 314 or MECH 414, and CHEN 490.

CHEN 691 Reservoir Characterization: Carbonate Rocks 3 cr.
This course is an introduction to the common, modern approached for the characterization of carbonate reservoirs. State of the art petrographic tools will be introduced. The major depositional environments of carbonate rocks and carbonate platform types s well as the principal controls on carbonate sedimentation will be highlighted. Diagenesis (modification of reservoir properties through time) will be discussed through related processes and products, including the process of dolomitization. An in depth coverage of secondary porosity evolution in carbonate reservoirs will be provided (including elements of appropriate rock-typing). A team based project to solve a case study in reservoir characterization and a field-trip to provide a practical view of carbonate reservoir rocks will be included. Prerequisite: CHEN 490.

CHEN 696 Reservoir Modeling 3 cr.
This course introduces students to the theory and practice of hydrocarbon reservoir simulation. It details the mathematics of the governing equations and numerical techniques that form reservoir simulation models. The course will cover data preparation, simulation grid preparation, reservoir model calibration, forecasting of future performance, and interpretation of simulation results. Students will learn, through practical cases and projects using PetrelTM / ECLIPSETM, about the elements of a reservoir simulation model, the types of reservoir simulators and the role of simulation in field development planning, reservoir management and production optimization.

CHEN 779 Special Projects 3 cr.
A course that allows the student to take a given set of requirements and must create a proposal regarding the nature of the research, the specific goals of the research and the desired final report outcome to fully meet those requirements. The student is required to participate under the supervision of a faculty member, in a research project. Prerequisites: Approval of Advisor

CHEN 796 Engineering Literature Critique 1 cr.
This is a project-based course in which students will be asked to conduct an extensive literature review of an assigned engineering topic and present, in both written and oral formats, a critical review of this literature. Prerequisite: Consent of advisor.

CHEN 797 Seminar 0 cr.
This is a seminar that consists of presentations on current research or applied projects in chemical engineering or related fields. Seminars are presented by students, faculty members or invited scholars. This is a pass/fail course based on attendance.

CHEN 798 Special Topics in Chemical Engineering I 3 cr.
This class is available to graduate students wishing to gain knowledge in a specific area in which no graduate level classes are offered. The proposed class would involve a directed study for which the student(s) would be given credit. Students wishing to take the class would be assigned a suitable class advisor most familiar with the specific area of interest. Students will be required to present the term work in an organized publication format. Prerequisite: Consent of advisor.

CHEN 798A Waste Minimization in the Process Industry 3 cr.
The objective of this course is to become familiar with waste minimization principles, quality management systems and pollution control and legislation. The course contents include: introduction and background to waste minimization, benefits of wasteminimization, implementation of a waste minimization program, practical techniques to minimize waste, methodology of waste minimization, typical causes and sources of waste and examples of practical waste minimization techniques.

CHEN 798B Special Topics in Chemical Engineering II 3 cr.
This class is available to graduate students wishing to gain knowledge in a specific area in which no graduate level classes are offered. The proposed class would involve a directed study for which the student(s) would be given credit. Students wishing to take the class would be assigned a suitable class advisor most familiar with the specific area of interest. Students will be required to present the term work in an organized publication format. Prerequisite: Approval of Advisor.

CHEN 799 (A-E) Thesis 9 cr.
Every term. Prerequisite: CHEN 799T or CHEN 799TR.

CHEN 799 (9 cr., 7.14 billing)
CHEN 799

CHEN 799A/B/C (9 cr., 0 billing)
CHEN 799A/B/C

CHEN 799D/E (9 cr., 1 billing)
CHEN 799D/E

CHEN 799T/799TR Thesis Proposal 0 cr.
Every term. The Masters Thesis Proposal grading mode is P/F. If a student fails CHEN 799T, s/he must register for CHEN 799TR.

Department of Electrical and Computer Engineering

Chairperson:	Chehab, Ali
Professors:	Abou Faycal, Ibrahim; Bazzi, Louay; Chaaban, Farid; Chedid, Riad; Chehab, Ali; Dawy, Zaher; Elhajj, Imad; El-Hajj, Ali; Jabr, Rabih; Kabalan, Karim; Karaki, Sami; Kayssi, Ayman; Sharafeddine, Sanaa
Associate Professors:	Awad, Mariette; Costantine, Joseph; Daher, Naseem; Kanj, Rouwaida; Karameh, Fadi; Saghir, Mazen; Tawk, Youssef; Zaraket, Fadi
Assistant Professors:	Fahs, Jihad; Sarieddine, Hadi; Issa, Ibrahim
Adjunct Professors:	Hajj Hazem; Mansour, Mohammad; Mneimneh, Saad
Lecturers:	Bakri, Hussein; Hariss, Khalil; Hussein, Ali; Shwaykani, Hassan
Instructors:	Ashkar, Nicolas; Chbaro, Malek

Graduate Programs

The Department of Electrical and Computer Engineering offers the degree of Master of Engineering (ME) in Electrical and Computer Engineering and the degree of Doctor of Philosophy (PhD) in Electrical and Computer Engineering.

Master of Engineering in Electrical and Computer Engineering

The ME program degree two options: A non-thesis and a thesis option. The ME degree develops future engineering professionals who drive innovations, conduct research, and advance technology for a successful career in industry and academia.

- ECE Thesis Program
- ECE Non-Thesis Program

All programs must satisfy either the thesis program requirements or the non-thesis program requirements. The program is indicated on the student's transcript. Accepted students normally are eligible for Graduate Fellowship and Assistantship Program (GFAP) and Graduate Research Assistant (GRA). Refer to the General University Academic Information section.

Requirements

All relevant requirements and regulations of the university and the Maroun Semaan Faculty of Engineering and Architecture for the master's degree apply to the ME in ECE programs.

In order to be eligible for admission, a student must have a bachelor's degree from an accredited university.

Students whose undergraduate degree is in an area other than engineering and students whose undergraduate degree is a three-year degree are considered prospective graduate students. The supplementary courses must be completed within four consecutive regular terms.

Master's Thesis Program Requirements (30 cr.)

- 24 course credit hours of which
  - a minimum of 21 credits of graduate level courses
  - a minimum of 18 credits of ECE courses
  - a minimum of 9 credits of graduate level in the major area
- 6 credits for master's thesis
- the seminar course (should be registered for a minimum of 2 terms)
- students have to declare their major area by the end of the registration period of their last term.

Note: A student may declare a minor area after registering for at least two courses in the area.

Master's Non-Thesis Program Requirements (33 cr.)

- 33 credit hours in graduate courses
  - a minimum of 24 credits of ECE courses
  - a minimum of 12 graduate credits in the major area
- the seminar course (should be registered a minimum of 2 terms)
- Students have to declare their major area by the end of the registration period of their last term.

Note: A student may declare a minor area after registering for at least two courses in the area.

Major and Minor Areas

The major and minor areas for the ME and PhD in ECE programs are shown below with their corresponding courses.

- **Applied Electromagnetics and RF Systems:** EECE 680, EECE 681, EECE 682, EECE 683, EECE 684, EECE 685, EECE 686, EECE 687, EECE 688
- **Artificial Intelligence and Machine Learning:** EECE 633, EECE 634, EECE 639, EECE 664, EECE 667, EECE 668, EECE 690, EECE 693, EECE 699
- **Biomedical Engineering:** EECE 601, EECE 603, EECE 605
- **Communications and Signal Processing:** EECE 640, EECE 641, EECE 644, EECE 645, EECE 646, EECE 691, EECE 692, EECE 694, EECE 695
- **Computer Hardware Systems:** EECE 612, EECE 616, EECE 617, EECE 621, EECE 622, EECE 623, EECE 624, EECE 625, EECE 626
- **Computer Software Systems:** EECE 631, EECE 636, EECE 637, EECE 638, EECE 642, EECE 652, EECE 696, EECE 731, EEE 732
- **Control Systems:** EECE 660, EECE 661, EECE 662, EECE 663, EECE 665, EEE 669, EECE 697, EECE 698
- **Energy and Power Systems:** EECE 670, EECE 671, EECE 672, EECE 673, EECE 674, EECE 675, EECE 676, EECE 677, EECE 678, EECE 679
- **Networks and Security:** EECE 632, EECE 635, EECE 647, EECE 651, EECE 653, EECE 655, EECE 656, EECE 657

PhD in Electrical and Computer Engineering

Mission

The PhD program in ECE creates knowledge through advanced coursework and original research with expert faculty to shape the next generation of leaders for careers in academia and industry. It provides students with research-intensive studies in the different areas of ECE to develop competencies and proficiency in emerging technologies, and the latest advancements in science and engineering.

Objectives

The objectives of the program are to:

- provide students with research opportunities to acquire an in-depth of knowledge in one specialization area of electrical and computer engineering and familiarity with allied areas,
- provide opportunities for doctoral students to develop competence in performing independent research, communicating effectively and learning independently,
- advance the state of electrical and computer engineering research at AUB, in Lebanon and in the region,
- and advance state of the art in electrical and computer engineering.

Program Outcomes

Graduates of the program are expected to have:

- breadth of knowledge in electrical and computer engineering and depth of knowledge in their specific area of research,
- an ability to identify and define research problems,
- experience in performing research and communicating the results effectively,
- experience in doing independent academic work,
- and a published contribution to the existing literature in electrical and computer engineering.

Applicants who have an excellent record of academic achievement and potential for creative and independent work may be admitted into one of the following categories:

- Students Holding a Master's Degree
- Students Holding a Bachelor's Degree

The minimum admission requirements for the two categories are described below.

Admission Requirements for Students Holding a Master's Degree

Applicants to the PhD program must hold a master's degree in Electrical and Computer Engineering or a related discipline from AUB or another recognized institution of higher education, with a minimum cumulative GPA of 3.7 or its equivalent. Admission is determined by evaluating the following:

- Academic transcripts from the institution(s) of higher education attended by the applicant
- Graduate Record Examination (GRE) general test scores
- A written statement of purpose
- Three letters of recommendation
- A portfolio that includes a resume and samples of work
- An interview conducted with the ECE Graduate Committee (EGC) in person, by phone or over the Internet
- Satisfaction of the university requirements for admission to PhD programs

Program Requirements for Students Holding a Master's Degree

Completion of at least 48 credits of graduate study consisting of combined course work and research beyond the master's degree is required for the PhD degree in Electrical and Computer Engineering. A minimum of 18 credits of course work and a minimum of 24 credits of research and thesis work are required.

The basic program of study for the PhD degree is built around one major area and at least one minor area. Students take courses to satisfy the major and minor area requirements and acquire the knowledge needed for the written and oral examinations.

- The major area has to be in one of the ECE areas.
- Students must take at least 4 graduate courses, including courses prior to admission to the PhD program, in their PhD major area.
- Students must also take at least 2 graduate courses in their PhD minor area, including courses taken prior to admission to the PhD program.

- The minor courses have to be from one of the ECE areas.

Students must maintain a cumulative GPA of 3.7 in order to remain in good standing. The cumulative average is calculated for courses taken beyond the master's degree. Students will be placed on probation if they fail a course (below C+) or have a cumulative average that falls below (3.7). In such cases, students have one term to raise their cumulative average to a minimum grade of (A-) and have to repeat failed courses as soon as the concerned courses are offered. Failure to do so will result in academic dismissal. Students cannot earn a PhD with a cumulative average below (3.7).

PhD Qualifying Exam for Students Holding a Master's Degree

Refer to the General University Academic Information section.

Qualifying Exam Part I: Comprehensive Exam for Students Holding a Master's Degree

After taking at least 15 credits of coursework and mastering the knowledge delineated in the PhD major area, students take the Qualifying Exam Part I: Comprehensive Exam. The exam is given twice a year at the end of the fall and spring terms. Students are informed beforehand of the subjects that will be covered in the examination. Students who do not pass may repeat the exam only once during the following term. If students do not pass the exam after their second attempt, they will be asked to discontinue their PhD studies.

Students sit for two exams that together constitute the comprehensive examination with one in the major area and one in the minor area. These two exams are taken separately at different times during the same examination period. The major area exam consists of eight questions, out of which five questions should be answered in four hours. The minor area exam consists of six questions, out of which three questions should be answered in two and a half hours. The area exams are prepared by the corresponding area faculty committee and are designed to evaluate the student's understanding of the fundamentals in the area. Passing the comprehensive exam requires an average of no less than 3.3, with no less than 3.3 in the major area and no less than 2.3 in the minor area. Refer to the General University Academic Information section.

Admission to Candidacy for Students Holding a Master's Degree

Students must be admitted to candidacy at least two terms before obtaining the PhD degree.

For admission to candidacy, students are expected to have:

- submitted a program approved by the thesis committee, ECE Graduate Committee (EGC), MSFEA Graduate Studies Committee (GSC) and Graduate Council (GC),

- passed the Qualifying Exam Part I and II,

- completed at least 12 credits of graduate courses beyond the master's degree,
- attained a cumulative GPA of 3.7 in all courses taken beyond the master's degree,
- and maintained good academic standing.

Residency Requirements for Students Holding a Master's Degree

A student must register for at least four terms beyond the completion of the master's degree. Requirements for the PhD degree must be completed within a period of ten regular terms years after starting graduate work beyond the master's degree. Extension beyond the five-year limit requires the approval of the EGC, MSFEA GSC and GC.

Admission Requirements for Students Holding a Bachelor's Degree (Accelerated PhD Track)

- A bachelor's degree with a minimum major and cumulative GPA of 3.7 or its equivalent in Electrical and Computer Engineering
- Graduate Record Examination (GRE) general test scores
- Three letters of recommendation (one from the FYP supervisor)
- An applicant's written statement of purpose that shows the research potential in the proposed area of study
- A two-three page research proposal
- Performance of the candidate in the EECE 499 research-based course if taken or a proven research record through published articles
- An interview conducted with the ECE Graduate Committee (EGC) in person, by phone or over the Internet

Course Requirements for Students Holding a Bachelor's Degree

The completion of at least 78 credits of graduate study consisting of combined coursework and research beyond the bachelor's degree is required for the accelerated PhD track in Electrical and Computer Engineering. A minimum of 36 credit hours must be in approved graduate level course work and a minimum of 30 credit hours in thesis work. In addition, normally a maximum of 6 credit hours out of the 36 credits of coursework may be in tutorial courses.

The basic program of study for the accelerated PhD track is built around one major area and a minimum of one minor area. Students take courses to satisfy the major and minor area requirements and to acquire the knowledge needed for the Qualifying Exam Part I and II.

- The major area has to be in one of the ECE areas.
- Students must take at least six graduate level courses in their PhD major area.
- Students must take at least three graduate level courses in their PhD minor area.
- The minor courses have to be from one of the ECE areas.

PhD Qualifying Exam for Students Holding a Bachelor's Degree

Refer to the General University Academic Information section.

Qualifying Exam Part I: Comprehensive Exam for Students Holding a Bachelor's Degree

Comprehensive examinations are written exams taken after completing a minimum of 30 credits of course requirements for the accelerated track. Timing of the examination is set by the department/program no later than the sixth regular term of the PhD student's enrollment. Refer to the General University Academic Information section.

Residency Requirements for Students Holding a Bachelor's Degree

The student must register for at least eight terms beyond the completion of the bachelor's degree. Requirements for the PhD degree in the accelerated track must be completed within a period of twelve regular terms after starting graduate work beyond the bachelor's degree. Extension beyond the twelve regular terms limit requires the approval of the EGC, MSFEA GSC and GC.

Students deemed by the department, within one to two years after admission into the accelerated track, as not qualified to complete a PhD degree may be granted a master's degree in the area after completing the equivalence of a non-thesis master's. Every effort will be made to screen students carefully to assure their potential and aptitude as researchers prior to acceptance. This may be accomplished by having selected students participate in ongoing research projects while they are registered undergraduates.

Admission to Candidacy for Students Holding a Bachelor's Degree

Students must be admitted to candidacy at least two terms before obtaining the PhD degree.

For admission to candidacy, students are expected to have:

- submitted a program approved by the thesis committee, EGC, MSFEA GSC and GC
- passed the oral qualifying examination
- completed at least 30 credits of graduate level courses beyond the bachelor's degree
- attained a cumulative GPA of 3.7 in all courses taken beyond the bachelor's degree
- maintained good academic standing

PhD Thesis Committee

In accordance to the Lebanese Ministry of Higher Education, the thesis committee should be composed of at least five faculty members:

- Chair of the committee, advisor and at least one member from the student's department/ program
- Two members must be from outside the university
- At least four committee members must be from the student's major area
- All members must hold doctoral degrees
- The advisor and at least three of the members must be of professorial rank
- The chair of the thesis committee must be a full professor and cannot be the advisor

Members of the committee are recommended by the student's thesis advisor and approved by the Graduate Committee of the ECE department, MSFEA Graduate Studies Committee and Graduate Council.

The committee approves the thesis topic and research plan, administers the oral Qualifying Exam (Part II) and conducts the thesis defense. The thesis proposal and selection of the committee should be approved at least two terms before the thesis defense.

Any changes in the committee, including the thesis advisor, must receive the approval of the EGC, MSFEA GSC and GC.

PhD Thesis Proposal

Refer to PhD Thesis Proposal under General University Academic Information section.

Qualifying Exam Part II: Defense of Thesis Proposal

Within two terms of passing the comprehensive examination, the student must take an oral qualifying examination, administered by her/his thesis committee. The defense of

the PhD thesis proposal is considered part of the oral qualifying examination. In addition to reviewing the prospectus of the thesis, the nature and content of the examination are related to the student's field of research. Refer to Qualifying Exam Part II: Defense of Thesis Proposal under General University Academic Information section.

PhD Thesis

The student must submit a thesis based on the results of original and independent research. The PhD thesis is expected to make a significant contribution to the field of electrical and computer engineering. Upon its completion and after its approval by the thesis advisor, the thesis must be defended orally. Refer to PhD Thesis Format under General University Academic Information section.

PhD Thesis Defense

Refer to PhD Thesis Defense under General University Academic Information section.

Seminar Requirement

The student must register for the EECE 797 Seminar as long as s/he is enrolled in the program.

Program Completion Requirements

To earn the PhD degree in Electrical and Computer Engineering, the student must complete the following requirements:

- Have at least one journal article, based on the PhD thesis, accepted in a leading international journal in the field of specialty subjected to at least two reviews. Additionally, at least two refereed conference papers based on the thesis must have appeared in conference proceedings.
- Have a cumulative average, beyond the master's degree, of (3.7) or above and be in good academic standing.
- Satisfy the course and research credit requirements.
- Pass the comprehensive and oral qualifying examinations.
- Successfully completed the Certificate in Teaching in Higher Education (C-THE) program.
- Complete and successfully defend a PhD thesis.
- Satisfy the residency requirement and all other pertinent AUB regulations.

PhD Major or Minor Areas

The PhD major or minor areas of study with their corresponding courses are the same as those listed for the master's degree (page 402).

Course Descriptions

EECE 601 Biomedical Devices and Equipment 3 cr.
The course discusses the main types of biomedical devices and equipment in terms of the physical principles underlying their operation, their operational characteristics, and their applications. The discussion includes: ultrasound systems, blood instruments, cardiac and respiratory devices and equipment, clinical laboratory equipment, radiology equipment. X-ray machines, CT scanners, PET scanners, and magnetic resonance imaging systems. Prerequisites: BIOL 210 or BIOL 202 or PHYL 246; and EECE 210 or PHYS 228 and PHYS 228L; or consent of the instructor.

EECE 603 Biomedical Signal and Image Processing 3 cr.
Fundamentals of digital signal processing as implemented in biomedical applications. It provides a concise treatment of the tools utilized to describe deterministic and random signals as the basis of analyzing biological signals: data acquisition, imaging, denoising and filtering, feature extraction, modeling. The course is tightly coupled with a practical component through laboratory projects. Examples include the auditory system, speech generation, electrocardiogram, neuronal circuits and medical imaging. Students should have reasonable software skills in Matlab. Pre or co-requisites: STAT 230 and EECE 340, or STAT 233 and EECE 340 or consent of instructor.

EECE 605 Neuromuscular Engineering 3 cr.
An introduction on the nervous system, electrophysiology and chemical kinetics. The cell membrane in the steady state: resting membrane voltage and membrane equivalent circuit. Generation and propagation of the action potential: Hodgkin-Huxley model, properties and propagation of the action potential. Synapses: neuromuscular junction, fast chemical synapses, second-messenger systems, synaptic plasticity and electrical synapses. Neurons: neuronal currents, firing patterns and signaling in dendrites. Muscle: contraction, mechanics and receptors. Control of movement: mechanics, spinal reflexes, hierarchical organization and control, locomotion, equilibrium-point hypothesis. Prerequisites: BIOL 210 or BIOL 202 or PHYL 246, and EECE 210; or PHYS 228, PHYS 228L and MATH 202; or consent of instructor.

EECE 611/411 Analog Integrated Circuits 3 cr.
A course on the design, analysis, and simulation of analog integrated circuits with an emphasis on MOS circuits; differential and operational amplifiers, bandgap references; applications of analog integrated circuits such as switched capacitor circuits, oscillators, and phase locked loops. Introduction and extensive use of CAD tools for analog circuit simulation. Prerequisites: EECE 311 or consent of instructor.

EECE 612/412 Digital Integrated Circuits 3 cr.
A course on digital electronic circuits; models, current equations, and parasitics of CMOS transistors for digital design; study of CMOS inverter and logic gates, including analysis, design, simulation, layout, and verification; advanced circuit styles; sequential circuits; advanced topics: semiconductor memories, power grid, clocking strategies, data-path building blocks, deep-submicron design issues, interconnect. Prerequisites: EECE 310 and EECE 320, or consent of instructor.

EECE 616 Advanced Digital Integrated Circuits 3 cr.
This course covers advanced concepts in circuit design for digital VLSI systems in state of- the-art integrated circuits technologies. Emphasis is on circuit design and optimization techniques targeted for high-speed, low-power or high-density circuits. The impact of scaling, deep submicron effects, interconnect, signal integrity, power distribution/

consumption and timing on circuit design is investigated. Emerging challenges in low power/low voltage design, process variations and memory design in the nano-scale era are covered. Prerequisite: EECE 412 or EECE 612 or consent of instructor.

EECE 617 Reliability and Statistical Design 3 cr.
This course explores major aspects of statistical design methodologies with particular emphasis on electrical and computer engineering problems. It covers various topics in the domain of reliability, yield estimation, variance reduction methods for purposes of extreme statistics and rare fail event estimation, modeling and optimization. Case studies will be provided to analyze the manufacturability challenges of advanced circuits and the implications on low power design.

EECE 621 Advanced Computer Architecture 3 cr.
This course focuses on modern advancements in parallel computer architecture with emphasis on instruction level parallelism (ILP). Topics include: advanced branch prediction, data speculation, memory dependence prediction, trace caches, dynamic optimization, checkpoint architectures, latency-tolerant processors, simultaneous multithreading, speculative multithreading and virtual machines. A key component of the course is a research project in which students use architecture performance simulator to investigate novel architecture techniques. Prerequisite: EECE 421 or consent of instructor.

EECE 622 VLSI for Communications and Signal Processing 3 cr.
This course introduces concepts in the design and implementation of digital signal processing systems using integrated circuits. Emphasis is on the architectural exploration, design and optimization of signal processing systems for communications. Algorithm, architecture and circuit design techniques are introduced that enable joint optimization across the algorithmic, architectural and circuit domains. A key component of the course is a project in which students investigate problems in the design and implementation of low-power and high-performance communication systems. Prerequisite: EECE 491 or EECE 691 or consent of instructor.

EECE 623/423 Reconfigurable Computing 3 cr.
A course on reconfigurable computing systems and applications; contemporary FPGA architectures; FPGA design flows and tools; high-level synthesis; hardware/software partitioning; host, memory and peripheral interfaces; operating system support; dynamic partial reconfiguration; classical and emerging applications. Students work on a set of design assignments and a research project using appropriate FPGA development boards and tools. Prerequisite: EECE 321 or consent of instructor.

EECE 624 Digital Systems Testing 3 cr.
This course covers an overview of digital systems testing and testable design; test economics, fault modeling, logic and fault simulation, testability measures; test generation for combinational circuits; memory test; delay test; IDDQ test; scan design and boundary scan. Prerequisite: EECE 320 or consent of instructor.

EECE 625/425 Embedded and IoT Systems 3 cr.
A course on contemporary embedded systems design. The system design process; microcontroller architectures and programming; standard peripheral device controllers (GPIO, timers/counters, interrupts); serial interfaces (RS232, SSI/SPI, I2C, USB); displays; memory devices and DMA; IoT and network interfaces; analog/digital conversion; pulse-width modulation; motor control; embedded operating systems. Students work on a set of design assignments and a major project using appropriate microcontroller development boards and tools. Prerequisite: EECE 321 or consent of instructor.

EECE 626 Hardware Accelerators for Machine Learning 3 cr.
This course provides an in-depth coverage of architectural techniques used to design accelerators for training and inference in machine learning systems, with focus on recent advances towards enabling efficient processing of DNNs. It provides an overview of DNNs, discusses various hardware platforms and architectures that support DNNs, and highlights key trends in reducing the computational cost of DNNs via hardware design changes only or through joint hardware design and DNN algorithm optimizations. It also covers various development tools that enable students to quickly get started in this field, and highlights important benchmarking metrics and design considerations to be used for evaluating a plethora of DNN hardware design options. Case studies include Google's TPU, Apple's Neural Engine, Intel's Nervana processor, and ARM's Project Trillium. The course involves a semester project that focuses on developing architectures for hardware ML accelerators. Prerequisites: EECE 490 and EECE 420 or EECE 421, or consent of instructor.

EECE 631 Advanced Topics in Algorithms 3 cr.
This is a second course on algorithms. The aim of the course is to cover general tools from probability and convex optimization with applications to randomized algorithms, approximation algorithms, and theoretical computer science in general. Topics include: introduction to randomized algorithms, tail inequalities, probabilistic method, random walks, hashing, derandomization, introduction to approximation algorithms, basics of linear programming, algorithms for solving linear programs, linear programming relaxation and approximation algorithms, basics of semidefinite programming, semidefinite relaxation and approximation algorithms, interior point methods, and selected topics as time permits. Prerequisites: EECE 431 or EECE 331 and STAT 230 or STAT 233 and MATH 218 or MATH 219 or consent of instructor.

EECE 632/455 Cryptography and Network Security 3 cr.
This course provides an overview of encryption and network security. The topics include: classical encryption techniques, block ciphers and the data encryption standard, finite fields, advanced encryption standard, confidentiality using symmetric encryption, public-key cryptography, key management, hash and MAC algorithms, digital signatures, authentication applications, Web security, email security and IP security.

EECE 633 Data Mining 3 cr.
This course is an introduction to data mining. Data mining refers to knowledge discovery, using huge amounts of data to arrive at non-trivial conclusions. Topics will range from statistics to machine learning to database, with a focus on analysis of large data sets. The course will target at least one new data mining problem involving real data, for which the students will have to find a solution. Prerequisite: EECE 330 or consent of instructor.

EECE 634 Introduction to Computational Arabic 3 cr.
The course discusses computational challenges specific to the Arabic language including representation, rendering, processing, structure, interface and recognition. The course also discusses multilingual texts with Arabic, visits text processing techniques such as encoding, matching, tokenization, search, indexing and pattern matching. The course reviews the state of the art in automating Arabic language understanding. Prerequisite: EECE 330 or consent of instructor.

EECE 635 Theoretical Foundations of Security and Privacy 3 cr.
This course provides a rigorous framework to study security and privacy using suitable mathematical models. Such models enable the assessment of the security/privacy guarantees of a given system, including communication and computing systems and databases. In particular, this course covers both computational and information-theoretic notions of security and privacy. Students learn various adversarial models and

their corresponding information-theoretic measures, in addition to basic cryptographic principles and protocols. Topics include: the Shannon cipher system, one-time pads and perfect secrecy, semantic security and the RSA algorithm, equivocation, and guessing entropy (and other measures). A particular focus is given to the notion of differential privacy and its applications. Prerequisite: EECE 330 and STAT 230 or STAT 233 or consent of instructor.

EECE 636 Logic Verification and Synthesis 2 cr.
The course discusses the correctness of logic systems whether software or hardware, the basic representations of propositional logic and first order logic. It discusses how expressive and realizable different logic theories are. It covers tools that reason about the correctness of logic and that automatically synthesize logic into an implementation. Prerequisite: EECE 330 or consent of instructor.

EECE 637 Advanced Programming Practice 3 cr.
This is an advanced course on programming practices with a focus on verification. Teams will work in agile and extreme programming environments and will use formal specifications, design patterns and aspect-oriented programming. Projects will involve tools for source control, debugging, code building, documentation, dynamic and static verification. Prerequisite: EECE 330 or consent of instructor.

EECE 638 Software Testing 3 cr.
The course focuses on concepts, techniques and tools for testing software. It provides practical knowledge of a variety of ways to test software and an understanding of some of the tradeoffs between testing techniques. The topics include: software testing at the unit, module, and system levels; functional and structural testing; regression testing; mutation testing; test suite minimization and prioritization; automatic test case generation.

EECE 639 Advanced Techniques and Applications in Data Mining 3 cr.
A course that covers advanced topics in data mining and recent progress in this field. Discussions will include which techniques fit best for complex applications in data mining. Mining complex data will include general text mining, Arabic text mining, social network analysis, spatial data mining, mining of the World Wide Web, stream data, time-series data and sequence data. We will also discuss recent application sectors and trends in data mining such as for the telecommunication, biological, and financial sectors. Prerequisites: EECE 330 and one of the following: EECE 633, EECE 667 or EECE 693; or consent of instructor.

EECE 640/440 Wireless Communications 3 cr.
A course that covers the fundamentals of wireless communications with emphasis on wireless channel modeling; digital modulation in wireless channels; diversity techniques; channel coding and interleaving in fading channels; adaptive equalization; multiple access techniques; the cellular concept; overview of current wireless communications systems. Prerequisite: EECE 442 or consent of instructor.

EECE 640L Wireless Communications Laboratory 1 cr.
A laboratory course that covers the following topics: basics of radio network planning and optimization, radio network planning for the GSM cellular system, radio network planning for the UMTS cellular system, GSM-UMTS co-existence and co-citing, radio network planning for the WiMAX broadband system, indoor GSM drive testing measurements and analysis, outdoor GSM drive testing measurements and analysis, UMTS drive testing measurements and analysis, and measurement-based wireless channel modeling. Prerequisite: EECE 640 or consent of instructor.

EECE 641 Information Theory 3 cr.
In this course students study data transmission through introducing the field of information theory. The theory is introduced in a gradual fashion and students study its application to communications theory, computer science, statistics and probability theory. Covering all the essential topics in information theory, students are introduced to the basic quantities of entropy, relative entropy and mutual information to show how they arise as natural answers to questions of data compression, channel capacity, rate distortion and large deviation theory. Prerequisite: STAT 230 or STAT 233 or EECE 442, or consent of instructor.

EECE 642 Introduction to Coding Theory 3 cr.
This course introduces the theory of error-correcting codes with a focus on the asymptotic, algorithmic and algebraic aspects. Topics include: background material from combinatorics and algebra; Shannon's coding theorem; linear codes; coding bounds; classical algebraic codes: Hamming and Hadamard codes, Reed-Solomon codes and Justesen codes and decoding algorithms; codes from graphs: low density parity check codes, expander codes, explicit constructions and decoding algorithms; and an introduction to turbo codes.

EECE 644/444 Stochastic Processes, Detection, and Estimation 3 cr.
This is a graduate-level introduction to the fundamentals of detection and estimation theory involving signal and system models in which there is some inherent randomness. The concepts that we develop are extraordinarily rich, interesting and powerful, and form the basis for an enormous range of algorithms used in diverse applications. The material in this course constitutes a common foundation for work in the statistical signal processing, communication and control areas. Prerequisites: STAT 230 and EECE 340 or STAT 233 and EECE 340 or consent of instructor.

EECE 645 Wireless Cellular Technologies 3 cr.
A course on the evolution of cellular technologies with focus on 2G GSM technology, 3G UMTS/HSPA technology, 4G LTE technology and beyond. Topics include: cellular network fundamentals; standardization; transmitter and receiver link level designs; access and core network architectures; physical channels and signaling procedures; scheduling and radio resource management; radio network planning; multiple antenna techniques; emerging topics. Prerequisite: EECE 640 or consent of instructor.

EECE 646/446 Data Communications 3 cr.
A course that addresses digital communication principles and techniques aimed at achieving improved reliability. The course examines information measures, such as entropy and mutual information for discrete and waveform channels, source coding, channel capacity and coding theorem, linear block and cyclic codes, hard and soft decision decoding, and spread spectrum modulation. Prerequisite: EECE 442 or consent of the instructor.

EECE 647 Queuing Theory 3 cr.
A course that covers Poisson counting and renewal processes; Markov chains and decision theory, branching processes, birth death processes and semi-Markov processes; simple Markovian queues, networks of queues, general single and multiple- server queues, bounds and approximations.

EECE 651 Internet Engineering 3 cr.
A course that provides in-depth coverage of Internet architecture, Internet protocols and routing; discusses recent developments on the Internet such as IPv6, switching and mobility; and gives a detailed study of TCP. Prerequisite: EECE 350 or EECE 351 or consent of instructor.

EECE 651L Internetworking Laboratory 1 cr.
This laboratory course covers the technologies and protocols of the Internet. The experiments cover IP, ARP, ICMP, UDP, TCP, DNS, routing protocols (RIP, OSPF, BGP), network address translation (NAT), dynamic host configuration (DHCP), SNMP and IP multicast. Prerequisite: EECE 350 or EECE 351 or consent of instructor.

EECE 652 Web Server Design and Programming 3 cr.
This course concentrates on major technologies used in building web servers. It is divided into two parts: client programming and server programming. The first part includes HTML, CSS, Java Script and XML programming. The second part is based on the ASP. NET framework (both Forms and MVC) along with C#. It covers basic controls, validation, database interfacing, AJAX, sessions and cookies, file uploading and downloading, emails with attachments, securing websites, user controls and third-party controls. The course concludes with programming and interfacing with web services. The website development group-based project is a major component of the course.

EECE 653 Multimedia and Networking 3 cr.
This course covers topics in multimedia such as system requirements, performance requirements, representation and compression. Multimedia networking is emphasized by discussing multicasting, streaming, multimedia networking protocols and quality of service-based traffic management protocols. Other topics covered include synchronization, VoIP and Internet2. Multimedia networking applications are designed and implemented as student projects. Prerequisite: EECE 350 or EECE 351 or consent of instructor.

EECE 654/454 Communication Networks-Modeling and Optimization 3 cr.
The course covers the modeling and optimization of communication networks with applications that span fundamental and emerging design problems. Topics include modeling network resources, performance metrics, and requirements; optimization problem formulations and solution methods for multihop communications, resource allocation, network planning and topology design; and emerging research problems such as drone-based cell planning, edge computing, and ultra-low latency communications. Prerequisite: EECE 350 or EECE 351 or consent of instructor.

EECE 655 Internet Security 3 cr.
The course covers topics in Internet security. It discusses security threats, vulnerabilities of protocols and the different types of attacks. Preventive and defensive mechanisms are covered, such as e-mail security, web security, IP security, network management security, wireless security, intrusion detection techniques, firewalls, VPNs and tracing the source of attacks. Student projects will be composed of implementation, simulation and research components. Prerequisite: EECE 350 or EECE 351 or consent of instructor.

EECE 655L Network and Computer Security Laboratory 1 cr.
A laboratory that addresses advanced network and computer security topics. Experiments include the execution of attacks, the setup of intrusion detection and prevention, securing computers and wired and wireless networks, and digital forensics. Prerequisite: EECE 350 or EECE 351 or consent of instructor.

EECE 656 Mobile Ad Hoc and Sensor Networks 3 cr.
This course covers major aspects of ad hoc and sensor networking, and tackles topics related to mobility, disconnections and battery energy consumption. The course is composed of two parts: mobile ad hoc networks (MANETs) and wireless sensor networks (WSNs). The first part provides a detailed treatment of routing protocols in MANETs, the changes to TCP to support mobility and vehicular networks. In the second part, topics

covered concern information-centric routing, MAC layer provisions for energy savings, addressing, localization, time synchronization and information dissemination. The group project gives students hands-on experience in designing protocols and applications for real sensor devices. Prerequisite: EECE 350 or EECE 351 or consent of instructor.

EECE 657 Wireless Security 3 cr.
A course that covers wireless network security; security challenges in wireless networks; security problems facing existing and upcoming wireless networks; security in naming, addressing, neighbor discovery and routing; and trust and privacy. Prerequisites: EECE 350 or EECE 351 and EECE 455 or EECE 632, or consent of instructor.

EECE 660/ MECH 653 System Analysis and Design 3 cr.
A course that outlines state-space models of discrete and continuous, linear and nonlinear systems; controllability; observability; minimality; Eigenvector and transforms analysis of linear time invariant multi-input multi-output systems; pole shifting; computer control; design of controllers and observers. Prerequisite: EECE 460 or MECH 436, or consent of instructor.

EECE 661/MECH 641 Robotics 3 cr.
A course discussing concepts and subsystems; robot architecture; mechanics of robots: kinematics and kinetics; sensors and intelligence; actuators; trajectory planning of end effector motion; motion and force control of manipulators; robot languages. Pre- or corequisite: EECE 460, MECH 436 or consent of instructor.

EECE 662/MECH 655 Optimal Control 3 cr.
A course on optimization theory and performance measures, calculus of variations, the maximum principle, dynamic programming, numerical techniques, LQR control systems.

EECE 663/MECH 656 System Identification 3 cr.
This course introduces the basic mathematical tools to fit models into empirical input-output data. General time-series modeling and forecasting, such as stock prices, biological data and others. Topics include nonparametric identification methods: time and frequency response analysis; parametric identification: prediction error, least squares, linear unbiased estimation and maximum likelihood; convergence, consistency and asymptotic distribution of estimates; properties and practical modeling issues: bias distribution, experiment design and model validation.

EECE 664 Fuzzy Sets, Logic and Applications 3 cr.
A course that outlines fuzzy sets and related concepts; logical connectives; mapping of fuzzy sets; extension principle; fuzzy relations and fuzzy set ordering; fuzzy logic inference; applications: fuzzy control, signal processing, pattern recognition, decision- making and expert systems.

EECE 665/MECH 654 Adaptive Control 3 cr.
A course that includes the control of partially known systems; analysis and design of adaptive control systems; self-tuning regulators; model reference adaptive control of uncertain dynamic systems; typical applications. Prerequisite: EECE 460 or MECH 436, or consent of instructor.

EECE 667 Pattern Recognition 3 cr.
The course provides an overview of the algorithms used in machine learning. The course discusses modern concepts for model selection and parameter estimation, decision-making and statistical learning. Special emphasis will be given to regression and classification for supervised modes of learning. Students will be assigned typical machine

learning problems to investigate as projects.

EECE 668 Game Theory and Decision-Making 3 cr.

This course provides a set of tools, approaches and perspectives on game theory to mimic the human elements of decision-making that is best described by strategy and cooperation. Topics covered include: games of skills, games of chance, cooperative, mixed motive, zero sum, coalition and repeated games. Students will be assigned real-world examples of game theory to investigate as projects.

EECE 669/MECH 648 Nonlinear Systems: Analysis, Stability and Control 3 cr.

Introductory to the theory of systems of coupled, nonlinear, time-varying ordinary differential equations. Topics include existence and uniqueness of solutions, stability of equilibria, nonlinear stability theory, Lyapunov analysis, Barbalat's lemma, input-to-state stability, input-output stability, nonlinear control design techniques, feedback linearization, backstepping, and sliding mode control. Prerequisite: EECE 460 or MECH 436, or consent of instructor.

EECE 670/470 Power System Planning 3 cr.

The course investigates electric energy and peak demand forecasts using weather sensitive, time curve, autoregressive and causal models; generation reliability evaluation, loss of energy expectation, energy limited units, probabilistic production costing, generating capacity expansion analysis and maintenance scheduling; operational planning, unit commitment, hydrothermal coordination; power system security classification, contingency analysis, external equivalents, optimal power flow; planning in a competitive electric power environment. Prerequisite: EECE 471 or consent of instructor.

EECE 671 Environmental Aspects of Energy Systems 3 cr.

A course that examines world energy resources and classifications; sources and effects of air pollution; air quality modeling, Gaussian dispersion models for pollution estimation; motor vehicle emissions and noise pollution; environmental impacts of electricity generation, pollution control systems, electromagnetic radiation, production and impacts in high-voltage applications; environmental impact assessment; basic concepts.

EECE 672 Energy Planning and Policy 3 cr.

This is a course that focuses on features of modern energy planning and policy. Topics covered include the interaction among the technological, economic, environmental and sociopolitical aspects of energy supply and use; electricity, oil and gas industries, and their market structures; elements of energy planning on the sector and national levels; energy decision-making under conditions of uncertainty; risk management in energy planning; liberalization of energy markets; case studies.

EECE 673 Power Electronics Systems and Applications 3 cr.

A course that reviews converter topologies for AC/DC, DC/AC and DC/DC; power supply applications; converter applications to motor drives; utility interface of distributed energy systems; static VAR systems; flexible AC transmission; high voltage DC; power quality control; active and passive harmonics compensation. Prerequisite: EECE 473 or EECE 471, or consent of instructor.

EECE 674 Energy Storage and Sustainable Systems 3 cr.

The course covers the principles of sustainable energy systems, solar radiation, solar thermal applications, the Stirling engine, fuel cells and the hydrogen cycle. Various energy storage technologies are also investigated, e.g. thermal storage, compressed air, flywheels, batteries, and ultra-capacitors. The operation principles of each application will be discussed, its current developments and future trends, and students will design an energy storage solution for a selected application. Prerequisites: EECE 230, EECE 310 and Phys 210, or consent of instructor.

EECE 675 PV and Wind Electric Energy Systems 3 cr.
This course seeks to impart in students a sound understanding of renewable energy systems in terms of their design, operation and economic impacts. It covers wind resource assessment and site selection; drag and lift principles; linear momentum theory; turbine characteristics; power and energy yield calculation; aspects of wind drive options: horizontal and vertical axis machines, fixed and variable speed wind turbine generators. It also covers solar resource assessment; photovoltaic cells: photo effect, P-N junction, principle of operation of PV cells, circuit models, maximum power point trackers, I-V and power characteristics, physics of shading, types and characteristics of autonomous solar energy systems, hybrid systems and grid connected systems; the economics of wind and solar energy systems. Introduction to small hydro and geothermal energy systems.

EECE 676 Modeling and Control of Electric Drives 3 cr.
A course that covers several topics related to modeling and control of electric drives. The course introduces fundamental equations related to inductance and flux variations in a rotating machine, leading to torque production. Reference frame theory and transformations are also studied for modeling purposes. Dynamic models of three- phase induction and permanent-magnet synchronous machines are derived. Basic modeling of power electronic converters for electric drives, with focus on three-phase DC/AC inverters, are introduced. Various control strategies are studied with focus on vector control and different power electronic switching schemes in electric drives. Prerequisite: EECE 474 or EECE 473 or consent of instructor.

EECE 677 Electric Power System Stability and Control 3 cr.
A course on synchronous machine modeling and simulation, response to small disturbances and voltage instability. Topics include Park's transformation, flux linkage, voltage and state-space equations, subtransient and transient parameters, simplified models of the synchronous machine, treatment of saturation, system reference frame, small-signal stability, power system stabilizers and bifurcation analysis. Prerequisite: EECE 678 or consent of instructor.

EECE 678/478 Advanced Power System Analysis 3 cr.
A course on optimal dispatch of generation, symmetrical components and unbalanced faults, transient stability, control of generation, state estimation in power systems and power system simulation. Prerequisite: EECE 471 or consent of instructor.

EECE 679/479 Energy Efficiency in the Power Sector 3 cr.
Introduction to the concept of sustainable development and its roots as an interdisciplinary vision, the framework of the 17 SDGs, with 169 targets, and the history of development, achievements and challenges facing the SDGs deployment, role of engineers in achieving sustainability, outcomes of COP28. Selected topics covered in the course include: Energy conversion, generation and cogeneration, load duration curves, losses and efficiency optimization, theory and application of energy analysis techniques, energy audit: definition and types, data analysis, reporting and recommendation. Prerequisite: EECE210, or consent of instructor.

EECE 680/480 Antennas for Wireless Communications 3 cr.
This course provides students with an understanding of basic principles of antenna analysis and design for wireless communications. The course covers an overview of the fundamental characteristics and parameters of antennas, an overview of analytical methods used to analyze and design antennas with application to some basic antenna structures such as linear antennas, loop antennas, antenna arrays and microstrip antennas. Prerequisite: EECE 380 or consent of instructor.

EECE 681 Advanced Antenna Design 3 cr.
This course provides students with an understanding of advanced antenna structures and presents an overview of analytical and numerical methods used to analyze and design these antenna structures. This course includes broadband antennas, frequency-independent antennas, aperture antennas, horn antennas, microstrip antennas and reflector antennas. Students will work on a research paper on a selected antenna design topic. Prerequisite: EECE 680 or consent of instructor.

EECE 682 Time-Harmonic Electromagnetic Fields 3 cr.
A course on time-varying and time-harmonic EM fields; electrical properties of matter; wave propagation and polarization; construction of solutions; reflection and transmission; electromagnetic theorems and principles in particular equivalence; rectangular waveguides and cavities; dielectric, circular and spherical waveguides; radiation from structures; scattering by wedges, cylinders and spheres; radiation from apertures, and perturbational and variational techniques. Prerequisite: EECE 380 or consent of instructor.

EECE 683 Numerical Methods in Electromagnetics 3 cr.
This course examines the principles and applications of numerical techniques for solving practical electromagnetics problems. It covers the moment methods, finite difference methods, finite element methods and hybrid methods. The course also investigates the application of the finite-volume control method in electromagnetics. Prerequisite: EECE 682 or consent of instructor.

EECE 684/484 Microwave Engineering 3 cr.
This course focuses on the analysis and design of passive microwave circuits. It covers the fundamentals for radio frequency and microwave engineering. It discusses the theories of transmission lines, waveguides, impedance matching, microwave networks, scattering parameters, power dividers, directional couplers, microwave resonators and microwave filters. The course enables students to study and analyze their own microwave network using computer-aided design tools and measurement equipment. Prerequisite: EECE 380 or consent of instructor.

EECE 685/485 Radio Frequency (RF) Circuits Design 3 cr.
This course covers advanced RF circuit design principles and techniques, beginning with the behavior of passive components like high-frequency resistors, capacitors, and inductors. Students learn to design RF circuits using transmission line theory and the Smith Chart, then delve into the study of two-port networks and their representations in terms of S-parameters. The course emphasizes impedance matching, biasing, and RF transistor modeling. Various RF amplifier configurations such as low noise, high power, and broadband amplifiers are explored along with their applications. Nonlinear systems in RF oscillator and mixer circuits are discussed, as are RF switches and phase shifters. Throughout the course, students use computer-aided design tools for simulation and analysis, gaining practical skills in RF circuit design. Prerequisites: EECE 310 and EECE 380; or consent of instructor.

EECE 686/486 Radio-Frequency (RF) Transceiver Design 3 cr.
This course targets the physical layer of a communication system by focusing on the interactions between the various transceiver blocks. The course addresses the design and operation of the components that reside between the signal processing unit and the antenna within the RF chain. The course also details the functional level modeling of different transceiver architectures by accounting for the gain, noise, nonlinearity, sensitivity and dynamic range. In addition, students are exposed to recent computer- aided

simulation tools and measurement techniques through a set of laboratory experiments that are tailored based on the course content. As a result, the course equips the students with theoretical and practical experience in RF transceiver. Prerequisites: EECE 380 and EECE 311; or consent of instructor.

EECE 687/487 Radio-Frequency Integrated Circuit (RFIC) Design 3 cr.
The course addresses the analysis and design of passive and active Radio Frequency Integrated Circuits (RFICs). The course introduces the design of on-chip lumped elements and passive RF components. In addition, it includes the design of various RF blocks such as low noise amplifiers, power amplifiers, oscillators, mixers, phase locked loops, frequency synthesizers, and switches. The course provides students with hands-on experience in the simulation of RFICs as well as the different calibration and de-embedding techniques for on-wafer measurements. As a result, the students will be equipped with essential theoretical and practical experience in RFIC design. Prerequisites: EECE 380 and EECE 311 ; or consent of instructor.

EECE 688/488 Engineering Bio-Electromagnetics 3 cr.
This course discusses the interaction between biological material and electromagnetic fields. The course introduces Bio-Electromagnetics along with its sub-divisions and reviews the fundamental properties of electromagnetic fields and their propagation characteristics in lossy biological tissues. The course then elaborates on the electromagnetic properties of biological tissues from a bioelectric perspective. Bio-Electromagnetism is then analyzed at DC, extremely low frequencies, radio frequencies, up to Terahertz frequencies and beyond. The concept of Dosimetry and the principles of energy absorption in biological tissues are then studied along the design of electromagnetic sensors and electrodes for monitoring, reception and stimulation in the human body. The human body is then analyzed as a communication channel and as a generator of electromagnetic fields. The course is concluded with an introduction to the various electromagnetic simulation tools and the corresponding measurement techniques. Prerequisites: EECE 380 and EECE 340 ; or consent of instructor.

EECE 690/490 Introduction to Machine Learning 3 cr.
The course provides an overview of machine learning theory and algorithms that learn from experience to predict or control yet to be seen instances. The course discusses the intuition and the theory of some selected modern machine learning concepts as well as practical know-how to successfully apply them to new problems. It covers topics in supervised learning such as parametric/ non-parametric, generative/ discriminative algorithms for classification and regression and in unsupervised learning for clustering, dimensionality reduction and reinforcement learning. The course also includes case studies and applications so that students can gain practice on regularization, model selection, parameter estimation, Bayesian networks, hidden Markov models, support vector machines, reinforcement learning, neural networks and deep learning. Students cannot receive credit for both EECE 664M and EECE 633 and 667. Prerequisites: EECE 330, and MATH 218 or MATH 219, and STAT 230 or STAT 233 or consent of instructor.

EECE 691/491 Digital Signal Processing 3 cr.
Digital Signal Processing (DSP) is at the heart of almost all modern technology. This course introduces fundamentals of DSP systems, including digital IIR and FIR filter design, sampling and reconstruction, A/D and D/A conversion, quantization, discrete-time Fourier analysis and fast convolution, spectral analysis, sample-rate conversion, filter structures and realizations, and multirate DSP and filter banks. The course also discusses applications of DSP in areas such as speech/audio processing, autonomous vehicles, and software radio. It includes a project related to DSP algorithm implementation on embedded processors.

Prerequisite: EECE 340 or consent of instructor

EECE 691L Digital Signal Processing 3 cr.
This graduate lab is comprised of a set of lab experiments in MATLAB, C and Assembly covering a series of real-time signal processing topics. The developed laboratory material is intended to complement the digital signal processing course (EECE 691). Upon completion of the lab, students will have acquired the required knowledge and skills to develop real-time DSP systems. Prerequisite: EECE 691 or EECE 491 or consent of instructor.

EECE 692/MECH 642 Computer Vision 3 cr.
An introductory course on the problems and solutions of modern computer vision. Topics covered include image acquisition, sampling and quantization; image segmentation; geometric framework for vision: single view and two-views; camera calibration; stereopsis; motion and optical flow; recognition; pose estimation in perspective images.

EECE 693 Neural Networks 3 cr.
The course provides a comprehensive foundation to artificial neural networks and machine learning with applications to pattern recognition and data mining; learning processes: supervised and unsupervised, deterministic and statistical; clustering; single layer and multilayer perceptrons; least-mean-square, back propagation, deep learning; Al-Alaoui pattern recognition algorithms; radial basis function networks; committee machines; principal component analysis; self-organizing maps; current topics of interest.

EECE 694 Digital Image Processing 3 cr.
An introduction to multi-dimensional signal processing; digital image fundamentals; image formation and perception; image representation, coding and filtering; image enhancement in the spatial and frequency domains; image restoration; color image processing; wavelet and multi-resolution processing; image compression; morphological image processing; image segmentation; feature extraction and scene analysis; representation and description; object recognition; introduction to computer graphics and computer vision; current topics of interest.

EECE 694L Image Processing Lab 1 cr.
The EECE 694L graduate lab comprises a set of MATLAB/C++ based lab experiments in different image processing topics covering image pre- and post-processing techniques, image compression, morphological transformations, image restoration and enhancement techniques, color image processing, computer vision basics, and geographical image processing. In addition, students will be exposed to software optimizations for real time image processing using SIMD instructions. Prerequisite: EECE 694 or EECE 603, or consent of instructor.

EECE 695 Adaptive Filtering 3 cr.
A course that examines the fundamentals of optimal filtering and estimation, Wiener filters, linear prediction, steepest-descent and stochastic gradient algorithms; frequency-domain adaptive filters; method of least squares, recursive least squares, fast fixed order and order-recursive (lattice) filters; misadjustment, convergence and tracking analyses, stability issues, finite precision effects; connections with Kalman filtering; and nonlinear adaptive filters.

EECE 696 Applied Parallel Programming 3 cr.
This course is an introduction to parallel programming and GPU computing. Topics include GPU as part of the PC architecture; CUDA, CUDA threads and CUDA memory; floating point performance; open CL, MPI and reductions, and their implementation. The course also includes application case studies, current topics and a course case study. Prerequisite: EECE 321 or consent of instructor.

EECE 697/MECH 646 Wheeled Mobile Robotics 3 cr.
A course that provides in-depth coverage of wheeled mobile robots. The material covers: nonholonomy and integrability of kinematic constraints. Modeling: kinematics, dynamics and state-space representation. Nonlinear control strategies (open-loop and closed-loop). Five case studies are covered during the course: car-like, cart-like, omni- directional wheeled, mobile wheeled pendulums and bike-like robots.

EECE 698/MECH 650 Autonomous Mobile Robotics 3 cr.
This course is designed to provide engineering graduate and 4th year students with the opportunity to learn about autonomous mobile robotics. Topics include sensor modeling, vehicle state estimation, map-based localization, linear and nonlinear control, and simultaneous localization and mapping. Prerequisites: EECE 230, EECE 312, and Pre- or corequisite MECH 436; or Prerequisites: EECE 230 and Pre- or corequisite EECE 460; or consent of instructor.

EECE 699 Topics in Artificial Intelligence 3 cr.
This course focuses on some selected topics in AI related to agent and multi-agent systems, life-long learning and artificial life. Specifically, this course covers both theoretical and technical issues in reinforcement learning, transfer learning, evolutionary approaches, quantum genetic algorithms and explainable AI. The course also has a practical project for students to explore learned concepts from a contemporary lens.

EECE 731 Advanced Topics in Complexity Theory 3 cr.
The course covers advanced topics in computational complexity theory. Topics include: hierarchy theorems; relativization; non-uniform models of computations: branching programs and circuits, relations and lower bounds; alternation and the polynomial hierarchy; interactive proofs; probabilistically checkable proofs; pseudorandomness: hardness versus randomness paradigm, generators for space bounded computations, special purpose generators. Prerequisite: EECE 631 or consent of instructor.

EECE 732 Pseudorandomness 3 cr.
This course covers the basics of the area of pseudorandomness. Topics include: randomized complexity classes; background material from coding theory; computational indistinguishability and pseudorandom generators; hardness versus randomness: Nisan-Wigderson generator, Impagliazzo-Wigderson theorem; simple generators: k-wise independence and small-bias spaces; unconditional generators for constant depth circuits and space-bounded computation; and randomness extractors. Prerequisite: EECE 631 or consent of instructor.

EECE 796 Special Project 3 cr.
An assigned project of no more than 3 credit hours supervised by a faculty member.

EECE 797 Seminar 0 cr.
Seminar

EECE 798 Special Topics 3 cr.
Every term.

EECE 799 Thesis 6 cr.
Every term. Prerequisite: EECE 799T.

EECE 799T Comprehensive Exam 0 cr.

Every term.

EECE 898 Advanced Topics in Electrical and Computer Engineering 3 cr.
Advanced Topics in Electrical and Computer Engineering.

EECE 980 Qualifying Exam Part I: Comprehensive Exam 0 cr.
Every term.

EECE 981 Qualifying Exam Part II: Defense of Thesis Proposal 0 cr.
Every term. Prerequisite: EECE 980.

EECE 982 PhD Thesis 3 cr.
Every term. Taken while total required credit hours have not been completed

EECE 983 PhD Thesis 6 cr.
Every term. Taken while total required credit hours have not been completed

EECE 984 PhD Thesis 9 cr.
Every term. Taken while total required credit hours have not been completed

EECE 985 PhD Thesis 12 cr.
Every term. Taken while total required credit hours have not been completed

EECE 986 PhD Thesis 0 cr.
Every term. Taken while total required credit hours have not been completed

EECE 987 PhD Thesis Defense 0 cr.
Every term. Prerequisite: EECE 981.

Department of Industrial Engineering and Management (IEM)

Chairperson:	Maddah, Bacel
Professors:	Maddah, Bacel; Salameh, Moueen
Associate Professor:	Tarhini, Hussein
Assistant Professors:	Nouiehed, Maher; Abou Ibrahim, Hisham; Zahed, Karim; Nehme, Nabil (visiting); Olleik, Majd
Senior Lecturers:	Abillama, Walid; Noueihed, Nazim; Saad, Youssef; Trabulsi, Samir
Lecturers:	Abboud, Jacques; Bdeir, Fadl; Hamade, Tarek; Kalach, Mayssa; Khraibani, Rayan; Youness, Hasan
Instructors:	Basmadjian, Garo; Gharios, Nadim; Hosn, Majd; Jaafar, Maysaa; Kadi, Samir; Karam, Mario; Mattar, Maurice; Sfeir, Rana

General Information

The Department of Industrial Engineering and Management offers a graduate program in Engineering Management. The graduate program leading to the degree of Master of Engineering Management (MEM) provides professional training in engineering management, with emphasis on technically based organizations and applications to various engineering and related disciplines. This program addresses the specific area of management of technical activities and enterprises.

A student may pursue courses to satisfy one of the three following areas of concentration:

- Financial and Industrial Engineering (FIE)
- Project and Program Management (PPM)
- Management of Technology and Entrepreneurship (MTE)

The requirements for the Master of Engineering Management degree can be fulfilled by pursuing one of the following two options.

Non-Thesis Option

Under this option, a student is required to complete a total of 33 credits, subdivided as follows:

- Four core courses (ENMG 602, ENMG 603, ENMG 606, and ENMG 661, 12 credits)
- Four electives from the student's area of concentration (12 credits)
- Three free electives (9 credits)
- Seminar (0 credit)

Thesis Option

Under this option, a student is required to complete a total of 30 credits, subdivided as follows:

- Four core courses (ENMG 602, ENMG 603, ENMG 606, and ENMG 661, 12 credits)
- Three electives from the student's area of concentration (9 credits)
- One free elective (3 credits)
- Thesis (6 credits)
- Seminar (0 credit)

Free electives should be graduate courses (within IEM, MSFEA or any AUB program), which relate to engineering management. All free electives must be approved by the student's academic advisor. All students pursuing the FIE concentration are required to take ENMG 623 Stochastic Models and Applications. All students pursuing the PPM concentration are required to take ENMG 632 Project Planning Scheduling and Control. The ENMG 797 Special Project course can be used to satisfy the 3-credit requirement of any elective depending on the nature of the topic addressed. A flexible combination of courses not in fulfillment of either option stated above leads to no mention of an area of concentration on the student's transcript.

Requirements for Admission

In order to be eligible for admission to the MEM program, a student must have a bachelor's degree in engineering, architecture or a related field. The student must also satisfy the requirements of the university and the Maroun Semaan Faculty of Engineering and Architecture for admission to graduate study, as specified in the relevant sections of this catalogue.

Graduates of universities other than AUB or from majors other than engineering or architecture may be required to take undergraduate prerequisite courses to make up for deficiencies.

A student is not allowed to register in the program for more than four calendar years beyond the date of his/her first registration, except with the approval of the Graduate Studies Committee of the faculty.

Engineering Management Master's Degree – Online

The Master of Engineering Management - Online program is a graduate program that provides the student with a complete management experience, coupling the analytical and scientific tools with business management skills. The MEM – Online program is designed to have the same learning outcomes as the residential MEM program. Similar to the residential MEM program, it prepares the student for managerial and leadership positions within turnkey projects and organizations.

Eligibility and Admissions Requirements

Following AUB's standards, in order to be eligible for admission to the MEM – Online program, a student must have an undergraduate bachelor's degree in engineering or architecture (BE or its equivalent) with an average of 3.3 or higher GPA on the AUB Scale (or equivalent) in the last two years of study. This requirement may be waived for applicants with strong work experience.

Other admission requirements are similar to those of the residential MEM program on the previous page.

Structure and Program Requirements

The MEM – Online program only admits students in the non-thesis option. A student is required to complete a total of 33 credits, subdivided as follows:

- Four core courses (12 credits): ENMG 602, ENMG 603, ENMG 606, and ENMG 661
- Seven electives (21 credits): The student chooses from the following electives, which are offered online on a regular basis, ENMG 624, ENMG 627, ENMG 632, ENMG 635, ENMG 642, ENMG 644, ENMG 645, ENMG 646, ENMG 647, and ENMG 648.

Dual Master's Degrees: Master of Engineering in Engineering Management and Master of Science in Energy Studies (thesis option only)

The dual master's degrees - Master of Engineering in Engineering Management and Master of Science in Energy Studies – program is primarily intended for individuals with a bachelor's degree in engineering who seek to deepen their knowledge in advanced energy studies and engineering management subjects.

Applicants must be accepted into both programs (Master of Engineering Management and Master of Science in Energy Studies) and in accordance with the policies of each program, and with AUB policies regarding dual graduate degrees.

A student wishing to apply for the dual degree may submit a single dual-degree application that will be sent to each program simultaneously when first applying for graduate admissions. If the student is already registered in one degree, the student may apply for the second degree no later than the end of the second term at AUB.

The program permits full-time or part-time enrollments. To fulfill the basic requirements for the dual degree, a student must complete a minimum of 18 credit hours of graduate course work in each degree program. The remaining credits include additional course work and a thesis that are credited to the dual degree. The program requires a minimum of 42 credit hours of graduate course work and 6 credits of thesis work. The coursework is distributed as follows:

- 9 credits of core Engineering Studies (ENST) courses
- 6 credits of core Engineering Management (ENMG) courses
- 6 credits of common courses: Required core ENMG (ENST List A Electives)
- 12 credits of ENMG elective courses
- 6 credits of elective courses from ENST List B on energy science and technology
- 3 credit elective course as approved by thesis advisor/s (ENST)

The courses that are counted toward both degrees are:

ENMG 603 Probability and Decision Analysis 3 cr.

ENMG 604 Deterministic Optimization Model 3 cr.

Comprehensive Exam 0 cr.

Thesis 6 cr.

Course Descriptions

Core Courses

ENMG 602 Introduction to Financial Engineering 3 cr.
Acquire the basics of financial accounting, the investment process and financial markets, and gain a flavor of Financial Engineering applications such as pricing and portfolio structuring of bonds, capital budgeting, cash matching, dynamic investment management and firm valuation. This course will prepare you to handle more complex financial instruments with uncertain cash flows, such as stocks, options and futures.

ENMG 603 Probability and Decision Analysis 3 cr.
Acquire the basics of financial accounting, the investment process and financial markets, and gain a flavor of Financial Engineering applications such as pricing and portfolio structuring of bonds, capital budgeting, cash matching, dynamic investment management and firm valuation. This course will prepare you to handle more complex financial instruments with uncertain cash flows, such as stocks, options and futures.

ENMG 606 Applied Data Science 3 cr.
Gather theoretical knowledge and gain practical skills to analyze, visualize, and explore data. Get introduced to applied data analytics, with an emphasis on viewing data from both statistical and machine learning perspectives.

ENMG 661 Strategic Management of Technology 3 cr.
The organization as a whole and its interaction with its environment. The corporation as it undergoes the process of a global transformation. Mergers, acquisitions, outsourcing, downsizing and privatization. Framework of analysis for the identification of central issues and problems usually faced in strategic management. Understanding the effect of present and future environments on the corporation's welfare.

Elective Courses

Financial and Industrial Engineering Sequence

ENMG 604 Deterministic Optimization Models 3 cr.
Mathematical modeling and the operation research approach. Formulation and classification of optimization models. Improving search. Formulation of linear programs (LPs). Simplex algorithms for solving LPs. Duality and sensitivity in linear programming. Multi-objective optimization and goal programming. Introduction to network flow models. Formulation of integer programs. Solution methods for integer programs. Unconstrained nonlinear programming. Introduction to constrained nonlinear programming and quadratic programming.

ENMG 611 Supply Chain Design and Management 3 cr.
The course is an introduction to supply chain management and its key issues, such as logistics, network configuration, inventory management, distribution strategies and strategic alliances. The value of information in supply chains, information technology and decision support systems for supply chain management are also covered.

ENMG 612 Advanced Supply Chain Design and Management 3 cr.
This course concentrates on the advanced quantitative and qualitative techniques used in supply chain management to achieve competitive advantage. The focus is on planning models for production, inventory and distribution in general multi-echelon multi-item systems. This course also deals with models for planning, information sharing, transportation, distribution and site selection.

ENMG 616 Advanced Optimization Techniques 1 cr.
The course is divided into four parts covering integer programming, nonlinear programming, stochastic programming and heuristic methods. Students will develop skills in modeling complex systems using mathematical programming, analyzing the structure of mathematical programs, and developing and applying the correct solution techniques.

ENMG 617 Engineering Management Statistics 3 cr.
Review of probability and probability distributions. Data description. Random samples and sampling distributions. Parameter estimation. Tests of hypotheses. Design and analysis of single-factor experiments: the analysis of variance. Design of experiments with several factors. Simple linear regression and correlation. Multi-variable regression. Nonparametric statistics.

ENMG 622 Simulation Modeling and Analysis 3 cr.
Generating discrete and continuous random variables. Discrete-event simulation. Statistical analysis of simulated data. Variance reduction techniques. Statistical validation techniques. Markov chain and Monte Carlo methods. Experience with a modern discrete-event simulation package (e.g., ARENA, SIMIO).

ENMG 623 Stochastic Models and Applications 3 cr.
Review of probability and random variables. Poisson process, renewal theory, queueing models, reliability theory, Markov chains, Brownian motion, random walks and Martingale, stochastic order relations.

ENMG 624 Financial Engineering I: Portfolios and Risk Management 3 cr.
Basic theory of interest. Fixed-income securities yield, duration convexity and immunization. Term structure of interest rates. Expectation, liquidity and market segmentation explanations of the term structure. Applied interest rate analysis: capital budgeting, optimal portfolios, dynamic cash flow processes, optimal management, the Harmony Theorem, valuation of a firm. Mean-variance portfolio theory. Introduction to expected utility theory. Introduction to general pricing theory. Prerequisite: ENMG 602 or INDE 301, or consent of instructor.

ENMG 625 Financial Engineering II: Derivatives 3 cr.
Derivative securities: forwards, futures and swaps; models of asset dynamics; options theory; interest rate derivatives. General cash flow streams: optimal portfolio growth, general investment evaluation. Prerequisite: ENMG 602 or INDE 301, or consent of instructor.

ENMG 626 Human-Computer Interaction and Usability 3 cr.
This course provides an overview of human-computer interaction and user-centered design, including human cognition and visual search theories, methods to understand the user and context (e.g., interviews, questionnaires, observations), design principles, prototyping, and a variety of usability testing and evaluation techniques. As part of the course, students will also learn basic design of experiments and statistical analysis.

ENMG 627 Applied Data Science 3 cr.
The purpose of this course is to provide theoretical knowledge and practical skills to analyze, visualize and explore data. The covered material provides an introduction to

applied data analysis, with an emphasis on providing conceptual framework for viewing data from both statistical and machine learning perspectives. Topics covered include supervised and unsupervised machine learning models (e.g. regression, classification, clustering, PCA), frequentist estimation, and hypothesis testing.

Project and Program Management Sequence

ENMG 632 Project Planning Scheduling and Control 3 cr.
Extended overview of project management. Basic planning and scheduling concepts. Project participants and roles. Project management applications and growth. Project team formation. Dealing with time. Project planning and costing. Advanced scheduling techniques. Integrated project cost-time control.

ENMG 633 Advanced Topics in Project Management 3 cr.
Planning and scheduling under constraints. Trade-off analysis in a project environment. Project cost control from a client's perspective. Project risk management. Managing the international project. Determinants of project success. Lessons learned in project management. Strategic planning in project management. Modern developments in project management.

ENMG 635 Project Deliverance and Contracts 3 cr.
Overview of project organizations. The design-build project delivery approach. The build-operate-transfer project delivery approach. Innovative delivery approaches, financial schemes and associated contracts. Allocation of risks in contracts. Bidding phase characteristics. Components of the proposal package. Evaluation of the commercial, financial and technical components. Contract formation and agreement closure.

ENMG 642 Lean Engineering Concepts 3 cr.
This course focuses on the emerging concept of lean performance in the construction industry. Topics covered include the origin of lean concepts, application to the design process, implementation in construction, contracting for lean performance and value improving practices (e.g., benchmarking, constructability and value management).

ENMG 644 Agile Software Project Management 3 cr.
The main objectives of this course are to enable the student to understand the fundamental principles underlying software management and economics. The course provides a quick overview of traditional software development and management strategies. This will be contrasted with iterative and incremental agile methods.

ENMG 645 Program and Portfolio Management 3 cr.
This course presents a view of managing projects from an organizational perspective. The main areas of discussion will be strategic alignment, the role of effectively managing organizational assets through an enterprise project management office, portfolio management and program management. Using specific examples and a case study approach, students will explore the importance of using organizational strategies to align projects and apply practices to create portfolios of programs and projects to efficiently leverage organizational assets.

ENMG 646 Project Risk Management 3 cr.
This course is designed for students with shy or no previous knowledge of risk management, with the objective of engaging them in active discovery of risk management principles. In a project environment, students will develop an awareness of the challenges, the tools and

the process of designing and implementing a risk management program. The practices covered are consistent with the PMBOK (Project Management Body of Knowledge) of the Project Management Institute (PMI). Application to industry projects will be stressed.

ENMG 647 Dispute Resolution 3 cr.
The course covers construction contract conditions governing claims and disputes. Focus is on claim evolvement and administration (including issues dealing with time barring, notification and substantiation) and ADR methods and amicable settlement.

ENMG 648 Project Management Principles and Practices
This course exposes students to the project management principles and practices. Students will acquire the necessary tools, and techniques to plan, execute, and control projects to deliver successful outcomes. The course will introduce students to project charter development, scope selection, delivery strategies, project planning, cost estimation, project controls, staffing, health/safety/environment (HSE), and quality management. The course exposes students to the principles of agile project management.

Management of Technology and Entrepreneurship Sequence

ENMG 601 Management Theory 3 cr.
Nature of managerial work and the roles of the executive (informational, decisional and symbolic). Organizational configurations. Ethics in business and organizational behavior. Business strategy. Principles and practice of worker motivation. Project management and performance assessment. Effective communications in organizations. Negotiation. Power and leadership.

ENMG 654 Technology-Based Entrepreneurship 3 cr.
An introduction to general theories, principles, concepts and practices of entrepreneurship and intrapreneurship. The entrepreneurial perspective, developing the entrepreneurial plan, initiating entrepreneurial ventures, growth and development of entrepreneurial ventures and contemporary challenges in entrepreneurship are discussed. The course includes case study analysis and group projects.

ENMG 656 Management of Technological Innovations 3 cr.
Strategic management of technology-based innovation within the firm. Assessing the innovative capabilities of the firm. Managing the corporate R&D function. Managing the interfaces between functional groups in the development process. Managing the new business development function in the firm. Building distinctive technology- based competencies and competitive advantages. Technological leadership versus followership in competitive strategy.

ENMG 661 Strategic Management of Technology 3 cr.
The organization as a whole and its interaction with its environment. The corporation as it undergoes the process of a global transformation. Mergers, acquisitions, outsourcing, downsizing and privatization. Framework of analysis for the identification of central issues and problems usually faced in strategic management. Understanding the effect of present and future environments on the corporation's welfare.

ENMG 663 Product Design and Development 3 cr.
This class provides students with a holistic perspective that includes the design, analysis and management of complex engineered systems/products. Topics covered include marketing research, integrated system/subsystem/component design, production planning, manufacturing strategy, supply chain management, innovation and entrepreneurship.

ENMG 664 Introduction to Human-Centered Design 3 cr.
This course introduces students to human-centered design approaches for innovative problem solving. Human-centered design begins with a deep understanding of people, technology, and social contexts. The course will include fundamental readings in design thinking, interactive design methods and processes, and hands-on projects. Students will learn how user research and prototyping can be integrated into different phases of the design process.

ENMG 698 Special Topics in Engineering Management 3 cr.
Special Topics in Engineering Management.

ENMG 700 Seminar 0 cr.
All students are required to register for the seminar during each fall term.

ENMG 797 Special Project in Engineering Management 3 cr.
A supervised study that may involve special research in the student's area of concentration.

ENMG 800 Comprehensive Exam 0 cr.
A capstone exam covering core engineering management concepts.

ENMG 798 Thesis 6 cr.
Thesis

Department of Mechanical Engineering

Chairperson:	Lakkis, Issam
Professors:	Asmar, Daniel;Ghaddar, Nesreene; Lakkis, Issam; Moukalled, Fadl; Shihadeh, Alan
Professor Emeritus:	Sakkal, Fateh
Associate Professors:	Mustapha, Samir; Oweis, Ghanem; Shammas, Elie
Assistant Professors:	Abou Jaoude, Dany; Harb, Mohammad; Honein, Theresa; Kaddouh, Bilal
Assistant Research Professor:	Talih, Soha
Instructors:	Al Saidi, Abdul-Kader; Balhas, Zainab; Fayad, Rami; Kassis, Lina; Kfoury, Elie

General Information

The department of Mechanical Engineering offers three graduate master's programs which include the degree of Master of Engineering with a major in Mechanical Engineering (Thesis/Non-Thesis), the degree of Master of Mechanical Engineering with a major in Applied Energy (Thesis/Non-Thesis), the degree of Master of Science in Energy Studies (Thesis/Non-Thesis), in addition to the degree of Doctor of Philosophy (PhD) in Mechanical Engineering.

In addition, an online graduate diploma in building energy systems is offered in the Department of Mechanical Engineering for professionals who seek to enhance their knowledge and experience in the field.

Master of Engineering (ME)

The Department offers the following programs, all leading to the Master of Engineering in Mechanical Engineering degree:

- Master of Engineering, major Mechanical Engineering (Thesis)
- Master of Engineering, major Mechanical Engineering (Non-Thesis)
- Master of Mechanical Engineering in Applied Energy (Thesis)
- Master of Mechanical Engineering in Applied Energy (Non-Thesis)

Graduate Diplomas

The department of Mechanical Engineering offers the following program:

- Online Graduate Diploma in Building Energy Systems

Requirements

A student applying for admission to a graduate program is only eligible if s/he has a Bachelor of Engineering degree with a mechanical engineering major or the equivalent. A student must also satisfy the requirements of the university and the Maroun Semaan Faculty of Engineering and Architecture for admission to graduate study, as specified in the relevant sections of the university catalogue.

Master of Engineering (ME), Major: Mechanical Engineering

ME Thesis Program Requirements:

In this program, students may choose a concentration in any of the following areas:

- Thermal and Fluid Sciences
- Design, Materials and Manufacturing
- Mechatronics

The student is encouraged to select a concentration area of personal interest. The master's degree requires a minimum of 21 credit hours of coursework and a thesis equivalent to 9 credits. Twenty to twenty-four months of research are usually required to complete the master's degree. The student and the graduate advisor, in coordination with the thesis committee, develop a plan of study tailored to the student's specific interest and background. It is advisable that this plan be developed no later than the first month of the second term of graduate work.

The required 21 course credit hours and the 9 credits for thesis are distributed as follows:

- A mandatory 3-credit course in applied mathematics

Acceptable courses include, but are not limited to, the following:

CMPS	354	The Finite Element Method
CMPS	350	Discrete Models for Differential Equations

CMPS	373	Parallel Computing
ENMG	604	Deterministic Optimization Models
MATH	307	Topics in Analysis
MECH	630	Finite Element Methods in Mechanical Engineering
MECH	663	Computational Fluid Dynamics
MECH	691	Convex Optimization
MECH	764	Advanced Topics in Computational Fluid Dynamics

The math or math-oriented course offered by other departments must be approved by the graduate student's advisor.

- Three engineering technical courses (9 credit hours) in the concentration area and at least one from the list of fundamental courses in the area.
- Three engineering elective courses (9 credit hours) with a maximum of two courses in other departments within the MSFEA, also subject to the approval of the graduate student's advisor.
- Seminar Course: MECH 797 (0 credit hours). This is a pass/fail course based on attendance and is offered at least once per year. Students must register for the course each time it is offered.
- Thesis: MECH 799 (equivalent to 9 credit hours) should be completed based on independent research.

ME Non-Thesis Program Requirements:

The course-based master's program requires a minimum of 33 credit hours of graduate level courses:

- A minimum of one 3-credit course in applied mathematics. Acceptable courses are listed on the previous page.
- Three engineering technical courses (9 credit hours) in the concentration area and at least one from the list of fundamental courses in the area.
- Seven engineering electives courses (21 credit hours) within ME with the option of having a maximum of two courses in other departments within the MSFEA, also subject to the approval of the graduate student's advisor.
- Seminar Course: MECH 797 (0 credit hours). This is a pass/fail course based on attendance and is offered at least once per year. Students must register for the course every time it is offered.

- Qualification examination: comprehensive exam (MECH 799T) should be done upon the completion of the coursework in all major and minor areas.

List of Mechanical Engineering courses for the thesis and non-thesis option is shown below:

Thermal and Fluid Sciences:

Fundamental Courses: MECH 701 (Principles of Combustion), MECH 760 (Advanced Fluid Mechanics), MECH 761 (Convection Heat Transfer), MECH 762 (Advanced Thermodynamics), MECH 707 (Statistical Mechanics and Thermodynamics), MECH 764 (Advanced Topics in Computational Fluid Dynamics), MECH 763 (Radiative Heat Transfer), MECH 766 (Turbulent Flow and Transport), MECH 767 (Heat Conduction)

Technical Electives: MECH 602 (Energy Conservation and Utilization), MECH 603 (Solar Energy), MECH 604 (Refrigeration), MECH 606 (Aerosol Dynamics), MECH 607 (Micro Flows Fundamentals and Applications), MECH 609 (Experimental Methods in Fluid Dynamics), MECH 663 (Computational Fluid Dynamics), MECH 665 (Unsteady Gas Flow), MECH 702 (Pollutant Formation and Control in Combustion), MECH 703 (Combustion Modeling), MECH 600 (Applied Reservoir Engineering I), MECH 608 (Applied Reservoir Engineering II), MECH 653 (System Analysis and Design), MECH 670 (Laboratory for Renewable Energy in Buildings), MECH 671 (Renewable Energy Potential, Technology and Utilization in Buildings), MECH 672 (Modeling Energy Systems), MECH 673 (Energy Efficient Buildings with Good Indoor Air Quality), MECH 674 (Energy Economics and Policy), MECH 675 (Building Energy Management Systems), MECH 676 (Passive Building Design), MECH 678 (Solar Electricity), MECH 679 (Energy Audit Lab), MECH 705 (Bioheat Modeling and Human Thermal Environments), MECH 751 (Simulation of Multiphase Flows), MECH 765 (Advanced Finite Volume Techniques), MECH 768 (Transport Through Porous Media), MECH 769 (Advanced Scientific Computing), MECH 770 (HVAC and Refrigeration Systems Lab), MECH 771 (HVAC System Control Strategies and Energy Efficiency), MECH 772 (Moisture and Control of Humidity Inside Buildings), MECH 773 (Numerical Methods in Energy Technology), MECH 778 (Special Projects on Renewable Energy Systems Design).

Design, Materials and Manufacturing:

Fundamental Courses: MECH 624 (Mechanics of Composite Materials), MECH 720 (Advanced Machine Design), MECH 721 (Elasticity and Plasticity), MECH 630 (Finite Element Methods in Mechanical Engineering)

Technical Electives: MECH 611 (Computational Modeling in Biomechanics), MECH 615 (Continuum Mechanics), MECH 619 (Quality Control in Manufacturing Systems), MECH 622 (Advanced Manufacturing Processes), MECH 631 (Micro Electro Mechanical Systems), MECH 632 (Structural Health Monitoring), MECH 633 (Biomechanics), MECH 634 (Biomaterials and Medical Devices), MECH 637 (Micromechanics and Crystal Plasticity), MECH 736 (Modeling Solidification Processes)

Mechatronics:

Fundamental Courses: MECH 643 (Mechatronics and Intelligent Machines Engineering), MECH 740 (Advanced Dynamics), MECH 641 (Robotics), MECH 642 (Computer Vision),

MECH 648 (Nonlinear Systems: Analysis, Stability and Control), MECH 650 (Autonomous Mobile Robotics), , MECH 653 (Systems Analysis and Control)

Technical Electives: MECH 628 (Design of Mechanisms), MECH 644 (Modal Analysis), MECH 645 (Noise and Vibration Control), MECH 646 (Wheeled Mobile Robotics), MECH 647 (Hydraulic Servo Systems), MECH 654 (Adaptive Control), MECH 655 (Optimal Control), MECH 656 (System Identification), MECH 657 (Vehicle Dynamics and Control).

Master of Mechanical Engineering (ME), Major: Applied Energy (APPE)

The objectives of the master's program leading to the Master of Mechanical Engineering: Applied Energy degree are for its graduates to be able to:

- design and manage efficient energy systems for buildings with high-quality indoor environments,
- integrate renewable energy technologies with conventional energy systems to improve sustainability of energy supply systems,
- understand the economic, policy and regulatory frameworks within which decisions on sustainable energy utilization practices are made,
- and assess and evaluate the impact of new technical developments in energy systems on society, the environment and the economy.

APPE Thesis Program Requirements:

Program Structure

The master's degree with the thesis option will normally require between 20 and 24 months for completion.

The program consists of 30 credits distributed as follows:

- 9 credits of mandatory courses
- 3 credits of lab
- 6 credits of elective courses selected with the approval of the graduate student's advisor in any of the following areas: sustainable energy production from renewable sources, hybrid systems, and sustainable energy utilization practices in the context of buildings.
- A 3 credit general graduate technical elective from science, math or engineering as

approved by thesis advisor.

- Seminar Course: MECH 797 (0 credit hours). This is a pass/fail course based on attendance and is offered at least once per year. Students must register for it each time it is offered.

- Thesis: MECH 788 (equivalent to 9 credit hours). The thesis must be based on independent research.

APPE Non-Thesis Program Requirements:

The course-based master's program requires a minimum of 33 credit hours of graduate level courses distributed as follows:

- 9 credits of mandatory courses

- 3 credits of lab

- 15 credits of elective courses selected with the approval of the graduate student's advisor in any of the areas described above

- 6 credits of general graduate technical electives from science, math or engineering as approved by thesis advisor

- Seminar Course: MECH 797 (0 credit hours). This is a pass/fail course based on attendance and is offered at least once per year. Students must register for it each time it is offered.

- Qualification examination: Comprehensive Exam (MECH 799T) should be done upon the completion of the coursework in all major and minor areas

List of APPE courses for the thesis and non-thesis option is shown below:

Mandatory Courses, 3 credits each:

MECH 671	Renewable Energy Potential, Technology and Utilization in Buildings
MECH 672	Energy Systems Modeling
MECH 673	Energy Efficient Buildings with Good Indoor Environment
MECH 674	Energy Economics and Policy

Lab Courses, 3 credits each:

MECH 670	Renewable Energy Lab
MECH 679	Energy Audit Lab
MECH 680	HVAC and Refrigeration Systems Lab

Technical Electives, 3 credits each:

MECH 603	Solar Energy
MECH 670	Renewable Energy Lab
MECH 676	Passive Building Design
MECH 677	Heat Pumps
MECH 678	Solar Electricity
MECH 679	Energy Audit Lab
MECH 680	HVAC and Refrigeration Systems Lab
MECH 681	Green Building Basics and LEED Practices
MECH 683	Wind Turbines
MECH 771	HVAC Systems Control Strategies and Energy Efficiency
MECH 772	Moisture and Control of Humidity Inside Buildings
MECH 778	Special Project in Renewable Energy and Energy Efficiency

Any course from the thermal and fluid sciences concentration in the Master of Mechanical Engineering program can be selected.

Master of Science Degree Program in Energy Studies

Professors:	Ghaddar, Nesreen (MECH); Karaki, Sami (EECE)
Associate Professors:	Kazan, Michel (PHYS); Khodr, Hiba (PSPA)
Lecturers:	El-Meouchi, Chadia; Habchi, Carine; Kinab, Elias; Rached, Mounir

Educational Goals and Program Learning Outcomes

The Master of Science in Energy Studies program is planned to consolidate and build on AUB's excellent research and professional profile addressing current and future energy research needs of the region in areas such as energy science and technology, economics,

public policy and energy management. The program's educational goals are:

- to promote an interdisciplinary approach to understanding and evaluating various modes of energy supply and end-use efficiency of energy systems within the context of sustainability and development in the region

- to develop effective collaboration skills among students from different disciplines including energy science and technology, economics and public policy

- Upon successful completion of this interdisciplinary course of study, students will:

  - evaluate different sources of energy related to energy extraction, conversion, and utilization for both traditional systems and sustainable/renewable energy alternatives,

  - apply methods of economic analysis, risk and decision analysis, environmental impact assessment and policy techniques for performing energy planning and reaching, and decision-making while addressing sustainability in supply and demand,

  - and understand advances in selected energy technologies, products and energy end-use efficiency and their impact on market economy and development activities.

Admission Requirements

Admission requirements to the program will follow AUB Graduate Studies Policies. Bachelor degree holders from relevant fields of study are eligible to apply for admission into the Energy Studies master's program. Remedial courses may be needed for students as would be recommended by the program.

Applicants to any graduate program other than AUB graduates and graduates of recognized colleges or universities in North America, Great Britain, Australia and New Zealand must demonstrate proficiency in the English language. See Readiness for University Studies in English (RUSE) under Admissions section (page 38).

Credit Waiver Policy

The Energy Studies program may recommend a waiving of up to 6 credits of graduate coursework for students who have completed a Bachelor of Engineering Degree (BE) and are applying for admissions to a Master of Energy Studies Program (MS-ENST). This is subject to approval by the advisor, the chairperson and the MSFEA Graduate Studies Committee. In addition, the total number of transferable credits from BE to MS-ENST should not exceed 9 credits when a student has taken credit overload during his/her undergraduate BE studies. To apply, the student must have completed graduate electives that meet the program requirements with a GPA of at least 3.3.

Degree Requirements

MS-ENST Thesis Program Requirements

The program permits full-time or part-time enrollments. To obtain a master's degree in energy studies (thesis program), the student must complete a minimum of 24 credits of graduate coursework, 6 credits of interdisciplinary thesis work on energy-related fields and a 0-credit seminar. The course work is distributed as follows:

- 9 credits of required core courses
- 3 or 6 credits of elective courses from List A on energy resources, economics and policy
- 6 or 9 credits of elective courses from List B on energy science and technology
- 3 credits of elective course as approved by the thesis advisor/s if the elective is not from List A or B
- 0 credit seminar

Credit Summary

Course	Credits
Required core courses	9 cr.
Elective courses from List A	3 or 6 cr.
Elective courses from List B	6 or 9 cr.
Elective graduate course	3 cr.
Thesis	6 cr.
Seminar	0 cr.
Total number of credits required for graduation	**30**

MS-ENST Non-Thesis Program Requirements

To obtain a master's degree in energy studies (non-thesis program), the student must complete a minimum of 30 credits of graduate coursework and a 0-credit seminar. The coursework is distributed as follows:

- 9 credits of required core courses
- 6 or 9 credits of elective courses from List A on energy resources, economics and policy

- 9 or 12 credits of elective courses from List B on energy science and technology
- 3 credits of elective course as approved by thesis advisor/s if the elective is not from List A or B
- 0 credit seminar

Credit Summary

Course	Credits
Required Core Courses	9 cr.
Elective courses from List A	6 or 9 cr.
Elective courses from List B	9 or 12 cr.
Elective graduate course	3 cr.
Seminar	0 cr.
Total number of credits required for graduation	**30**

Required Core Courses		Credits
ENST 305/ ECON 333/ MECH 674	Energy Economics and Policy	3
PSPA 352	Foundation of Public Policy	3
ENST 300	The Science and Technology of Energy (FAS/ MSFEA)	3
List A	**Energy Resources, Economics and Policy Courses**	**Credits**
ENMG 645	Program and Portfolio Management	3
DCSN 330	Project Management	3
ENMG 661	Strategic Management	3
ENMG 698	Special Topics in Engineering Management	3
ENST 310	Advanced Energy Economics	3
ENST 320	Energy Law and Case Studies	3
ECON 337	Economic Development (with focus on energy and development)	3
ECON 338	Economics of Natural Resources and the Environment	3
ECON 305	Econometrics I	3
ECON 347	Economics Forecasting	3
MFIN 360	Energy Finance	3

ENMG 601	Management Theory	3
ENMG 603	Probability and Decision Analysis	3
ENMG 604	Deterministic Optimization Models	3
ENMG 611	Supply Chain Management	3
ENMG 632	Project Planning Scheduling and Control	3
ENMG 656	Management of Technological Innovations	3
ENMG 698L	ST: Operations & Process Management	3
PPIA 310G	Economic crisis in Lebanon	3
PSPA 316	International Environmental Policy	3
PSPA 362	Policy Research and Analysis	3
PSPA 381	Special Topics in Energy and Public Policy	3
ENST 396	Topics In Energy Issues: The Case Of Lebanon	3
ENST 396C	Special Topics in Energy Issues: Energy Strategies for Developing Countries	3
ENST 398	Special Projects in Energy Studies in Cooperation With Industry and/or NGO and Legislative Bodies	3
MFIN 356	Financial Markets in ME Region	
List B	**Energy Science and Technology Courses**	**Credits**
ENHL 314	Environmental Management Systems	3
CHEM 324E	Electrochemistry	3
CHEM 331	Chemical Instrumentation for Environmental Analysis	3
CHEM 352C	Renewable Energy	3
CHEN 619	Sustainability Science: Human and Environmental Interaction	3
CHEN 690	Reservoir Engineering	3
CHEN 798A	Waste Minimization in the Process Industry	3
CIVE 628	Sustainable Building Design and Construction	3
CIVE 656	Air Pollution Control I	3
CIVE 659	Environmental Impact Assessment	3
CIVE 601	GIS and Geospatial Data Modeling	3
CIVE 686	Enviro Responsive Buildings	3
CIVE 691A	Scales of Sustainability	3
ENMG 602	Introduction to Financial Engineering	3
ENMG 622	Simulation Modeling and Analysis	3
ENMG 633	Advanced Topics in Project Management	3

ENMG 655	Management of Technology	3
ENMG 698	Special Topics in Engineering Management	3
ENST 330	Energy Science and Technology Lab	3
ENST 396B	Biofuels Between Food and Energy Security	3
ENST 396D	Energy Resources & Renewable Technologies: Regional Analysis	3
EECE 670	Power System Planning	3
EECE 671	Environmental Aspects of Energy Systems	3
EECE 672	Energy Planning and Policy	3
EECE 675	PV and Wind Electric Energy Systems	3
ENST 398	Special Projects in Energy Studies in Cooperation with Industry and/or NGO and Legislative Bodies	3
GEOL 300	Elements of Petroleum Geology	3
MECH 600	Applied Reservoir Engineering I	3
MECH 671	Renewable Energy Potential, Technology and Utilization in Buildings	3
MECH 673	Energy Efficient Buildings With Good Air Quality	3
PHYS 340	Atmospheric Physics and Energy	3

Comprehensive Exam

See General University Academic Information section in this catalogue (page 72).

Prerequisite Courses

Students who join the program may have to complete prerequisites for courses offered in the program or obtain the consent of the course instructor and program chair. The core courses are designed to include remedial preparation in social science. This will enable the waiver of social science prerequisites for students who join from sciences, math, business or engineering majors. BA holders from the economics major may not need remedial courses beyond the core energy science course. Students from other social science majors or arts may be required to take one or more remedial courses over and above program requirements as would be recommended by the chair of the program upon admissions. Suggested remedial courses for BA holders are PHYS 210, MATH 201 or Math 204, and STAT 201 or their equivalents. These remedial courses are part of the general education requirements of most universities. The prerequisites by topic include:

- Preliminary concepts of fluid dynamics, heat, and first and second law of thermodynamics
- Methods of differentiation and integration
- Partial derivatives and multivariable functions

- Vector functions
- Probability and elementary statistics

The minimum passing grade for a prerequisite course taken after admission to the graduate program is C+. If a student fails to obtain a grade of C+ in any of the undergraduate prerequisites, s/he is allowed to repeat the course only once.

Sample Program

The sample program schedule is given in the following table:

Fall (Term I)		**Spring (Term II)**	
Course Title	Cr.	Course Title	Cr.
Core Course I	3	Core Course II	3
List A Elective	3	List B Elective	3
List B Elective	3	Graduate Elective	3
Seminar	0		
Total Credits	**9**	**Total Credits**	**9**
Fall (Term III)		**Spring (Term IV)**	
Course Title	Cr.	Course Title	Cr.
Core Course III	3	Thesis	6
List A or B Elective	3	Seminar	0
Seminar	0		
Total Credits	**6**	**Total Credits**	**6**

Graduation Requirements

See General University Academic Information section in this catalogue (page 72).

Dual Master's Degrees – Master of Engineering in Engineering Management and Master of Science in Energy Studies (thesis option only)

The dual master's degrees - Master of Engineering in Engineering Management and Master of Science in Energy Studies – program is primarily intended for individuals with a bachelor's degree in engineering who seek to deepen their knowledge in advanced energy studies and engineering management subjects.

Applicants must be accepted in both programs in accordance with the policies of each program and with AUB policies regarding dual graduate degrees.

A student wishing to apply for the dual degree may submit a single dual-degree application that will be sent to each program simultaneously when first applying for graduate admissions. If the student is already registered in one degree, s/he may apply for the second degree no later than the end of a student's second term at AUB.

The program permits full-time or part-time enrollments. To fulfill the basic requirements for the dual degree, a student must complete a minimum of 18 credit hours of graduate coursework in each degree program. The remaining credits include additional course work and a thesis both of which are credited to the dual degree. The program requires a minimum of 42 credit hours of graduate coursework and 6 credits of thesis work. The coursework is distributed as follows:

- 9 credits of core Energy Studies (ENST) courses
- 6 credits of core Engineering Management (ENMG) courses
- 6 credits of common courses: Required core ENMG (ENST List A Electives)
- 12 credits of ENMG elective courses
- 6 credits of elective courses from ENST List B on energy science and technology
- 3 credits of elective course as approved by thesis advisor/s (ENST)

The courses that are counted toward both degrees are:

ENMG 603 Probability and Decision Analysis 3 cr.

ENMG 604 Deterministic Optimization Model 3 cr.

Comprehensive Exam 0 cr.

Thesis 6 cr.

Sample Schedule

Term: Fall I		
Course Number & Title	**Credits**	**Prerequisite(s)**
ENST 305/ ECON 333/ Energy Economics and Policy MECH 674	3	
PSPA 352 Foundations of Public Policy	3	

ENST 300 The Science and Technology of Energy	3	PHYS 210 or equivalent
Term credit total	**9**	
Term: Spring I		
Course Number & Title	**Credits**	**Prerequisite(s)**
ENMG 601 Management Theory	3	
ENMG 602 Introduction to Financial Engineering	3	
ENMG Elective 1	3	
Term credit total	**9**	
Term: Fall II		
Course Number & Title	**Credits**	**Prerequisite(s)**
ENMG 603 Probability and Decision Analysis	3	
ENMG 604 Deterministic Optimization Models	3	
ENST List B Elective 1	3	
Term credit total	**9**	
Term: Spring II		
Course Number & Title	**Credits**	**Prerequisite(s)**
ENMG Elective 2	3	
ENMG Elective 3	3	
ENST List B Elective 2	3	
Term credit total	**9**	
Term: Fall III		
Course Number & Title	**Credits**	**Prerequisite(s)**
ENMG Elective 4	3	
ENST Elective Graduate Course	3	
Comprehensive Exam	0	
Term credit total	**6**	
Term: Spring III		
Course Number & Title	**Credits**	**Prerequisite(s)**
Thesis	6	
Term credit total	**6**	
Program Total	**48**	

Energy Studies Interdisciplinary Courses

ENST 300 The Science and Technology of Energy (FAS/MSFEA) 3.0, 3 cr.
This course examines the fundamental principles of energy conversion processes as well as their impact on the environment and provides a clear physical explanation of these principles. It also offers a survey of current energy conversion technologies. Topics are selected based on their future promise energy sources. The course starts with introductory topics providing a minimum base on thermodynamics, kinetic theory of gases, heat transfer and fluid flow and the concept of energy efficiency. Topics include: applications in heat engines, solar thermal, photovoltaic energy conversion, wind, biomass and fuel cells. Prerequisite: PHYS 210 or equivalent.

ENST 305/ECON333/MECH674 Energy Economics and Policy 3.0, 3 cr.
A course that aims at developing an understanding of practical analytical skills of energy economics and planning approaches taking into account the cost of impact on the environment. This course will provide fundamental concepts of economic issues and theories related to energy, such as economics of natural and energy resources, aggregate supply and demand analysis, and the interrelationship between energy, economics and the environment as well as some important issues in energy policy. The course will also demonstrate the use of economic tools for decision-making in energy and environment planning and policy. It will explore the terminology, conventions, procedures and planning policy applications. It will also cover a number of contemporary energy and environmental policy issues, including energy security, global warming, regulations of energy industries, energy research and development, and energy technology commercialization. Prerequisite: INDE 301. Students cannot receive credit for ENST305 and MECH 674 or ECON 333.

ENST 310 Advanced Energy Economics 3.0, 3 cr.
This class provides students with a holistic perspective that includes the design, analysis and management of complex engineered systems/products. Topics covered include marketing research, integrated system/subsystem/component design, production planning, manufacturing strategy, supply chain management, innovation and entrepreneurship.

ENST 320 Energy Law and Case Studies 3.0, 3 cr.
This course is concerned with regulation of energy, energy resources and energy facilities. Among the topics examined are the regulation of rates and services, the state public utility commissions and the interaction with environmental law. Attention is given to energy resources (such as oil, natural gas and coal reserves, and hydropower resources) and to the generation, transmission and distribution facilities. Special emphasis is placed on the current and future roles of renewable energy, energy efficiency and nuclear energy, as well as on the regulation and deregulation of electricity.

ENST 330 Energy Science and Technology Lab 3.0, 3 cr.
This course is designed to give students “hands-on” experience on selected energy science and technology topics in solar energy; electrochemical energy storage; thermoelectric technologies; fuel cells; thermo-hydraulics of power systems; energy efficiency in a wide range of systems; hybrid engines; thermal management of electronics; and energy efficient buildings. The selected topics vary from term to term.

ENST 396 Topics in Energy Issues: The Case of Lebanon 3.0, 3 cr.
This course addresses contemporary issues in energy economics facing Lebanon. It evaluates energy sector economic policies in production and pricing, taxation and conservation, and provides alternatives policies and solutions.

ENST 396A Special Topics in Energy Issues: The Future of Nuclear Power 3.0, 3 cr.
This course will provide students with a deeper understanding of nuclear energy and the underlying economic, security, and technological challenges associated with it. Covered topics include the basic physics of nuclear energy, overview of nuclear technologies, economics of nuclear power and examination of safety and security risks. The course aims to provide a policy-oriented platform to assess the prospects of a global nuclear "renaissance" as well as the realities of nuclear power deployment in the Middle East. Prerequisite: MECH 310, PHYS 210 or PHYS 211.

ENST 396B Special Topics in Energy Issues: Biofuels Between Food and Energy Security 3.0, 3 cr.
This course provides students with a deeper understanding of biofuels. The course examines the different biofuel options and their ecological as well as socio-economic impacts. Covered topics include the consequences of biofuel production for food and energy security as well as for the environment. Particular emphasis is placed on biofuel production in developing countries. The course aims to identify criteria for sustainable biofuel production that contributes to energy independence, economic growth and environmental protection.

ENST 396C Special Topics in Energy Issues: Energy Strategies for Developing Countries 3.0, 3 cr.
This course provides students with a deeper understanding of the different energy resources (fossil energy such as oil, coal and natural gas; nuclear energy; and the different options of renewable energies like hydropower, solar energy, on- and offshore- wind energy, biofuels, energy derived from animal waste) and their use in developing countries. The course examines the energy strategies in developing countries in relation to issues such as combatting climate change, stimulating economic growth and contributing to energy independence. Amongst other cases, special emphasis of the course will be on Lebanon's challenges in the energy sector. The course also looks at the role of developed countries and international organizations in helping developing countries in meeting their energy needs in a sustainable way.

ENST 396D Energy Resources & Renewable Technologies: Regional Analysis 3.0, 3 cr.
This course will provide students with a deeper understanding of the different energy technologies in Arab countries. Which local economic, political, and geographic conditions influence the energy situation (import and export dependency, choice of energy sources, etc.) of countries in the region? How are the Arab countries interconnected with each other on energy issues? Apart from the regional dynamics, which global forces (such as climate agreements and oil market prices) influence the energy situation in Arab world countries? The course will examine the use of energy resources like conventional energy (fossil oil, coal and natural gas), nuclear energy, renewables (hydropower, solar energy, onshore and offshore wind energy, use of biomass) to provide a better understanding of the energy situation and challenges in Arab world countries such as the finiteness of fossil resources and ecological problems. The students will learn to develop regional strategies for a sustainable energy transition (under environment, social, economic and technical criteria) that take impacts from global markets and local developments into consideration.

ENST 397 Seminar
Must be registered once per year.

ENST 395A Comprehensive Exam
Comprehensive Exam

ENST 699 Thesis 6 cr.
Thesis

ENST 398 Special Projects in Energy Studies in Cooperation 3.0, 3 cr.
With Industry and/or NGO and Legislative Bodies.

Graduate Diploma in Building Energy Systems (GDBES)

The online Graduate Diploma in Building Energy Systems aims to equip the students with the following:

- Ability to identify how through an integrated building design approach, modification on envelop material, construction, orientation, mechanical systems for heating and cooling can be greatly reduced or eliminated
- Qualitative and quantitative analysis tools for evaluating energy performance of new and existing buildings including materials, envelope, heating, cooling, and ventilation systems that provide occupant comfort and good air quality
- Stimulated thinking about approaches for integration of renewable energy sources and systems into buildings and processes
- Understanding of the impact of energy economics, energy policies and regulatory frameworks on improving energy performance of systems, processes and buildings.

Upon successful completion of the GDBES, students are able to:

- Determine energy demands in buildings and processes for meeting needs of power, cooling ventilation, and heating in different climates and building functions
- Identify how through an integrated building design approach, modification on envelop material, construction, orientation, mechanical systems for heating and cooling can be greatly reduced or eliminated
- Perform analysis, develop and recommend enhanced performance technical solutions for meeting energy demands and air quality requirements in buildings and systems as applicable
- Use analysis tools to assess economic, building standards, and policy aspects that can help in expanding renewable energy resources use in systems, processes, buildings and their market.

Admission Requirements

The student should meet the university's minimum requirement for admission to a

graduate degree program. The student should have an undergraduate bachelor's degree in engineering (BE or its equivalent) with GPA 3.0 in the last two years of study (or standardized equivalent from other institutions of higher learning). In addition, an applicant who does not meet the minimum undergraduate average requirement but appears to have reasonable potential for academic success, for example as manifested by relevant practical experience or high scores on relevant standardized exam (e.g. GRE exam), may be admitted based on the recommendation of the faculty.

A student cannot be admitted simultaneously to the online GDBES program and the MMEAE program.

Degree Requirements

The online GDBES will require the successful completion of 12 credits of course work as follows:

- 6 credits of mandatory courses
- 6 credits of elective courses as offered by the program

Credit Summary

Course	**Credits**
Core Courses	6
Elective courses	6
Total number of credits required for graduation	**12**

Required Core Courses		**Credits**
MECH 682E	Principles of Integrative Building Design, Construction, and Operation for Sustainability	3
MECH 674E	Energy Economics and Policy	3
Elective Courses		**Credits**
MECH 671E	Renewable Energy Potential, Technology, and Utilization in Buildings	3
MECH 672E	Modeling Energy Systems	3
MECH 677E	Refrigeration and Heat Pumps	3
MECH 680E	Innovation and Knowledge Transfer In Renewable and Building Services Systems	3
MECH 673E	Energy Efficient, High Indoor Air Quality Buildings	3

Features of Online Delivery Courses

The course must comply with the AUB online course design standards.

The course has frequent formative and summative assessment using a mix of low stakes and high stakes activities that enhance student learning and permit continuous and prompt evaluation of student work.

The GDBES includes a comprehensive face-to-face exam which carries a weight of at least 30% of the overall grade of the course.

Graduation Requirements

To be eligible for graduation, the student must:

- Pass all four courses with a minimum grade of (C+) in any course.
- Attain a cumulative course average of 3.3 or above, over the four courses.
- Transfer of Credits to Regular Master Program
- The student can transfer up to 12 online credits taken towards the GDBES into the full regular MMEAE program. The number of transferred credits counts towards the grand total of 12 credits that a student with a Bachelor of Engineering degree is allowed to transfer.
- The student must obtain an overall course grade of 3.3 to be able to transfer the course.

Doctor of Philosophy (PhD)

Specialization: Mechanical Engineering

The Maroun Semaan Faculty of Engineering and Architecture offers a graduate program of study leading to the PhD degree with specialization in mechanical engineering

General Information

The graduate curriculum offers students opportunities to develop levels of expertise and knowledge consistent with a career of technical leadership. The doctoral program emphasizes the acquisition of advanced knowledge and the fostering of individual experience of significant intellectual exploration.

The educational objectives of the PhD program are to develop:

- expertise in a core area of mechanical engineering,
- the ability to identify pertinent research problems, formulate and execute a research plan, and generate and analyze original research results,
- the capacity to communicate those results through oral presentations and written publications,
- and the practice of independent learning and advancing knowledge.

Admission Requirements

Candidates for the doctoral degree program are expected to have an outstanding academic record demonstrated by a minimum undergraduate GPA of 3.3 or a cumulative grade average of B+ according to AUB standards (3.3 in a 4.0 grade system) and have completed a master's degree in mechanical engineering or a related discipline with a cumulative grade average of A- according to AUB standards (3.7 GPA in a 4.0 grade system).

The application to the doctoral program follows the deadlines set by the Admissions Office. All applicants are required to take the General Exam section of the Graduate Record Examination (GRE) and submit their scores. Students who are not AUB graduates or graduates of recognized colleges or universities in North America, Great Britain, Australia and New Zealand are required to meet the Readiness for University Studies in English (RUSE) (See page 38).

PhD Program Description

The PhD program in mechanical engineering requires a minimum of 18 credit hours of coursework beyond the master's degree. The student must pass a two-part PhD Qualification Examination. In addition, the student must submit an original thesis based on independent research that makes a significant contribution to her/his area of research. The thesis is the principal component of the doctoral program and the part that will serve as the major indicator of a candidate's abilities. A minimum of 30 credits registered as thesis work is required.

Advisors

After admission into the department, a general advisor will be assigned to the PhD student to guide her/him with the initial selection of courses and to introduce the student to the various research areas in the department. The student must select a thesis advisor by the end of the first term after admission into the program. The student must seek the faculty members that are in the student's area of interest and discuss possible research topics for the PhD thesis with them. Once an advisor is identified, the student will develop a Proposed Program of Study that lists the courses the student intends to take and the proposed dates for the written and oral Doctoral Qualifying Examinations. The Proposed Program of Study must then be submitted to the ME Graduate Committee for approval.

Course Requirements

The PhD program requires a minimum of 18 credit hours of coursework beyond the master's degree. The program is composed of 3 credit hours of advanced study in mathematics, 9 credit hours of technical graduate level courses of advanced study in the student's area of research (major course area requirements), and 6 credit hours of courses in a minor specialization area of study, selected by the student, in a field different from the major field of study. The minor specialization, which is composed of 6 credit hours of courses, must be taken from outside the Mechanical Engineering Department. The minor requirement could be satisfied through courses previously taken in the student's master's degree program. This, however, will not reduce the required minimum of 18 credit hours of coursework needed beyond the master's degree.

Mathematics Course Requirements

A 3-credit advanced course in mathematics is required from all doctoral candidates. The course must be approved by the candidate's advisor. The mathematics course requirement is satisfied if the student has completed at least 6 credits of advanced courses in math beyond the bachelor's degree.

Major Course Area Requirements

At least 9 credit hours of core courses of advanced study in mechanical engineering are needed to satisfy this requirement. The courses should be in the major research area of the student and must be approved by the student's graduate thesis advisor. This will enable the doctoral candidate to pursue coursework in direct support of her/his research. The coursework must address all recommendations made during the qualification period by the student's advisor and thesis committee.

The following major course areas are offered:

- Thermal and Fluid Sciences
- Design, Materials and Manufacturing
- Mechatronics

Minor Subject Requirements

The minor is a program of advanced study that will help the student develop knowledge and some competence in an area related to her/his research other than the candidate's major field of study. Two graduate courses (not less than 6 credits) must be taken in a coherent field that is different from the major field of study. These 6 course credit hours must be taken from outside the Mechanical Engineering Department (i.e., in other engineering or basic science departments). Part of this requirement could be satisfied through coursework done during the student's master's degree program. This, however,

will not reduce the required minimum of 18 credit hours of coursework needed beyond the master's degree. All courses taken in this minor area must be at the graduate level and must be taken while the student is registered in a graduate program at AUB. The minor subject must be approved in advance by the student's thesis committee and the MSFEA Graduate Studies Committee. The approval of the department offering the minor should also be sought.

If the student chooses mathematics as her/his minor, then the course taken to fulfill the mathematics course requirement will count towards the minor subject requirements.

PhD Qualification Examination

See PhD Qualifying Exam under General University Academic Information section (page 89).

Qualifying Exam Part I: Comprehensive Exam

Students must demonstrate that they have mastered the concepts of advanced calculus, solution of differential equations and computational methods.

The student must take four sections of the written qualification examination in four sub-disciplines that are normally selected from the list of topics below:

- Applied Mechanics
- Materials and Manufacturing Processes
- System Dynamics and Control
- Design
- Fluid Mechanics
- Thermodynamics
- Heat and Mass Transfer

For more Information, see Qualifying Exam Part I: Comprehensive Exam under General University Academic Information (page 89).

Qualifying Exam Part II: Defense of Thesis Proposal

See Qualifying Exam Part II: Defense of Thesis Proposal under General University Academic Information (page 90).

PhD Thesis Requirements

Following successful completion of the first part of the qualifying examination, all PhD candidates must submit a thesis proposal summarizing their thesis problem and planned approach. The purpose of the proposal is to inform the department and faculty, in a concise statement, of the candidate's research program and those involved in it. It should explain what the student intends to do and how s/he intends to go about it. The thesis proposal must provide sufficient literature citations to indicate an awareness of previous work and enough detail to show how the work is expected to advance knowledge in the field.

Doctoral Thesis Committee

See PhD Thesis Committee under General University Academic Information (page 90).

Course Plan for PhD Students

All courses that are offered for credit in the master's program will also be offered as graduate courses for those in the PhD program.

Math Requirement Courses

At least one math course offered outside the ME department and approved by the graduate student's advisor is required. Acceptable courses include the following:

MATH 307	Topics in Analysis
CMPS 354	The Finite Element Method
CMPS 350	Discrete Models for Differential Equations
CMPS 373	Parallel Computing
ENMG 604	Deterministic Optimization Models
MECH 630	Finite Element Methods in Mechanical Engineering
MECH 663	Computational Fluid Dynamics
MECH 691	Convex Optimization
MECH 764	Advanced Topics in Computational Fluid Dynamics

Note that in the Faculty of Arts and Sciences, 300 level courses are graduate courses.

Major Area Courses

Thermal and Fluid Sciences:

MECH 701, MECH 760, MECH 761, MECH 762, MECH 707, MECH 764, MECH 763, MECH 766, MECH 767, MECH 602, MECH 603, MECH 604, MECH 606, MECH 607, MECH 609,

MECH 663, MECH 665, MECH 702, MECH 703, MECH 600, MECH 608, MECH 653, MECH 670, MECH 671, MECH 672, MECH 673, MECH 674, MECH 675, MECH 676, MECH 678, MECH 679, MECH 705, MECH 751, MECH 765, MECH 768, MECH 769, MECH 770, MECH 771, MECH 772, MECH 773, MECH 778

Design, Materials and Manufacturing:

MECH 611, MECH 624, MECH 720, MECH 721, MECH 630, MECH 615, MECH 619, MECH 622, MECH 631, MECH 632, MECH 633, MECH 634, MECH 637, MECH 736

Mechatronics:

MECH 643, MECH 645, MECH, 646, MECH 655, MECH 656, MECH 740, MECH 641, MECH 642, MECH 650, MECH 628, MECH 644, MECH 648, MECH 647, MECH 653, MECH 654, MECH 657

Seminar Course

Seminar Course: MECH 797 (0-credit). The student must register for the course once a year. This is a pass/fail course.

PhD Thesis

MECH 987 PhD Thesis: The thesis is based on original, independent research. A student is required to register for a minimum of 30 credits of thesis work. A student may register for a maximum of 12 credits in any given term. The student must submit a thesis based on results of original, independent research. The PhD thesis is expected to make a significant contribution to the field of mechanical engineering. Upon completion of the thesis and after its approval by the student's thesis advisor, a final oral examination will constitute the thesis defense.

Residency Requirements

The student must register for at least four terms beyond the completion of the master's degree. Requirements for the degree of Doctor of Philosophy must be completed within a period of five years after starting graduate work beyond the master's degree. An extension will require the approval of the AUB Graduate Council.

Accelerated Doctor of Philosophy, Major: Mechanical Engineering

Admission Requirements

- A bachelor's degree with a minimum major and cumulative average of GPA of 3.7 or its equivalent

- Graduate Record Examination (GRE) general test scores
- Three recommendation letters (one from the final year project supervisor)
- A written statement of purpose that shows the research potential in the proposed area of study
- All applicants must also satisfy the university requirements for admission to PhD accelerated track.

Course Requirement

The completion of at least 78 credits of graduate study consisting of combined coursework and research beyond the bachelor's degree is required for the PhD accelerated track in Mechanical Engineering.

- A minimum of 36 credit hours must be in approved graduate level coursework and a minimum of 30 credit hours of thesis work. In addition, normally a maximum of 6 credit hours of the 36 credits of coursework may be tutorial courses.
- The basic program of study for the PhD accelerated track is built around one major area and a minimum of one minor area. Students take courses to satisfy the major and minor area requirements and to acquire the knowledge needed for the Qualifying Exam Part I and Qualifying Exam Part II.
- The major area can be in one or a combination of two of the ME areas.
- Students must take:
    - At least 2 courses (6 credit hours) in advanced mathematics. The courses must be approved by the candidate's supervisor. The mathematics course requirement is satisfied if the student has completed at least 6 credits of advanced courses in math beyond the bachelor's degree.
    - Students must take at least 6 graduate courses (18 credit hours) in their major area.
    - They must also take 2 graduate courses (6 credit hours) in their PhD minor area. The minor courses must be taken from outside the Mechanical Engineering department (i.e., in other engineering or basic science departments). If the student chooses mathematics as a minor, then the courses taken to fulfill the mathematics course requirements will count towards the minor subject requirements.
    - Finally, students must take 2 graduate electives courses within the Mechanical Engineering department.

Residency Requirements

- The student must register for at least eight terms beyond the completion of the bachelor's degree.
- Requirements for the PhD degree in the accelerated track must be completed within a period of twelve regular terms after starting graduate work beyond the bachelor's degree. Extension beyond the twelve regular terms limit requires the approval of the ME graduate committee, MSFEA GSC and GC.
- Students deemed by the department, within one to two years after admission into the accelerated track, as not qualified to complete a PhD degree, may be granted a master's degree in the area after completing the equivalence of a non-thesis master's.

For other requirements and rules, please refer to the PhD in Mechanical Engineering section (page 454).

PhD Qualifying Exam

Refer to Qualifying Exam Part I and II section.

Graduation Requirements

A student can graduate at the end of any academic term upon satisfying the following requirements:

- Met the residency requirements and all pertinent AUB regulations
- Had at least two papers, based on her/his PhD thesis, accepted in a peer reviewed technical journal, in addition to one refereed conference paper
- Passed all the required courses and completed the research credit requirements
- Attained a minimum cumulative course average of 85 (3.7) beyond the master's degree and is not on probation
- Passed the Doctoral Qualifying Examination
- Successfully defended a thesis of original scholarly work
- Deemed worthy by the faculty

Course Descriptions

MECH 600/CHEN 690 Reservoir Engineering 3 cr.
This course will cover both fundamental and applied reservoir engineering concepts. It aims at understanding the rock and fluid properties and how these properties interact to affect production from a hydrocarbon reservoir. From a practical aspect, the course will focus on classical reservoir engineering, reservoir drive mechanisms, well testing and well test analysis as well as the use of reservoir simulation to assist the reservoir engineer at different stages of a hydrocarbon reservoir lifecycle. Prerequisites: MECH 310 and CHEN 490.

MECH 602 Energy Conservation and Utilization 3 cr.
A course that deals with methods for reduction of losses and gains from a building envelope; energy conservation in cooling, heating, air-handling and plumbing systems; and energy management programs. Prerequisites: MECH 310 and MECH 412.

MECH 603 Solar Energy 3 cr.
A course discussing the fundamentals of solar radiation, collectors and concentrators, energy storage, estimation and conversion formulas for solar radiation. Prerequisite: MECH 412.

MECH 604 Refrigeration 3 cr.
A course on fundamental concepts and principles: cold storage, functions and specifications of refrigeration equipment, applications. Prerequisite: MECH 412.

MECH 606 Aerosol Dynamics 3 cr.
A course covering the physical and chemical principles that underlie the behavior of aerosol collections of solid or liquid particles suspended in gases, such as clouds, smoke, dust and the instruments used to measure them. Topics include: aerosol particle characterization; transport properties and phenomena in quiescent, laminar and turbulent flows; gas- and particle-particle interactions; and applications to human respiratory tract deposition and atmospheric pollution. Prerequisites: MECH 314, MECH 412 and MECH 414; or consent of instructor.

MECH 607 Micro Flows Fundamentals and Applications 3 cr.
A course on theory and applications of micro flows. The continuum hypothesis and the various flow regimes. Shear and pressure driven micro flows. Electrokinetically driven liquid micro flows. Compressibility effects of the micro flow of gases. Particulate flows in bio-applications. Modeling techniques. Hybrid continuum-molecular methods. Reduced order modeling of micro flows in multi-physics micro flow applications. Case studies in BioMEMS. Prerequisites: MECH 310, MECH 314 and MECH 412; or equivalent.

MECH 608 Applied Reservoir Engineering II 3 cr.
This course introduces the advanced concepts and principles needed to analyze hydrocarbon reservoir fluid systems, and defines the size and content of petroleum accumulation. Students will learn to organize programs for collecting, recording and analyzing data describing the advanced characteristics of individual well and reservoir performance. This course covers a variety of topics such as fluid flow in a porous medium; fluid distribution, fluid displacement; fractional flow equation; Buckly- Leverete equation; pressure draw-down and pressure buildup analysis; in addition to the nature and type of primary, secondary and tertiary recovery, water influx and prediction of water-flood behavior, reservoir model simulation and history matching. Prerequisite: MECH 600.

MECH 609 Experimental Methods in Fluid Dynamics 3 cr.
A graduate level course aimed at introducing students to experimental methods used to measure fluid flow quantities such as pressures, forces and velocities. The course starts with an introduction to what and why we measure, and uncertainty analysis and measurement error estimation. Some basic techniques for data reduction and data post-processing are introduced. The available fluid measurement methods are surveyed briefly with selected applications. Emphasis is on advanced optical diagnostic techniques, namely particle image velocimetry (PIV) and laser induced fluorescence (LIF). The theoretical foundations of these techniques are established and the discussion extended to practical considerations including software and hardware components. A few laboratory sessions are incorporated into the course to supplement the lectures and make use of the instruments available in the ME department, including the open circuit wind tunnel and the PIV system. In addition to the lectures and lab sessions, emphasis is on the available literature. Prior knowledge of the basic principles of fluid mechanics and fluid systems is required. MATLAB is needed for coursework. Prerequisite: MECH 314.

MECH 611/BMEN 611 Computational Modeling of Biomechanics 3 cr.
This course is open to engineering, science and medical students wanting a glimpse into the world of computational finite element modeling and simulation to investigate and solve biomedical problems. Students will take a journey through the processes involved in producing a computational finite element model in the biomedical field; starting at construction of model geometry from medical imaging data (CT/MRI), through to model creation, simulation and visualization using finite element analysis software (ANSYS Workbench). Students will also be exposed to a selection of experimental lab techniques in biomechanics and physiology to acquire data required for model development and validation. In pursuit of developing an appreciation for the areas covered, the course will incorporate a mix of theory, demonstrations, practice, real-world modeling applications and research seminars. Prerequisites: MATH 201 and consent of instructor.

MECH 615 Continuum Mechanics 3 cr.
The course offers a unified presentation of in continuum mechanics such as fluids, elasticity, plasticity and viscoelasticity. The general concepts and principles applicable to all continuous media are presented followed by defining equations for a particular media. Topics include fundamentals of tensor calculus, stress, deformation and strain, general principles, and constitutive equations for solids and fluids. Applications. Prerequisites: MECH 320, MATH 218 (or equivalent), MATH 212 (or equivalent), or graduate level standing.

MECH 617 Smart Materials and Structures 3 cr.
This course presents the fundamentals of modeling, analysis, and design of smart materials and structures. Students will be exposed to state of the art smart materials and systems, spanning piezoelectrics, shape memory alloys, electroactive polymers and fiber optics. Students will explore the application of such materials in structural systems from the aeronautic, automotive, biomedical and nautical industry. Smart materials are a class of materials varying in chemical composition and physical state that have one or more physical or physiochemical property that can be significantly changed by external stimuli, such as pressure, temperature, electric or magnetic field, etc. Each student will participate in a group project. Under the guidance of the professor, the student will learn to develop a proposal, do the project investigation and prepare and carry out the technical communications (writing and oral). In any of these scenarios, the student is directly responsible for the progress and quality of the results. At the end of the term, the student is required to submit a written project report and to give a seminar presenting the aims and achievements of the project.

MECH 618 Enterprise Resource Planning (ERP) in Manufacturing Systems 3 cr.
This course will cover how today's industries can cope with the challenges induced by global competition. The course will address challenges of today's industry; consequences of these challenges on product design and organizations; the role of information systems, PLM, ERP and APS; and practice of PLM and ERP systems on the SAP Business Suite and Business By Design solution.

MECH 619 Quality Control in Manufacturing Systems 3 cr.
The course covers the foundations of modern methods of quality control and improvement that may be applied to manufacturing industries. It aims to introduce students to the tools and techniques of quality control used in industrial applications and develop their ability to apply the tools and techniques to develop solutions for industrial problems. Emphasis is given to the application of quality management techniques to solve industrial case problems. The course emphasizes the philosophy and fundamentals of quality control, the statistical foundations of quality control, statistical process control, acceptance sampling, and product and process design. Prerequisites: STAT 230 and MECH 421.

MECH 622 Modeling of Machining Processes and Machines 3 cr.
This course covers the principles and technology of metal machining; mechanics of orthogonal and 3D metal cutting; static deformations, forced and self-excited vibrations and chatter; and design principles of metal cutting CNC machines. Prerequisite: MECH 421.

MECH 624 Mechanics of Composite Materials 3 cr.
A course on anisotropic elasticity and laminate theory, analysis of various members of composite materials, energy methods, failure theories and micromechanics. Materials and fabrication processes are introduced. Prerequisites: MECH 320 or CIVE 310, and MECH 340; or equivalent.

MECH 625 Fatigue of Materials 3 cr.
A course that deals with high cycle fatigue, low cycle fatigue, S-N curves, notched members, fatigue crack growth, cycling loading, Manson-Coffin curves, damage estimation, creep and damping. Prerequisite: MECH 320 or CIVE 310.

MECH 626 Metals and Their Properties 3 cr.
A course that investigates ferrous and non-ferrous alloys, industrial equilibrium diagrams, heat treatment of metals, surface properties of metals, plastic deformation of metals, elements of fracture mechanics and process-structure-properties relations. Prerequisite: MECH 340.

MECH 627 Polymers and Their Properties 3 cr.
A course on chemistry and nomenclature, polymerization and synthesis, characterization techniques, physical properties of polymers, viscoelasticity, mechanical properties and applications. Prerequisite: MECH 340.

MECH 628 Design of Mechanisms 3 cr.
A course involving graphical and analytical synthesis of single- and multi-loop linkage mechanisms for motion, path, and function generation through 2-3-4- and 5-precision positions, optimum synthesis of linkage mechanisms, synthesis of cam-follower mechanisms and synthesis of gear trains. Prerequisite: MECH 332.

MECH 630 Finite Element Methods in Mechanical Engineering 3 cr.
A course on the classification of machine components; displacement-based formulation; line elements and their applications in design of mechanical systems; isoparametric

formulation; plane stress, plane strain, axi-symmetric, and solid elements and their applications; modeling considerations and error analysis; introduction to ALGOR general formulation and Galerkin approach; and the analysis of field problems. Prerequisites: MECH 420 and MATH 251.

MECH 631 Micro Electro Mechanical Systems (MEMS) 3 cr.
A course that deals with materials for micro-sensors and micro-actuators, materials for micro-structures, microfabrication techniques and processes for micromachining, computer-aided design and development of MEMS, commercial MEMS structures and systems, packaging for MEMS and future trends, and includes a team project. Prerequisite: MECH 430.

MECH 632 Structural Health Monitoring 3 cr.
The general concepts of structural health monitoring will be introduced. The commonly used techniques to provide continuous monitoring will be discussed (vibration and ultrasonic wave based methods). Further, determination of critical measurement types and locations; data acquisition systems and instruments; and design of measurement setup will be discussed. Handling data with advanced machine learning algorithm such as artificial neural networking and support vector machine will be introduced; additionally, students will also be introduced to the damage detection and condition assessment process. Prerequisite: MECH 320 and MECH 430

MECH 633 Biomechanics 3 cr.
A course on the study of the biomechanical principles underlying the kinetics and kinematics of normal and abnormal human motion. Emphasis is placed on the interaction between biomechanical and physiologic factors (bone, joint, connective tissue, and muscle physiology and structure) in skeleto-motor function and the application of such in testing and practice in rehabilitation. The course is designed for engineering students with no previous anatomy/physiology. Prerequisite: CIVE 210, MECH 320, CIVE 310 or consent of instructor.

MECH 634/BMEN 608 Biomaterial and Medical Devices 3 cr.
A course that examines the structure-property relationships for biomaterials and the medical applications of biomaterials and devices. The first part of the course focuses on the main classes of biomaterials, metal, ceramic, polymeric and composite implant materials, as well as their interactions with the human body (biocompatibility). The second part of the course examines the various applications of biomaterials and devices in different tissue and organ systems such as orthopedic, cardiovascular, dermatologic and dental applications. Experts from the medical community will be invited to discuss the various applications. Prerequisite: MECH 340 or consent of instructor.

MECH 635/BMEN 601 Computational Modeling of Physiological Systems 3 cr.
This course focuses on the quantitative modeling of different physiological systems. It provides students with current concepts of the mathematical modeling, and different quantitative descriptions of cellular and organ physiology. At the subcellular/cellular level, we will examine mechanisms of regulation and homeostasis. At the system level, the course will cover basic aspects of anatomical and pathophysiological features of the nervous, neural, cardiovascular and respiratory systems. Several physiological processes are treated as case studies for increasing complexity in modeling dynamical systems. Prerequisites: MATH 202, or consent of instructor.

MECH 637 Micromechanics and Crystal Plasticity 3 cr.
This course covers the theoretical knowledge of the deformation process in single and

polycrystalline solids with an emphasis on the role of dislocations and other types of defects on the overall mechanical properties of materials. Topics will include an introduction to crystallography, defects in crystals, fundamentals of dislocations, strengthening mechanisms, microstructures and yielding. Prerequisites: MECH 340 and MECH 320.

MECH 638 Material, Selection for Design 3 cr.
This course describes the procedures for material selection in mechanical design, in order to ensure that the most suitable materials for a given application are identified from the full range of materials available. It targets both senior undergraduate and graduate students and investigates a vast number of conventional, unconventional, and hybrid materials used in the industry, as well as their selection and design processes that are followed by new product development departments around the world. Factors such as working environment, design requirements, fabrication type, cost, recyclability, and others are covered. Additionally, simulations of stress analysis during the manufacturing and application modes are investigated. Prerequisite: MECH 340 Engineering Materials.

MECH 641/EECE 661 Robotics 3 cr.
A course discussing concepts and subsystems; robot architecture; mechanics of robots: kinematics and kinetics; sensors and intelligence; actuators; trajectory planning of end effector motion; motion and force control of manipulators; robot languages. Corequisite: MECH 436, EECE 460.

MECH 642/EECE 692 Computer Vision 3 cr.
An introductory course on the problems and solutions of modern computer vision. Topics covered include image acquisition, sampling and quantization; image segmentation; geometric framework for vision: single view and two-views; camera calibration; stereopsis; motion and optical flow; recognition; pose estimation in perspective images. Prerequisites: MATH 202 and EECE 230 or EECE 231.

MECH 643 Mechatronics and Intelligent Machines Engineering II 3 cr.
A course on sensors, sensor noise and sensor fusion; actuators; system models and automated computer simulation; information, perception and cognition; planning and control; architectures, design and development. A team project is included. Prerequisites: MECH 340 and MECH 530.

MECH 644 Modal Analysis 3 cr.
A course reviewing MDOF system vibrations, frequency response functions, damping, mobility measurement, curve fitting and modal parameter extraction, derivation of mathematical models; laboratory experiments and projects are included. Prerequisite: MECH 531.

MECH 645 Noise and Vibration Control 3 cr.
A course on fundamental concepts in noise and vibration, passive and active damping strategies, damping materials, control methods and applications. Prerequisite: MECH 230, MATH 212 and MECH 531.

MECH 646/EECE 697 Wheeled Mobile Robotics 3 cr.
A course that provides in-depth coverage of wheeled mobile robots. The material covers: nonholonomy and integrability of kinematic constraints; modeling: kinematics, dynamics and state-space representation; and nonlinear control strategies (open-loop and closed-loop). Five case studies are covered throughout the course: car-like, cart- like, omni-directional wheeled, mobile wheeled pendulums and bike-like robots Prerequisite: Senior or graduate standing.

MECH 647 Hydraulic Servo Systems 3 cr.
A graduate lecture course which teaches the fundamentals of modeling and control of hydraulic servo-systems. It provides theoretical background and practical techniques for the modeling, identification and control of hydraulic servo-systems. Classical and advanced control algorithms are discussed. The use of Matlab/Simulink and DYMOLA will be an integral part in this course. Prerequisites: MECH 314 and MECH 436, or MECH 314 and EECE 460.

MECH 648/EECE 669 Nonlinear Systems: Analysis, Stability and Control 3 cr.
A course that presents a comprehensive exposition of the theory of nonlinear dynamical systems and its control with particular emphasis on techniques applicable to mechanical systems. The course will be punctuated by a rich set of mechanical system examples, ranging from violin string vibration to jet engines, from heart beats to vehicle control, and from population growth to nonlinear flight control. Prerequisite: MECH 436 or EECE 460.

MECH 650/EECE 698 Autonomous Mobile Robotics 3 cr.
This course is designed to provide engineering graduate and 4th year students with the opportunity to learn about autonomous mobile robotics. Topics include sensor modeling, vehicle state estimation, map-based localization, linear and nonlinear control, and simultaneous localization and mapping. Prerequisites: EECE 230/1, EECE 312 and MECH 436; or EECE 230 and EECE 460.

MECH 653/EECE 660 System Analysis and Design 3 cr.
A course that outlines state-space models of discrete and continuous, linear and nonlinear systems; controllability; observeability; minimality; Eigenvector and transforms analysis of linear time invariant multi-input multi-output systems; pole shifting; computer control; design of controllers and observers. MECH 436 or EECE 460 or equivalent

MECH 654/EECE 665 Adaptive Control 3 cr.
A course that includes the control of partially known systems; analysis and design of adaptive control systems; self-tuning regulator; model reference adaptive control of uncertain dynamic systems; typical applications. Prerequisite: MECH 436, EECE 460 or equivalent.

MECH 655/EECE 662 Optimal Control 3 cr.
A course on optimization theory and performance measures, calculus of variations, the maximum principle, dynamic programming, numerical techniques and LQR control systems. Prerequisite: Senior or graduate standing, or consent of instructor.

MECH 656/EECE 663 System Identification 3 cr.
This course introduces the fundamentals of system identification as the basic mathematical tools to fit models into empirical input-output data. While rooted in control theory, applications extend to general time-series modeling and forecasting, such as stock prices, biological data and others. Topics covered include nonparametric identification methods: time and frequency response analysis; parametric identification methods: prediction error methods, least squares, linear unbiased estimation and maximum likelihood; convergence, consistency and asymptotic distribution of estimates; properties and practical modeling issues: bias distribution, experiment design and model validation. Prerequisite: Senior or graduate standing, or consent of instructor.

MECH 657 Vehicle Dynamics and Control 3 cr.
A course designed for seniors and graduate students. This course of advanced vehicle dynamics begins with whole vehicle motion, including acceleration, braking, aerodynamics,

steering, rollover, and extends to vehicle component dynamics, including tire, drive train, and steering, and suspension. Automotive active safety control systems (e.g., anti-lock braking, traction control, cruise control, vehicle stability control) will be introduced. An outlook into autonomous ground vehicle, and their main components and technology enablers, will be provided at the end of the course. Prerequisites: MECH 436.

MECH 663 Computational Fluid Dynamics 3 cr.
A course that deals with the discretization process in fluid dynamics; numerical approaches and applications; iterative and direct matrix methods; numerical implementation of turbulence models. Prerequisites: MECH 314 and MECH 412.

MECH 665 Unsteady Gas Flow 3 cr.
A course examining equations of unsteady continuous adiabatic multidimensional flows, unsteady continuous one-dimensional flow of a perfect gas with and without discontinuity, applications and pressure exchangers. Prerequisite: MECH 414.

MECH 670 Laboratory for Renewable Energy in Buildings 2 cr.
A laboratory course that will investigate means of reducing building energy consumption first through green building design, giving consideration to building orientation, thermal massing, wind- and buoyancy-driven flows, “urban heat island” effects; and second, by retrofitting existing buildings with energy saving materials and devices such as window films, solar water heaters, and green roofs. This course is offered because in Lebanon and the region, electricity consumption for building services accounts for a major portion of national energy use and greenhouse gas emissions. Students will measure and compare effects of various designs and retrofit interventions on the thermal performance, lighting and glare, and natural ventilation of model-scale buildings, and characterize performance of devices used in green building design. Lab assignments may vary by term but will normally include mathematical modeling and experimental measurement components organized around aspects of building physics. Prerequisite: MECH 430.

MECH 671 Renewable Energy Potential, Technology and Utilization in Buildings 3 cr.
A course that covers the principles and utilization of solar (thermal and photovoltaic), wind and geothermal energy, as well as energy from biomass. Issues relevant to energy efficiency and energy storage are discussed (heat and power store and bio-tanks). The course distinguishes between energy sources for large-scale, industrial/commercial settings and those intended for smaller structures. The potential of using renewable energy technologies as a complement to and, to the extent possible, replacement for conventional technologies, and the possibility of combining renewable and non- renewable energy technologies in hybrid systems are analyzed. Design aspects of active, passive, wind, bio-energy and photovoltaic energy conversion systems for buildings; and strategies for enhancing the future use of renewable energy resources are presented. The course will include several demonstrations of concept experiments. Prerequisite: MECH 310. Students cannot receive credit for both MECH 671 and EECE 675 or ENST 300.

MECH 672 Modeling Energy Systems 3 cr.
A course that covers indoor space thermal models. The course also deals with the analysis and modeling of building energy systems involving applications of thermodynamics, economics, heat transfer, fluid flow and optimization. The use of modern computational tools to model thermal performance characteristics of components of HVAC systems including chillers, recovery systems, flow control devices, heat exchanges, solar panels, dehumidification systems, boilers, condensers, cooling towers, fans, duct systems, piping systems and pumps. The course will use extensively modern simulation tools. Prerequisite: MECH 310.

MECH 673 Efficient Buildings with Good Indoor Air Quality 3 cr.
A course covering energy consumption standards and codes in buildings and energy conservation measures in built-in environments to enhance the building's energy efficiency while maintaining space, thermal comfort and indoor air quality requirement. Fundamental ventilation, indoor-air-quality, infiltration, natural and mechanical ventilation, importance and impact of indoor air quality on human health and energy performance of the building air conditioning system, ASHRAE, and ASHRAE requirement for ventilation. Particular focus will be given to green energy alternative measures. An overview of the different heating, ventilation and air conditioning system designs is also covered. Performance and energy consumption of the conventional air conditioning system (constant and variable air volume), as well as the hybrid integrated air conditioning systems will be discussed and compared. The course will include several demonstrations of concept experiments. Pre- or corequisite: MECH 310 or equivalent.

MECH 674/ ENST305/ ECON 333 Energy Economics and Policy 3 cr.
A course that aims at developing an understanding of practical analytical skills of energy economics and planning approaches taking into account the cost of impact on the environment. This course will provide fundamental concepts of economic issues and theories related to energy, such as economics of natural and energy resources, aggregate supply and demand analysis, and the interrelationship between energy, economics and the environment as well as some important issues in energy policy. The course will also demonstrate the use of economic tools for decision-making in energy and environment planning and policy. It will explore the terminology, conventions, procedures and planning policy applications. It will also cover a number of contemporary energy and environmental policy issues, including energy security, global warming, regulations of energy industries, energy research and development, and energy technology commercialization. Prerequisite: INDE 301. Students cannot receive credit for both MECH 674 and ENST 305 or ECON 333.

MECH 675 Building Energy Management Systems 3 cr.
A course that provides an opportunity for students to explore topics in energy management systems and management strategies for new and existing buildings; energy use in buildings; energy systems analysis and methods for evaluating the energy system efficiency; energy audit programs and practices for buildings and facilities; initiating energy management programs; guidelines for methods of reducing energy usage in each area in buildings; conservation of the energy in the planning, design, installation, utilization, maintenance; control and automation of the mechanical systems in existing and new buildings; air conditioning and ventilation systems in buildings; assessment and optimization of energy control strategies; prediction methods of economic and environmental impact of implemented control strategies and indoor settings. Prerequisites: MECH 310 and MECH 412.

MECH 676 Passive Building Design 3 cr.
A course that centers on issues surrounding the integration of sustainable and passive design principles into conceptual and practical building design. Topics will include: solar geometry, climate/regional limitations, natural lighting, passive design and sustainability initiatives, insulating and energy storing material, and bioclimatic design and concepts. Case studies will be used extensively as a vehicle to discuss the success/failure of ideas and their physical applications. The course will focus on the use of energy auditing/modeling methods as means to both design and evaluate the relative "greenness" of buildings, as well as to understand the global implications of sustainable buildings. The course will include several demonstrations of concept experiments. Prerequisite: MECH 671.

MECH 677 Heat Pumps 3 cr.
A course that focuses on heat pumps in low energy and passive buildings as well as ground

source heat pump fundamentals, loop systems, open systems, soil/rock classification and conductivity, grouting procedures, performance of ground source heat pumps in housing units. Water loop heat pumps inside the building, bore holes, design and optimization of heat pump plants, including heat sources for such plants and cost effective design options will also be considered. The course includes study visits and seminars given by industry experts. Prerequisite: MECH 310.

MECH 678 Solar Electricity 3 cr.
A course that focuses on the solar cell: photo generation of current, characteristic current-voltage I-V curve, equivalent circuit, effect of illumination intensity and temperature. The Photovoltaic PV generator: characteristic I-V curve of a PV generator, the PV module, connections of modules, support, safeguards, shadowing. The PV system: batteries, power conditioning. PV systems: grid- connected and stand-alone systems, economics and sizing, reliability, applications. Manufacturing: preparation of crystalline silicon wafers, formation of contacts, coatings, construction of modules. The course will include several demonstrations of concept experiments. Prerequisite: EECE 210.

MECH 679 Energy Audit Lab 2 cr.
A course designed to give students “hands-on” experience with carrying out energy audit measurements and studies on buildings to identify possible savings through selected energy conservation measures. The students will carry out measurements to investigate ventilation, air conditioning equipment, lighting and other office and lab equipment. The students will then be introduced to Visual DOE or E-Quest to perform energy simulation of buildings. Such tools will then be used to carry out a full building simulation taking into consideration occupancy data, equipment, lights and building envelope. A base case of energy usage will thus be established and energy conservation will then be applied to deduce possible savings and their economic value. Pre- or co-requisite: MECH 672.

MECH 680 HVAC and Refrigeration Systems Lab 3 cr.
The focus is on HVAC design optimization and energy conservation measures in built-in environment. It includes concepts of district cooling/heating systems, dehumidification and personalized ventilation systems. This course has a major component of hands-on experience with building energy systems design, operation and efficiency. Students will learn how to use and develop test equipment and plan for assessing system performance. Experiments and lab projects will span a series of advanced modules on sustainable, energy-efficient HVAC and refrigeration systems as laboratory topics. Lab topics may vary every term. Prerequisites: Advanced standing and MECH 310.

MECH 681 CIVE 686/ARCH 073 Sustainable Built Environments 3 cr.
A course that enhances knowledge about the past present and future conditions of the built environment. The course starts with a general overview of global / regional environmental, social and economic issues. Then, focusing on the built environment, students are introduced to climate responsive and environmentally friendly concepts in planning and design. The impact of using construction materials and their environmental impact throughout the building’s lifecycle will also be discussed. Students will gain critical knowledge through interactive lectures, case study analysis and the proposal of concepts relating to a particular theme. Upon completing the course, students will be equipped with the necessary knowledge that will enable them to make informed project related design decisions in their careers.

MECH 683 Wind Turbines: Design and Applications 3 cr.
This course offers an overview of key aspects in wind energy technology and the

engineering principles underlying the operation of wind turbines. It covers the essentials of wind turbine systems, their working principle, power curve characteristics, speed control, and calculation. It also covers an overview of wind resource and historical development of wind. This course demonstrates how to apply fundamental principles of thermodynamic and fluid mechanics to wind turbine engineering. It also introduces fundamental concepts in materials and show how these concepts are applied to analyze stresses in airfoils and other wind turbine components. It also provides a summary of the electrical aspects of wind energy conversion, particularly regarding the actual generation and conversion of the electricity. Finally, this course examines wind turbine control system, explain the control system components in general, and covers common turbine operating strategies that are found in modern turbines. At the end of the course, students will achieve a basic solid understanding of the aerodynamics, dynamics, mechanics, electricity production, and control of wind turbines. Pre-requisite: MECH 314 and MECH 320.

MECH 691 Convex Optimization 3 cr.
Advanced course that covers topics such as convex sets, convex functions, convex optimization problems, scalarization for vector optimization, duality theory, optimality conditions. Example problems include least-squares, maximum likelihood estimation, minimax, and extremal volume problems. Prerequisite: Math 218.

MECH 701 Principles of Combustion 3 cr.
A course on gas-phase reaction mechanisms and thermo-chemical kinetics; theory of ignition, flame propagation and detonation; characteristics of premixed, diffusion, laminar and turbulent flames; combustion aerodynamics; liquid and solid fuels in practical systems; pollutant formation and reduction mechanisms. Prerequisite: CHEM 202, MECH 412, MECH 414 or equivalent.

MECH 702 Pollutant Formation and Control in Combustion 3 cr.
A course that covers the fundamentals of gas and condensed phase pollutant formation, measurement and control pertaining to practical combustion systems. Topics include heat and mass transfer in reacting systems, chemical reaction kinetics, particle coagulation kinetics, and flame structure and propagation. These fundamental subjects are applied in the study of pollutant formation and control in practical systems including internal combustion engines, jet engines and industrial boilers. Removal of gaseous and particulate pollutants from effluent streams by use of adsorption, absorption, catalytic processes, inertial separation and electrostatic precipitators. Prerequisites: MECH 310, MECH 410, MECH 412, and CHEM 202; or consent of instructor. May be repeated for credit when topics vary.

MECH 703 Combustion Modeling 3 cr.
A course that covers the following topics: chemical thermodynamics and chemical kinetics, conservation laws for reacting flow problems, diffusion controlled vs. chemistry controlled combustion, laminar non-premixed and premixed flames and jets multi-phase combustion, detonations waves, turbulent combustion and combustion stability. Prerequisites: CHEM 202, MECH 310 and MECH 412; or equivalent.

MECH 705 Bioheat Modeling and Human Thermal Environments 3 cr.
This course is concerned with bioheat heat modeling of the human body and the human responses to hot, moderate and cold thermal environments. A comprehensive and integrated approach is taken to mathematical modeling of heat transfer in the human body, heat and mass transfer from the human body while defining human thermal environments in terms of air temperature, radiant temperature, humidity and air velocity of the environment, as well as the clothing and activity of the person. Other topics covered are bioheat

modeling; mathematical analysis and computer modeling of human response to the thermal environment; interaction of environment parameters with physiological and psychological responses and impact on the human health, comfort and performance; evaluation of heat stress and cold stress; thermal properties of clothing under static and active conditions; models for estimation of ventilation of clothed active persons; and international standards for the assessment of thermal comfort in the indoor environment. Prerequisite: MECH 412.

MECH 707 Statistical Mechanics and Thermodynamics 3 cr.
A course that examines the basic principles of statistical mechanics and their relation to the laws of thermodynamics and the concepts of temperature, work, heat and entropy; the microcanonical, canonical and grand canonical distributions; the applications to lattice vibrations, ideal gas, photon gas and quantum statistical mechanics; the Fermi and Bose systems, and interacting and non-interacting systems. Prerequisite: MECH 310.

MECH 720 Advanced Machine Design 3 cr.
A course that involves the analysis of stress and strain, torsion, design of axi- symmetrically loaded members, beams on elastic foundations, elastic stability, surface contact and wear, impact and finite element applications to nonlinear problems. Prerequisite: MECH 520.

MECH 721 Elasticity and Plasticity 3 cr.
A course on tensor analysis, the general state of stresses, properties and deformation of solid materials, elasticity, plasticity, matrix methods and applications. Prerequisite: MECH 320 or CIVE 310.

MECH 729 Spatial Mechanisms 3 cr.
A course that covers position, velocity, and acceleration analysis of spherical and spatial mechanisms; isometry; geometry of rotation axes; finite position synthesis; the 4R spherical linkage; lines and screws; the RSSR, RSSP, 4C and 5TS spatial linkages; platform manipulators. Prerequisite: MECH 628.

MECH 736 Modeling Solidification Processes 3 cr.
A course that seeks to impart a coherent view of solidification processes and how they are modeled. Topics for the first part of the course include: homogeneous and heterogeneous nucleation with plane front, cellular and dendritic pattern, columnar and equiaxed grain growth. Phenomena affecting the quality of castings such as micro-segregation, constituent under-cooling, macro-segregation and porosity formation are also covered. In the second part, solidification models are developed and applied in the context of casting operations. The course covers: heat flow in solidification processes; thermodynamics of solidification: nucleation and growth; binary phase diagrams and phase diagram computation; microstructure evolution and constitutional under- cooling; columnar and equiaxed solidification enthalpy method; mushy zone modeling; phase-field method; volume-averaging of conservation equations; multi-scale models; and modeling solidification defects. Prerequisites: MECH 340 and MECH 420, or consent of instructor.

MECH 740 Advanced Dynamics 3 cr.
A course that examines three-dimensional kinetics and kinematics, theory of rotating axis, Hamilton's equations, Lagrange's equation and Euler's equations. Prerequisite: MECH 230 or equivalent.

MECH 746 Space Mechanisms 3 cr.
A course that covers the following topics: mobility, spatial displacements, formulation of the kinematic equation, analysis and synthesis of spherical mechanisms, analysis and synthesis of spatial mechanisms, optimum synthesis of spherical and spatial kinematic

chains and analysis of platform manipulators. Prerequisite: MECH 628.

MECH 747 Nonlinear Finite Element Analysis 3 cr.
A course that covers governing equations and geometric and material nonlinearities; formulation of nonlinear problems; solution algorithms; vector and matrix methods; direct and iterative equation solvers; FE methods for nonlinear mechanics; element technology; numerical implementation of constitutive models; pitfalls of nonlinear analysis. Prerequisite: MECH 630.

MECH 751 Simulation of Multiphase Flows 3 cr.
A course that is intended to give an overview of the fundamentals involved in dispersed multiphase flows and develop a working knowledge which would allow the student to predict these flows numerically. Multiphase flows are important to many engineering and environmental applications. The course examines the conservation equations for multiphase systems; discretization using the finite-volume method; pressure-based algorithms for multi-fluid flow at all speeds: mass conservation based algorithms and geometric conservation based algorithms (SIMPLE, SIMPLEC, PISO and so on); the partial elimination and SINCE algorithms; weighted pressure correction; mutual influence of volume fractions; implicit volume fraction equations; bounding the volume fractions; numerical implementation; and applications. Prerequisite: MECH 663.

MECH 760 Advanced Fluid Mechanics 3 cr.
A course that examines fundamental concepts and principles in addition to basic relations for continuous fluids; vorticity dynamics, Kelvin Helmholtz theorems; Navier- Stokes equations; turbulence and oscillating flows: Prerequisite: MECH 314.

MECH 761 Convection Heat Transfer 3 cr.
A course that covers fundamental modes of heat transfer; similarity between heat, momentum, and mass transfer in forced and buoyancy-driven flows; simultaneous heat, momentum and mass transfer with phase change. Prerequisites: MECH 314 and MECH 412.

MECH 762 Advanced Thermodynamics 3 cr.
A course on advanced thermodynamic concepts; gas mixtures and multi-phase systems; chemical reactions; thermodynamic property relations; chemical and phase equilibrium; applications. Prerequisite: MECH 414.

MECH 763 Radiative Heat Transfer 3 cr.
A course that deals with the principles of thermal radiation and their application to engineering heat and photon transfer problems. Quantum and classical models of radiative properties of materials, electromagnetic wave theory for thermal radiation, radiative transfer in absorbing, emitting and scattering media, and coherent laser radiation. Applications cover infrared instrumentation, global warming, furnaces and high temperature processing. Prerequisite: MECH 412.

MECH 764 Advanced Topics in Computational Fluid Dynamics 3 cr.
A course on numerical solution of compressible unsteady flows, advanced turbulence modeling, the segregated approach, the multigrid technique and an introduction to multi-phase flows. Prerequisite: MECH 663.

MECH 765 Advanced Finite Volume Techniques 3 cr.
A course that focuses on linear multigrid; non-linear multigrid; mesh agglomeration: structured and unstructured grids; mesh generation: structured and unstructured grids; free surface simulation; and solidification simulation. Prerequisite: MECH 633.

MECH 766 Turbulent Flow and Transport 3 cr.
A course that covers the methods of analysis of turbulent fluid flow; in-depth discussion of algebraic, one-equation and two-equation turbulence models; the power and limitations of turbulence models; and numerical implementation. Prerequisite: MECH 660.

MECH 767 Heat Conduction 3 cr.
A course on solutions of steady and transient heat conduction problems with various boundary conditions; approximate analytical methods; application of numerical techniques; moving boundaries, problems in freezing and melting; anisotropic and composite materials. Prerequisite: MECH 412.

MECH 768 Transport Through Porous Media 3 cr.
A course designed for graduate students interested in the flow of multi-phase, multi-component fluids through porous media. The course emphasizes physics of the momentum, heat and mass transport formulation and computations in multi-dimensional systems, including theoretical models of fluid flow, capillary effects, application of fractal and percolation concepts, characterization of porous materials, multiphase flow and heat transfer, turbulent flow and heat transfer, improved measurement techniques, and enhanced design correlations. Prerequisite: MECH 412.

MECH 769 Advanced Scientific Computing 3 cr.
A course in which students will learn how to solve and visualize large-scale continuum type problems using high-performance cluster-type computing systems. Sections of the course will concentrate on discretization methods and multigrid methods in a parallel computing context. Different parallel computing paradigms are introduced with emphasis on domain decomposition methods and the practical aspects of their implementations using MPI. Prerequisite: Prior knowledge of C programming and familiarity with the UNIX operating system.

MECH 771 HVAC System Control Strategies and Energy Efficiency 3 cr.
A course that deals with the most common control strategies based on temperature set point, PMV control, CO2 set-point; and equipment used to reduce the amount of energy consumed by heating, ventilating and air conditioning (HVAC) systems using non-derivative optimization techniques. Control strategies and technologies related to gaseous indoor air pollutants. The control strategies analyzed in the course are: scheduled start-stop, day-night setback, optimum start-stop, dead band control, duty cycling, demand limiting and load shedding, economizer and enthalpy cycles, scheduled temperature reset, chiller control and chilled water reset, boiler control and hot water temperature reset, and condenser water temperature reset. Recent developments in HVAC control system hardware, such as pneumatic systems, electro-pneumatic systems, digital-electronic systems and microcomputer-based control systems, are also discussed. The strategies are studied and compared to each other in terms of cost effectiveness using optimization techniques. Case studies are used to strengthen understanding. Prerequisites: MECH 431 and MECH 672.

MECH 772 Moisture and Control of Humidity Inside Buildings 3 cr.
A course focusing on the following topics: sources of moisture and factors affecting its entry and buildup inside buildings, such as construction practices and choice of building materials and furniture; impact of moisture on thermal comfort and energy performance of the air-conditioning system; solid/liquid desiccant dehumidification and hybrid air-

conditioning systems; modeling of moisture transport; industrial need to control indoor humidity; and moisture-caused health issues including mold formation and growth. The course will include several demonstrations of concept experiments. Prerequisite: MECH 672.

MECH 773 Numerical Methods in Energy Technology 3 cr.
A course that introduces the fundamentals of numerical methodology in energy related areas (CFD, heat and mass transfer). Topics include: basic conservations equations; boundary conditions; finite volume discretization of conservations equations; geometry and computational mesh discretization practices; turbulence modeling (k-two-equation model); SIMPLE and SIMPLEC algorithms; thermal and solar radiation; and dispersed multiphase flow. The course emphasizes how to apply this information to the design and test of related equipment. Individual and group assignments are given throughout the course to act as training aid and to enhance understanding. A class project is included to provide supervised practice on course material using commercial software. Prerequisite: MECH 672.

MECH 778 Special Projects on Renewable Energy Systems Design 3 cr.
A course that allows the student to take a given set of requirements and to select and design a complete renewable energy system to fully meet those requirements. The student will perform all aspects of the project design from cost- benefit analysis to systems specification to construction, control and final audit assessment of the completed energy system. The student is exposed to various commercially available design and simulation software for planning, specifying and simulation testing of renewable energy retro-fits and new installations. Prerequisites: MECH 671 and MECH 672.

MECH 788 (A-E) Thesis in Applied Energy 9 cr.
Prerequisite: MECH 799T or MECH 799TR.

MECH 796 Special Projects in Mechanical Engineering
An assigned project of no more than 3 credit hours supervised by a faculty member.

MECH 797 Seminar 0 cr.
A seminar that consists of weekly presentations on current research or applied projects in mechanical engineering presented by faculty, students and invited scholars. This is a pass/fail course based on attendance.

MECH 798 Special Topics in Mechanical Engineering 3 cr.
Special Topics in Mechanical Engineering

MECH 798A Fundamentals of Energy and Resource Recovery 1 cr.
A course covering the following topics: combustion and the environmental impact of combustion; fundamentals in energy and material balances; basic knowledge of the kinetics and the influence of different flow models; and humidification and vapor liquid equilibrium. Prerequisite: MECH 310.

MECH 798B Energy Recovery 1 cr.
A course that aims to give students extended knowledge on various techniques for energy recovery by combustion. Topics include combustion devices, fluidized bed boilers, grate boilers, biogas boilers, energy recuperation and recovery technology, effects of inorganic compounds in the fuel, fuel and ash treatment, fouling and agglomeration; and the fundamentals of metals, oxidation phenomena, high temperature corrosion and erosion-corrosion. Prerequisites: MECH 310 and MECH 340.

MECH 798C Sustainable Materials 1 cr.
A course that aims to give the student knowledge regarding sustainable materials and their use in the product development cycle in order to promote sustainability. The course covers the development and economy of industrial materials; the interaction between materials and environment; and materials and public health. Alternative strategies for material use are also covered such as: recycling and reuse, renewable materials and biodegradable materials. Finally, the importance of legislation and governmental policies in promoting sustainability in society is reviewed. Assignments will be in the form of case studies. Prerequisite: MECH 340.

MECH 798D Moisture Transport in Building Envelopes 2 cr.
A course that deals with the sources of moisture affecting building envelops; rain, water vapor in outside and inside air, condensation and water uptake from the foundation; factors affecting the entry and buildup of moisture such as construction practices, choice of building materials and surface treatments; impact of moisture on heat transport through the envelopes; modeling of moisture transport; and moisture-caused damages including mold growth, decay of construction materials paintings, and so on. Prerequisite: MECH 672.

MECH 798E Computer Modeling and Building Physics Applications 2 cr.
A course on computer modeling of temperature and moisture conditions in building materials and components is essential in order to evaluate the performance of the building envelope, which is decisive of the indoor climate, consumption of energy, and durability of the construction. These are important factors for low environmental impact and sustainable building technology. Focus will be put on understanding and using computer models for building physics applications. Theory of mathematical and numerical modeling of heat and mass transfer and an overview of existing calculation tools combined with practical exercises will be given. A simple calculation tool will also be developed within this course. Prerequisite: MECH 672.

MECH 798H Contemporary Topics in Energy Management 3 cr.
This course provides students with the basics of the interrelationships between energy, economy and the environment. It highlights the global and regional energy scenes. The module provides students with the fundamentals of energy and carbon accounting, energy management, and energy efficiency. It will cover policies and measures to shift towards low carbon economy and demonstrate approaches used in assessing these measures. Prerequisite: MECH 310.

MECH 798J/MECH503A Data-Driven Methods in Science and Engineering 3 cr.
This course provides a broad introduction to machine learning methods with applications in science and engineering. Topics include: supervised learning (linear/logistic regression, neural networks, support vector machines etc.), unsupervised learning (clustering, PCA, autoencoders), reinforcement learning, and learning theory (variance/bias trade-off, approximation/estimation errors, etc.). The course will emphasize engineering and scientific applications, including: control theory, nonlinear dynamics, fluid dynamics, and materials science. Recent developments in physics-informed machine learning techniques will be discussed, including: sparse identification of nonlinear dynamics (SINDy), dynamic mode decomposition (DMD), and physics-informed neural networks (PINNs). Pre-requisites: MATH 201, MATH 218, STAT 230, EECE 230

MECH 798M: Data-Driven Modeling 3 cr.
How do we go from a high dimensional, noisy, nonlinear, complex, and multiscale universe

to simple and predictive mathematical models? This course introduces traditional and modern data-driven modeling techniques using a wide variety of examples in physical, social and biological sciences. Modern data-driven approaches that take advantage of recent advances in machine learning are introduced, including: sparse identification of differential equations, dynamics mode decomposition, physics informed neural networks, and data-driven Koopman analysis. Pre-requisites: EECE 230/231, MATH 202, and STAT 230 or MATH 218/219.

MECH 799 (A-E) Thesis in Mechanical Engineering 9 cr.
Prerequisite: MECH 799T or MECH 799TR.

MECH 799T and 799TR Master's Comprehensive Exam 0 cr.
The master's degree comprehensive exam grading mode is pass/fail. If a student fails MECH 799T, s/he must register for MECH 799TR and take the exam during the next term, excluding summer.

MECH 898 Advanced Topics in Mechanical Engineering 3 cr.
Advanced Topics in Mechanical Engineering

MECH 980 Qualifying Exam Part I: Comprehensive Exam 0 cr.
Every term.

MECH 981 Qualifying Exam Part II: Defense of Thesis Proposal 0 cr.
Every term.

MECH 982 PhD Thesis 3 cr.
Every term. Taken while total required credit hours have not been completed.

MECH 983 PhD Thesis 6 cr.
Every term. Taken while total required credit hours have not been completed.

MECH 984 PhD Thesis 9 cr.
Every term. Taken while total required credit hours have not been completed.

MECH 985 PhD Thesis 12 cr.
Every term. Taken while total required credit hours have not been completed.

MECH 986 PhD Thesis 0 cr.
Every term. Taken while total required credit hours have not been completed.

MECH 987 PhD Thesis Defense 0 cr.
Every term.

Energy Studies Interdisciplinary Courses

ENST 300 The Science and Technology of Energy (FAS/MSFEA) 3.0; 3 cr.
This course examines the fundamental principles of energy conversion processes as well as their impact on the environment and provides a clear physical explanation of these principles. It also offers a survey of current energy conversion technologies. Topics are selected based on their future promise energy sources. The course starts with introductory topics providing a minimum base on thermodynamics, kinetic theory of gases, heat

transfer and fluid flow and the concept of energy efficiency. Topics include: applications in heat engines, solar thermal, photovoltaic energy conversion, wind, biomass and fuel cells. Prerequisite: PHYS 210 or equivalent.

ENST 310 Advanced Energy Economics 3.0; 3 cr.
This course covers advanced topics in both oil and natural gas economics with a clear distinction between these two energy sources. It is to cover in depth analyses of topics such as supply and demand, formation and forecast of prices, investment in oil and gas fields and infrastructure, the economics of transporting oil and natural gas (as piped or liquefied gas), as well as that related to the end-use of crude oil, petroleum products and natural gas in all its assortment. Prerequisite: ECON 333.

ENST 320 Energy Law and Case Studies 3.0; 3 cr.
This course is concerned with regulation of energy, energy resources and energy facilities. Among the topics examined are the regulation of rates and services, the state public utility commissions and the interaction with environmental law. Attention is given to energy resources (such as oil, natural gas and coal reserves, and hydropower resources) and to the generation, transmission and distribution facilities. Special emphasis is placed on the current and future roles of renewable energy, energy efficiency and nuclear energy, as well as on the regulation and deregulation of electricity. Prerequisite: PSPA 352.

ENST 330 Energy Science and Technology Lab 3.0; 3 cr.
This course is designed to give students “hands-on” experience on selected energy science and technology topics in solar energy; electrochemical energy storage; thermoelectric technologies; fuel cells; thermo-hydraulics of power systems; energy efficiency in a wide range of systems; hybrid engines; thermal management of electronics; and energy efficient buildings. The selected topics vary from term to term

ENST 396 Topics in Energy Issues: The Case of Lebanon 3.0; 3 cr.
This course addresses contemporary issues in energy economics facing Lebanon. It evaluates energy sector economic policies in production and pricing, taxation and conservation, and provides alternatives policies and solutions.

ENST 396A Special Topics in Energy Issues: The Future of Nuclear Power 3.0; 3 cr.
This course will provide students with a deeper understanding of nuclear energy and the underlying economic, security, and technological challenges associated with it. Covered topics include the basic physics of nuclear energy, overview of nuclear technologies, economics of nuclear power and examination of safety and security risks. The course aims to provide a policy-oriented platform to assess the prospects of a global nuclear “renaissance” as well as the realities of nuclear power deployment in the Middle East. Prerequisite: MECH 310, PHYS 210 or PHYS 211.

ENST 396B Special Topics in Energy Issues: Biofuels Between Food and Energy Security 3.0; 3 cr.
This course provides students with a deeper understanding of biofuels. The course examines the different biofuel options and their ecological as well as socio-economic impacts. Covered topics include the consequences of biofuel production for food and energy security as well as for the environment. Particular emphasis is placed on biofuel production in developing countries. The course aims to identify criteria for sustainable biofuel production that contributes to energy independence, economic growth and environmental protection.

ENST 396C Special Topics in Energy Issues: Energy Strategies for Developing Countries 3.0; 3 cr.
This course provides students with a deeper understanding of the different energy resources (fossil energy such as oil, coal and natural gas; nuclear energy; and the different options of renewable energies like hydropower, solar energy, on- and offshore- wind energy, biofuels, energy derived from animal waste) and their use in developing countries. The course examines the energy strategies in developing countries in relation to issues such as combatting climate change, stimulating economic growth and contributing to energy independence. Amongst other cases, special emphasis of the course will be on Lebanon's challenges in the energy sector. The course also looks at the role of developed countries and international organizations to help developing countries in meeting their energy needs in a sustainable way.

ENST 396D Energy Resources & Renewable Technologies: Regional Analysis 3 cr.
This course will provide students with a deeper understanding of the different energy technologies in Arab countries. Which local economic, political, and geographic conditions influence the energy situation (import and export dependency, choice of energy sources, etc.) of countries in the region? How are the Arab countries interconnected with each other on energy issues? Apart from the regional dynamics, which global forces (such as climate agreements and oil market prices) influence the energy situation in Arab world countries? The course will examine the use of energy resources like conventional energy (fossil oil, coal and natural gas), nuclear energy, renewables (hydropower, solar energy, onshore and offshore wind energy, use of biomass) to provide a better understanding of the energy situation and challenges in Arab world countries such as the finiteness of fossil resources and ecological problems. The students will learn to develop regional strategies for a sustainable energy transition (under environment, social, economic and technical criteria) that take impacts from global markets and local developments into consideration.

ENST 397 Seminar
Must be registered once per year.

ENST 395A/B Comprehensive Exam
Comprehensive Exam

ENST 699 Thesis 6 cr.
Thesis

ENST 398 Special Projects in Energy Studies in Cooperation 3.0; 3 cr.
With Industry and/or NGO and Legislative Bodies.

Online Courses

MECH 671E Renewable Energy Potential, Technology and Utilization in Buildings 3 cr.
This course has the same catalogue description as the MECH 671 course but follows the online delivery format.

MECH 672E Modeling Energy Systems 3 cr.
This course has the same catalogue description as the MECH 672 course but follows the online delivery format.

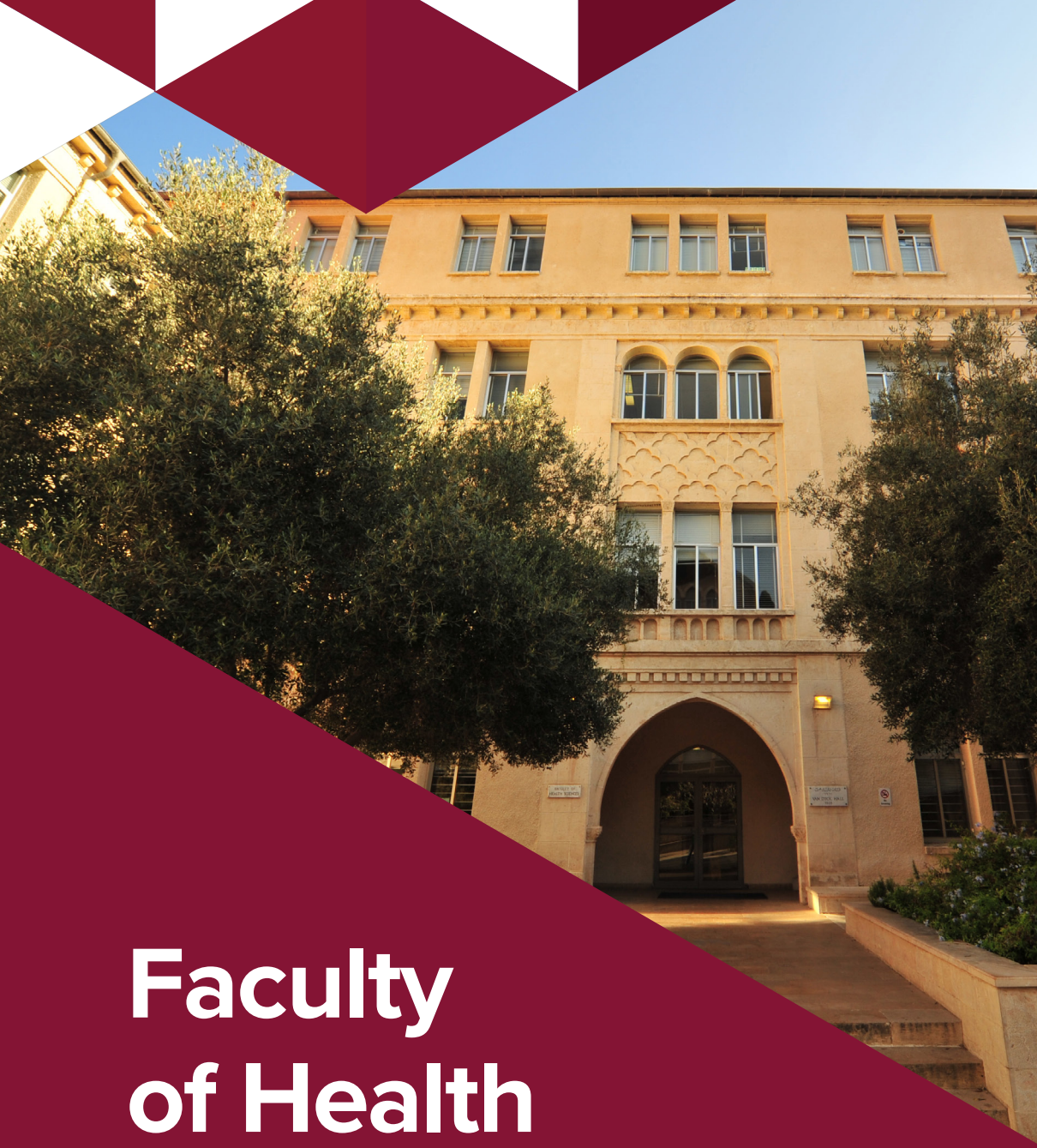
MECH 673E Energy Efficient, High Indoor Air Quality Buildings 3 cr.
This course has the same catalogue description as the MECH 673 course but follows the online delivery format.

MECH 674E Energy Economics and Policy 3 cr.
This course has the same catalogue description as the MECH 674 course but follows the online delivery format.

MECH 677E Refrigeration and Heat Pumps 3 cr.
This course has the same catalogue description as the MECH 677 course but follows the online delivery format.

MECH 680E Innovation and Knowledge Transfer in Renewable and Building Service Systems 3 cr.
A course designed to help students understand theory and practice for investing in and managing green ventures while exercising corporate social responsibility, sustainability within the organization and in the external environment. The course will develop knowledge and exposure to sustainable business concepts. Students will learn how to initiate, manage and implement a sustainable innovative project by collaboratively working on a venture which will be written up and presented at the end of the semester. The course will cover the management process required to transform an innovative idea into a commercial opportunity or business proposition. It will detail the stages and processes involved in the management and commercialization of intellectual property (IP). Students from all disciplines will be involved in the creation of knowledge in the form of intellectual property. Students will be provided with a fundamental understanding of how to manage the development of IP and transfer this asset to the Knowledge Economy. The module will examine some success stories and the address the requirements to manage and protect intellectual property rights (IPR) in areas such as renewable energy integration in buildings, HVAC applications, and smart building services. The potential routes to commercialization and the following key business feasibility questions will be considered: Can the product be made? Will someone buy it and is it possible to make a profit? This course will provide an essential grounding in matters relating to the exploitation of IP for students interested in both academic and industrial careers.

MECH 682E Principle of Integrative Building Design, Construction and Operation for Sustainability 3 cr.
This course centers on issues surrounding the integration of passive design principles into conceptual and practical building design sing basic design rules, simulation tools and conservation measures and protocols as means to improve building energy performance. Topics include: i) Building loads from envelop characteristics/materials including fenestration, building orientation and window location, type and area/shading and associated direct solar gains, people schedules/activities, lighting, infiltration; ii) building indoor requirements of thermal comfort and air quality; iii) passive design practices. Impact on building inherent load of passive design interventions including envelop, fenestration, shading orientation, shape, energy storage, trombe wall, natural and mixed ventilation, and other potential practices will be studied. Open source software is used to model a base building in regional climate and impact of various measures on energy performance and comfort requirements inside the building. The full building simulation is performed using case study occupancy data, equipment, lights, and building envelope. Energy conservation is then applied to deduce possible savings, their economic value and contribution to reduced greenhouse gas emissions and a sustainable building design.



Faculty of Health Sciences (FHS)

Graduate Program

Officers of the Faculty

Fadlo R. Khuri	President of the University
Zaher Dawy	Provost
Abla Mehio Sibai	Dean
Monique Shaya	Associate Dean
Bradley Jon Tucker	Registrar
Antoine Sabbagh	Director of Admissions
Lokman Meho	University Librarian

Faculty Administrative Support

Mona Katul	Executive Officer
Amal El-Kassis	Student Services Manager
Daisy Nasr	Financial Officer
Diala Badreddine	Accreditation Officer
Maya Abou Khouzam	Events and Projects Officer
Gina Cordahi	Operations and Strategic Initiatives Manager
Maia Sieverding	Director, Public Health Education Office
Annie Tabakian	Project Manager

Faculty Administrative Support

Suzanne El Kheshen	Instructor (Assistant to Dean)
Nida' El Helou	Instructor (Practicum Coordination and Career Services)
Maya Abi Chahine	Instructor of Public Health Practice (University for Seniors)

Adjunct Faculty

Rima Afifi	Marian Abouzeid

Historical Background

The Faculty of Health Sciences (FHS) was established in 1954 as an independent School of Public Health, the first of its kind in the region. The name of the school was changed to the Faculty of Health Sciences in 1978 to accommodate programs in allied health.

FHS serves to educate and train professionals and competent leaders to help meet the health needs of Lebanon and the region. Currently, FHS hosts four departments which are Epidemiology and Population Health (EPH), Environmental Health (EH), Health Promotion and Community Health (HPCH), Health Management and Policy (HMP), and a Division of Health Professions. It also hosts programs in collaboration with the Faculty of Medicine, which include programs in Medical Laboratory Sciences, Medical Audiology Sciences and Medical Imaging Sciences. FHS offers a BS degree in Environmental Health, Medical Laboratory Sciences, Medical Imaging Sciences and Medical Audiology Sciences, a BA degree in Health Communication, as well as a Graduate Public Health Program including an MS degree in Public Health (MPH) (concentrations in Epidemiology and Biostatistics, Health Promotion and Community Health, and Health Management and Policy), an MS in Epidemiology. FHS also offers an MS in Environmental Sciences, major: Environmental Health (as part of an Interfaculty Graduate Environmental Sciences Program), an Executive Master in Health Care Leadership and a PhD in Epidemiology. In addition, FHS provides courses in public health to students in the Faculty of Medicine.

Accreditation

In October 2006, the Public Health Program (PHP) of the Faculty of Health Sciences (FHS) became accredited by the Council on Education for Public Health (CEPH) and was reaccredited in 2012 for seven years term extending to 2019. In December 2019, the CEPH Board voted to renew the accreditation of the program for another seven-year term ending in 2026. The PHP includes the Master of Public Health, Master of Science in Epidemiology, Master of Science in Environmental Health, and the PhD in Epidemiology, as well as the Bachelor of Arts in Health Communication and the Bachelor of Science in Environmental Health. CEPH is an independent agency in the United States, which is recognized to accredit schools and programs of public health. The PHP at FHS was the first graduate public health program to be accredited by CEPH outside the Americas and remains the only program in the Arab region. Accreditation indicates that the PHP of the FHS meets standards for Public Health Education of leading schools of public health in the world.

Mission

To improve the health of populations and advance the public health discipline and field of health professions in the region and beyond, through excellence in education, research, and community engagement.

Vision

The leading academic voice and driver for equity, justice, and better health in the Arab region and beyond.

[1] Frozen

Graduate Public Health Program (GPHP)

Mission Statement

To build the next generation of public health leaders to advance knowledge, and impact practice and policy.

GPHP Value Statement

Our teaching, research, and service are guided by core values. These values derive from our context as a leading graduate program of public health in a middle-income regional setting that has suffered from intermittent political conflict and unrest, and from our adherence to basic principles of professional conduct, human rights, and service to underprivileged communities.

- **Equality & Social Justice:** We believe in equality among people; our work is oriented to enhance health equity and social justice by focusing on underserved communities.
- **Civic Responsibility:** We believe that each of us has a role to play in advancing knowledge and improving health, and we work to instill a sense of civic responsibility among students and partners organizations with whom we collaborate.
- **Integrity & Professional Ethics:** We bring a commitment to integrity and professional ethics in all our efforts.
- **Diversity:** We believe that diversity in our faculty, students, and in our practice sites enhances our ability to understand the perspectives and the circumstances that influence health.
- **Excellence:** We are committed to excel in all that we do, and believe that our faculty and alumni provide leadership and vision to improve the health of people and communities.
- **Peace:** We research and mitigate the public health effects of conflicts on population and systems as a contribution to achieving peace and justice.

Master of Public Health (MPH)

Admission Requirements

Applicants for graduate study in the MPH program may be considered for admission in one of the following categories:

Graduate

A candidate qualifies for this category if he/she: (a) holds a bachelor's degree from AUB or an equivalent degree from another recognized institution with a cumulative Grade Point Average (GPA) of at least 3.0 and a GPA of at least 3.3 or its equivalent in the major field of study, (b) holds a graduate degree from AUB or another recognized institution with a cumulative GPA of 3.3 or its equivalent.

On a case-by-case basis, applicants to the program may be admitted to this category if the

GPA in the major field of study is between 3.0 and 3.3, provided their cumulative GPA is at least 3.3.

When only a cumulative GPA is available, the applicant will qualify for this category if his/her average is 3.3 or more.

On a case-by-case basis, applicants to the program with major and/or cumulative GPA between 3.0 and 3.3, who have sufficient and significant work experience (more than 5 years in the Public Health field), may be admitted to this category upon recommendation of the department and approval by the Graduate Studies Committee (GSC).

Graduate on Probation

A candidate qualifies for this category if he/she holds a bachelor's degree from AUB or an equivalent degree from another recognized institution with an undergraduate major and cumulative GPA between 3.0 and 3.3.

When only a cumulative GPA is available, the applicant will qualify for this category if his/her average is between 3.0 and 3.3.

Special Student Not Working for a Degree

On exceptional basis either upon the recommendation of the Department or based on the public health experience of the applicant, those with a cumulative GPA below 3.0 can be considered for admission as a non-degree graduate student. The concerned department has to provide the GSC with a clear justification for its recommendation. However, applicants who are considering admission to the MPH program should also have a relevant and sufficient work experience to be considered for admission as special students.

A student registered as a special, not working for a degree, graduate student can register for a minimum of 7 and a maximum of 12 core and concentration credits in the relevant department and must obtain a cumulative GPA of at least 3.7 in the registered courses to be considered for admission to the MPH program. The average of all completed courses will be evaluated for admission into the MPH along with the undergraduate average and public health experience.

Spring/Mid-year admissions are accepted on a case-by-case basis if places are available. Students admitted at mid-year may only register as part-timers.

Students who have had significant prior experience in a health-related field may be granted a partial waiver of practicum hours. Applications for partial waiver of practicum hours are assessed on a case-by-case basis (see policy on Partial Practicum waiver). In the case in which waiver is granted, the waived practicum credit should be replaced with a one credit elective.

Selection Criteria

Applicants to the MPH program must specify the area of concentration of their choice by priority on the application form. Admission into the concentration areas within the MPH program is based on the following criteria:

- Choice of Faculty: Priority for consideration for admission goes to applicants who indicate FHS as their first choice.
- Choice of Concentration: Priority for consideration for admission in a concentration area goes to applicants indicating that concentration as their first choice.

- Grade Point Average: Normally, priority for consideration for admission goes to applicants with a higher grade point average.

Other factors taken into consideration include background diversity (prior degree and previous academic institution), geographic diversity, years and type of work experience, personal statement, recommendation letters and interview when applicable.

Graduation Requirements

MPH is a competency-based program where students are assessed on each foundational and concentration knowledge component and competency at least once.

Students must demonstrate that they have satisfied the minimum level of requirements in order to graduate from the program.

All recommendations for graduation are made by vote of the faculty on the recommendation of the Graduate Studies Committee. To be eligible for graduation in the MPH program, a student must accomplish the following:

- pass all required courses with a minimum grade of C+
- earn an overall GPA of at least 3.3
- and successfully complete a minimum of 42 credit hours

Credit requirements for the MPH program are tabulated below:

Course Type	Credits
Required core	23
Required concentration	10-11
Required public health experience	5
Electives	3-4
Total number of credits required for graduation	**42**

Credit Load

A full-time student must carry a minimum load of 12 credits per term. Students can register for up to 18 credits per term. Students who wish to register for more than 18 credits must petition the Graduate Studies Committee for approval. A part-time student must carry a minimum load of 4 credits per term. Students who wish to register for less than 4 credits must get the registration advisor's approval to ensure that their residency does not exceed the maximum of 4 years as per AUB policy. These students must petition the Graduate Studies Committee for approval.

Policy on Practicum Registration

All MPH students are required to satisfactorily complete a 300-hour practical experience as part of the MPH program. The Practicum consists of 2-credit hours of public health practice which students are expected to register for upon completion of all core and concentration courses. In exceptional circumstances, part-time students working full-time who wish to complete their practicum hours over two semesters may petition to do so. Students

are allowed to register for the Practicum in the same semester with only one core and/or concentration course along with the Integrative Learning Experience (ILE) II course (as long as the course not yet taken does not consist of material needed to effectively undertake the activities of the practicum). To be allowed to register for a concentration course along with the practicum, the student needs to seek the approval of the concerned department. The student needs to seek approval to be allowed to register for a concentration course along with the practicum.

Policy on Transferring to another Concentration

The MPH program has three options for concentration, which are Epidemiology and Biostatistics (EPBS), Health Promotion and Community Health (HPCH), and Health Management and Policy (HMP). Every year, a quota for admissions is set for each. Students are accepted into the program in a particular concentration area. Students may petition to transfer to another area of concentration. Petitions are reviewed in current and prospective departments in light of student academic performance, justification for transfer and implications on the quota. The final decision is made by the Graduate Studies Committee. Students cannot transfer to another concentration before the grades of the first term of enrolment in the current concentration are released.

Policy on Course Exemption

Some graduate courses may be exempted for students if the student has acquired the relevant knowledge components and satisfactorily completed the requirements of every competency.

- Exemption from a required FHS graduate course may only be considered when the student has proof that s/he has satisfactorily completed a comparable graduate level course in a recognized university normally with a minimum grade of B+ or the equivalent.
- Course exemption is possible if the course was taken in a period not exceeding the last 5 years.
- Graduate students are allowed to be exempted from courses with a maximum of 6 graduate credits.
- The requirement of this particular exempted course is waived but not its credits (i.e., the candidate has to replace the exempted course credits with other course(s) having the same number of credits). Students are still expected to complete the minimum number of credits required for graduation (MPH 42 credits; MS 30 credits).
- The course instructor assesses the equivalence of courses through comparison of course description and learning objectives. The course instructor may require that the petitioning student take an exam in order to demonstrate proficiency in the subject prior to the official registration period for the required course or before the deadline of the drop and add period.
- In cases where students want to equate a course offered in another faculty for a required graduate course in the MPH/MS program, the course instructor (or relevant department chairperson) must approve the petition for equating courses prior to the student registering for the course. This could only happen when the required course is not offered during the term in which the student needs to complete the degree requirements.

- HMPD 306 course exemption policy: Students enrolled in the MPH-HMP program and who took in their undergraduate studies a microeconomics course, such as ECON 211 or AGSC 212 or their equivalent from other recognized universities, can petition to be exempt from the workshop course HMPD 306. The instructor of the HMPD 306 course or Chairperson of the HMP department reviews the petition for possible approval.

Procedure for exemption:

- The student submits a petition for course exemption attaching the syllabus and official university transcript from the other university/program.
- The course instructor decides if the course can be exempted based on the course syllabus and/or a test.
- If an exam is required, the student is asked by the Graduate officer to sit for the exam either prior to the start of the term when the course is offered or before the deadline of the drop and add period.
- As per the course instructor's decision, the petition is approved/rejected and forwarded to the Graduate Studies Committee then to the Office of the Registrar at AUB.

Policy on Partial Practicum Waiver

No exemption is granted from the Practicum experience. The Practicum must be completed while a student is enrolled in the MPH program with no exceptions. However, a partial waiver of hours can be granted on a case-by-case basis. Students with the required level of experience prior to joining the MPH program may request a partial waiver to complete 150 hours of practicum work (instead of 300 hours), if they offer enough evidence of fulfilment of the practicum waiver criteria. Students who have a minimum of four years of full-time, relevant and documented public health work experience prior to joining the MPH program, are eligible to apply for a partial waiver of 150 practicum hours. This experience should match a minimum of two core and one concentration competencies of the MPH program.

Students granted partial waiver register for a 1-credit practicum course (HMPD/HPCH/EPBS 366). The waived practicum credit should be replaced with a one-credit elective.

Policy on Transfer of Credits

For courses taken outside FHS or outside AUB

A transfer of credits may be considered when the student has satisfactorily completed a graduate course with a minimum grade of B+ or equivalent at a recognized university. Credits counted toward another graduate degree at AUB or another institution cannot be transferred if they have already been used to satisfy requirements for another awarded graduate degree. In this case, students might be considered for exemption from a course but not credits. The transferred credits are accepted after seeking approval of the course instructor.

Transfer of course credits from graduate academic and professional diploma programs at AUB to a graduate degree program is allowed following the academic rules and regulations specified by the American University of Beirut. However, the number of course credits that can be transferred is up to 12 credits for graduate academic diplomas and up to 6 credits for graduate professional diplomas (in reference to AUB policy on transfer of credits).

Transfer of credits from graduate programs that are jointly offered with FHS at AUB is possible

before the completion of the degree in the event that the student wants to change major. The number of credits that can be transferred from joint programs cannot exceed 12 credits of comparable courses at FHS. However, the maximum number of transferable credits from non-CEPH accredited programs is 6 core or concentration credits.

Request for transfer of credits for MPH/MS students is only possible if the student has completed the course within the previous 5 years of the transfer request date.

Procedure for transferring credits:

To transfer credits, the candidate submits a course equivalence petition through the online petition system and attaches the following official documents after consulting with the academic and registration advisors:

- a detailed description of course content and syllabus
- an official statement of records/grades earned for the course(s)

For transfer of credits, the Graduate Officer verifies that the transferring university has comparable academic standards to those of the American university of Beirut.

The instructor of the specific course reviews the syllabus and recommends on the equivalence of the course.

The online petition passes through a chain of approvals until the final decision is taken by the Graduate Studies Committee.

Probation

Placement on Probation

A student is placed on probation if one of the following occurs:

- s/he fails in any graduate course taken for credit (passing grade is C+)
- s/he fails to obtain a minimum overall GPA of 3.3 in graduate courses

Part-timers can only be evaluated after completion of at least 10 credits. Their cumulative average is evaluated every term thereafter.

A student with an admission score (major and cumulative GPA) of at least 3.0, but less than 3.3 will be admitted on probation.

Removal of Probation

A full-time student will be removed from probation at the end of a term if s/he has passed all courses and attained an overall GPA of 3.3.

Part-timers are first evaluated after completion of at least 10 credits. Their overall GPA is evaluated every term thereafter.

Dismissal from the Program

A student on probation may be dismissed upon the recommendation of the Graduate Studies Committee if one of the following occurs:

- s/he fails to be removed from probation after one term or its equivalent for part–timers (10 credit hours).
- placement on probation more than once (not counting the probation at admission time).
- The student attains a cumulative average of less than GPA 2.3 after completion of 10 credits or fails two courses in one term.
- The student attains a cumulative average of GPA 2.3 or above but less than GPA 3.3 in any term, and fails one course in that term (This rule does not apply to the first term of study).
- In the judgment of the GSC, is not making satisfactory academic progress, or hasn't behaved in contempt of the norms and values upheld by the Faculty. Additional information about personal circumstances and general academic performance will be sought.

GSC will make their decisions based on all the above points.

Responsible Code of Conduct (RCR) Requirement

All newly admitted graduate students are required to successfully complete an online course on Responsible Conduct of Research (RCR) from the Collaborative Institutional Training Initiative (CITI Program). The course "covers core norms, principles, regulations, and rules governing the practice of research." It consists of the following modules: Research Misconduct, Data Management, Authorship, Peer Review, Mentoring, Using Animal Subjects in Research, Conflicts of Interest, Collaborative Research and Research Involving Human Subjects. FHS requires the completion of the following additional two modules, Social and Behavioral Responsible Conduct of Research Course, as well as Students - Class Projects.

Curriculum

The Master of Public Health (MPH) curriculum is composed of three principal elements which include core courses, concentration courses and public health experience courses. Core courses emphasize critical public health competencies. Concentration courses provide students with an opportunity to specialize in a chosen discipline of public health. The public health experience courses provide an opportunity to practice the knowledge and skills acquired from the coursework (core and concentration courses) into hands-on experience that is then synthesized and linked to core and concentration competencies.

Students enrolled in the MPH program may choose to specialize in one of three different disciplines of Public Health which are Epidemiology and Biostatistics, Health Promotion and Community Health, and Health Management and Policy.

I. Core Courses (Required of all MPH Students)

		Lecture Hrs./ Week	Lab Hrs./ Week	Credits
PBHL 312	Foundations of Public Health	1.5	0.5	2
ENHL 301	Environmental Health and Sustainable Development	1	0	1
PBHL 310	Research Methods in Public Health	2	2	3
EPHD 300	Principles of Epidemiology	1.5	0.5	2
EPHD 310	Basic Biostatistics	2	2	3
HMPD 300	Health Systems Management	3	0	3
HPCH 301	Health Communication	2	0	2
IPEC 300	Inter-professional Education	0	2	1
PBHL 303	Design and Evaluation of Public Health Programs	2	2	3
PBHL 304	Public Health Policy and Advocacy	3	0	3
PBHL 305	Contemporary issues in Public Health	0	1	0
PBHL 306A	Workshop Series: Library and Literature Search Skills	0	0	0
PBHL 306B	Workshop Series: Proposal Writing and Literature Synthesis for Public Health Research and Practice	0	0	0
PBHL 306C	Workshop Series: Conflict Resolution, Mediation and Negotiation Skills	0	0	0
Public Health Experience Courses				
PBHL 399A	Integrative Learning Experience I	0	0	1
PBHL 399B	Integrative Learning Experience II	0	0	2

II. Concentration Courses

A. Epidemiology and Biostatistics (EPBS)

		Lecture Hrs./ Week	Lab Hrs./ Week	Credits
Required Concentration Courses				
EPHD 312	Analysis of Continuous Data	1.5	0.5	2
EPHD 313	Analysis of Categorical Data	2	2	3
EPHD 316	Epidemiology, Prevention and Control of Communicable Diseases	2	0	2
EPHD 317	Epidemiology of Non-Communicable Diseases and Mental Health Disorders	1.5	0.5	2
EPHD 320	Epidemiology Beyond the Basics	1.5	0.5	2
Required Public Health Experience Courses				
EPHD 365	Practicum	0	30	2
Students in this group should take at least 3 credits of electives to complete their credit requirements.				

B. Health Promotion and Community Health (HPCH)

		Lecture Hrs./ Week	Lab Hrs./ Week	Credits
Required Concentration Courses				
HPCH 331	Theories in Health Promotion	2	0	2
HPCH 332	Community Health Promotion, Organizing and Advocacy	2	0	2
HPCH 333	Social Marketing for Health Promotion	2	0	2
HPCH 334	Qualitative Research in Health Promotion	3	0	3
HPCH 335	Implementation Research for Public Health	2	0	2
Required Public Health Experience Courses				
HPCH 365	Practicum	0	30	2
Students in this group should take at least 4 credits of electives to complete their credit requirements.				

C. Health Management and Policy (HMP)

		Lecture Hrs./ Week	Lab Hrs./ Week	Credits
Required Concentration Courses				
HMPD 306	A Workshop on Microeconomics for Healthcare	0	0	0
HMPD 315	Performance Improvement	3	0	3
HMPD 318	Policy and Decision Making in Health Systems	2	0	2
HMPD 342	Financial Management and Accounting in Health Care Organizations	3	0	3
HMPD 351	Health Economics	2	0	2
Required Public Health Experience Courses				
HPCH 365	Practicum	0	30	2
Students in this group should take at least 3 credits of electives to complete their credit requirements.				

Master of Science in Epidemiology (MS-EPID)

Admission Requirements

For full details on admission requirements to the Master of Science in Epidemiology, see the Admissions section of this catalogue. Mid-year admissions are only accepted for part-time students.

Graduation Requirements

For information regarding graduation requirements, refer to the General University Requirements in this catalogue.

Credit requirements for the MS in Epidemiology are tabulated below:

Course Type	Credits
Required	21
Electives	3
Thesis	6
Total number of credits required for graduation	**30**

Credit Load

A full-time student must carry a minimum load of 9 credits per term. Students can register for up to 12 credits per term. Students who wish to register for more than 12 credits must petition the Graduate Studies Committee for approval.

For full information on academic rules and regulations and general requirements for the Master of Science in Epidemiology and Master of Science in Environmental Sciences (Major: Environmental Health), refer to the General University Policy section in this catalogue.

Responsible Code of Conduct (RCR) Requirements

All newly admitted graduate students are required to successfully complete an online course on Responsible Conduct of Research (RCR) from the Collaborative Institutional Training Initiative (CITI Program). The course "covers core norms, principles, regulations, and rules governing the practice of research." It consists of the following modules: Research Misconduct, Data Management, Authorship, Peer Review, Mentoring, Using Animal Subjects in Research, Conflicts of Interest, Collaborative Research and Research Involving Human Subjects. FHS requires the completion of the following additional two modules, Social and Behavioral Responsible Conduct of Research Course, as well as Students - Class Projects.

Curriculum

		Lecture Hrs./ Week	Lab Hrs./ Week	Credits
PBHL 306A	Workshop Series: Library and Literature Search Skills	-	-	0
PBHL 306B	Workshop Series: Proposal Writing and Literature Synthesis for Public Health Research and Practice	-	-	0
PBHL 312	Foundations of Public Health	1.5	0.5	2
PBHL 305	Contemporary issues in Public Health	0	1	0
PBHL 310	Research Methods in Public Health	2	2	3
EPHD 300	Principles of Epidemiology	1.5	0.5	2
EPHD 310	Basic Biostatistics	2	2	3
EPHD 312	Analysis of Continuous Data	1.5	0.5	2
EPHD 313	Analysis of Categorical Data	2	2	3
EPHD 316 or EPHD 317[2]	Epidemiology, Prevention and Control of Communicable Diseases or Epidemiology of Non-Communicable Diseases and Mental Health Disorders	2 or 1.5	0 0.5	2 2
EPHD 319	Advanced Quantitative Methods of Epidemiology	1	0	1
EPHD 320	Epidemiology Beyond the Basics	1.5	0.5	2

[2] Students can choose either one depending on their research interest.

EPHD 320A	Epidemiology Beyond the Basics 2	0.5	1.5	1
EPHD 395	Comprehensive Exam	-	-	0
Electives				
EPHD 314	Data Management and Manipulation	1	2	1
EPHD 318	Introduction to Mathematical Modeling for Infectious Diseases	1.5	1.5	2
EPHD 321	Design and Analysis of Clinical Trials	1	2	2
EPHD 322	Special Topics in Epidemiology	2	0	2
EPHD 324	Special Topics in Biostatistics	-	-	1-3
Students should take at least 3 credits of electives.				
Thesis				
EPHD 399	Thesis			6

Master of Science in Environmental Sciences (Major: Environmental Health)

Admission Requirements

For full details on the admission requirements for this interfaculty program, see the Admissions section of this catalogue and the admission policies for the Interfaculty Graduate Environmental Sciences Program IGESP (page 39).

Graduation Requirements

For information regarding graduation requirements, refer to the General University Requirements in this catalogue.

Credit requirements are tabulated below:

Course Type	Credits
Core	15
Directed Electives	6
Free Electives	3-6
Project/Thesis	3-6
Total number of credits required for graduation	**30**

Credit Load

A full-time student must carry a minimum load of 9 credits per term. Students can register for up to 12 credits per term. Students who wish to register for more than 12 credits must petition the Graduate Studies Committee for approval.

For full information on academic rules and regulations and general requirements for the Master of Science in Epidemiology and Master of Science in Environmental Sciences (Major: Environmental Health), refer to the General University Policy section in this catalogue.

Responsible Code of Conduct (RCR) Requirements

All newly admitted graduate students are required to successfully complete an online course on Responsible Conduct of Research (RCR) from the Collaborative Institutional Training Initiative (CITI Program). The course "covers core norms, principles, regulations, and rules governing the practice of research." It consists of the following modules: Research Misconduct, Data Management, Authorship, Peer Review, Mentoring, Using Animal Subjects in Research, Conflicts of Interest, Collaborative Research and Research Involving Human Subjects. FHS requires the completion of the following additional two modules, Social and Behavioral Responsible Conduct of Research Course, as well as Students - Class Projects.

Curriculum

Course Type		**Credits**
A. Core Courses		15
PBHL 306A	Library and Literature Search Skills 0 credit	0
PBHL 306B	Proposal Writing and Literature Synthesis for Public Health Research and Practice	0
ENSC 640	Toxicology and Environmental Health Hazards	3
PBHL 310	Research Methods in Public Health	3
PBHL 312	Foundations of Public Health	2
ENHL 301	Environmental Health and Sustainable Development	1
ENHL 312	Occupational Health	3
ENHL 314	Environmental Management Systems	3
ENSC 695	Comprehensive Exam	0
B. Electives		**9-12**
Directed Electives		6
Free Electives		3-6
C. Thesis or Project		**3-6**
ENSC 699	Thesis	6
ENSC 697	Project	3
Total number of credits required for graduation		**30**

Doctor of Philosophy (PhD) in Epidemiology

Mission

The mission of the PhD Program in Epidemiology is to provide advanced training in epidemiology, statistical skills and cutting-edge research methods. Graduates of the

program acquire competencies to undertake high quality independent research, to assume professorial positions at universities, and to obtain leadership positions in research units in Ministries of Health and health care institutions in Lebanon, the region and beyond.

Program Goals

The PhD in Epidemiology aims to:

- graduate epidemiologists with advanced training, who can teach advanced courses, lead independent epidemiological research, and promote rigorous epidemiological practice.
- Strengthen epidemiological research, collaborations and partnerships to improve data systems and address existing and emerging public health problems in Lebanon and the region.

Admission Requirements

To be eligible for admission to the PhD program, a candidate must:

- Hold a master's degree in Epidemiology or a relevant discipline such as public health, nursing, statistics and health informatics, pharmacy, biological sciences and others, from AUB or other recognized institution of higher learning. A minimum cumulative course GPA of 3.7 or its equivalent, is required for admission.
- Have achieved an acceptable score on the Graduate Record Exam (GRE) general component taken in the last five years, with a minimum score of 152 in Quantitative and 151 in Verbal.
- Demonstrate English proficiency as stipulated in the university Graduate Catalogue for requirement for admission into PhD studies.
- Submit a complete application to the Office of Admissions that includes the following items: (1) Official transcripts and certified copies of degrees and certificates from previous universities, (2) official GRE scores on the general component, (3) letters of recommendation (a minimum of three letters), (4) personal statement outlining interest in the program of study focusing on research interests and experience, and (5) an updated CV.

Following the review of applications, shortlisted applicants will be contacted for an interview.

Financial Support

The department offers, on a selective basis, substantial support which fully covers tuition and includes a monthly stipend. There are also some funds available to support participation in international conferences; these funds are awarded on a competitive basis. In return, students help in teaching (preparing and delivering) introductory courses, proctoring, and correcting exams among other related tasks.

Program Requirements

The PhD in Epidemiology Program requires the completion of 27.5 credit hours of

coursework beyond the master's degree and 24 credit hours of thesis work. The credit load for the PhD in Epidemiology program is detailed below:

Course Type	Credits
Core PhD-level Courses (including 1.5 credit of research ethics course)	17.5
Required Master's level courses in Epidemiology and Biostatistics	4-5
Electives	5-6
Thesis	24
Total number of credits required for graduation	51.5

Course	Course name	Credits
Epidemiology/Biostatistics core courses (16 cr.)		
EPHD 403	Advanced Epidemiology Methods: Case Control and Cohort Studies	3
EPHD 404	Introduction to Causal Inference Methods	2
EPHD 405	Social and Behavioral Factors in Epidemiology	2
EPHD 406	Epidemiology in Action	3
EPHD 410	Applied Multivariate and Longitudinal Methods in Health Sciences	3
EPHD 411	Statistics for Psychosocial Research Psychometrics and measurement of Latent Constructs	3
Research related core courses (1.5 cr.)		
EPHD 440	Doctoral Seminar	0
EPHD 445	Writing Research Grants	0
SHRP 315	Introduction to Research Ethics and Responsible Conduct of Research	1.5
Specified set of Epidemiology/Biostatistics courses (5-4 cr.)		
EPHD 312	Analysis of Continuous Data	2
EPHD 313	Analysis of Categorical Data	3
EPHD 314	Data Management and Manipulation	1
EPHD 315	Nonparametric Data Analysis	2
EPHD 319	Advanced Quantitative Methods in Epidemiology	1
EPHD 321	Design and Analysis of Clinical Trials	2
EPHD 322	Special Topics in Epidemiology	2-3
EPHD 328	Systematic Review and Meta-Analysis	3
SHRP 332	Applied Survival Analysis	1
Elective courses		5-6

Thesis courses		24
EPHD 480	Qualifying Exam Part I: Comprehensive Exam	0
EPHD 481	Qualifying Exam Part II: Defense of Thesis Proposal	0
EPHD 482 (3), EPHD 483 (6), EPHD 483A (6), EPHD 484 (9), EPHD 486 (0): PhD Thesis		
EPHD 487	Thesis Defense	0
Teaching Requirement Courses		
EDUC 401	C-THE I: Teaching in Higher Education – Theory	0
EDUC 402	C-THE II: Teaching in Higher Education – Theory II & Practicum	0

Thesis Qualifying Exam: Parts 1 and 2

After taking and passing all core and required courses, students should register in two zero credit courses, the thesis proposal preparation and the comprehensive exam. They should pass both parts of the PhD Qualifying Exam: Part 1 which is the written comprehensive exam, administered by the department; and Part 2 which is the oral exam involving defense of the thesis proposal, administered by the thesis committee (please refer to the AUB Graduate Studies catalogue for details about the PhD Qualifying Exam).

Thesis Defense

Students have to defend their thesis within at most three years following passing Part 2 of the PhD Qualifying Exam.

Teaching Requirements

One of the competencies of the PhD program is for doctoral students to develop experience in teaching. This is accomplished by: (a) serving as a Teaching Assistant in one or more courses (minimum of 3 credits in total) taught by departmental faculty, and (b) registering, and successfully completing the requirements of two zero-credit courses-EDUC 401 and EDUC 402, as required by the Graduate Council.

Residency Requirements

The program completion time frame for the regular track is 3 to 5 based on AUB residency requirements. Extension requires Graduate Council approval upon recommendation by the faculty Graduate Studies Committee. Authorized leaves of absence, approved by the PhD Program Committee/Department are the only means of waiving the residency and registration requirements. Policies concerning the statute of limitations (for program completion) and leaves of absence are identified in the General Policies and Procedures section of the AUB Graduate Studies catalogue.

Core courses of the program should be taken at AUB, while further required or elective courses could be taken at a recognized institution of higher learning, preferably CEPH accredited, amounting to at most 12 credits that are transferable upon departmental approval. Courses are eligible for transfer only if they are taken beyond master's degree requirements and fulfill the criteria for type of eligible courses as outlined in the General University Academic Information section of the catalogue for PhD transfer of credits.

Students will be encouraged to spend a full term or a shorter duration in a School of Public Health in the US, Canada or Europe to take courses or engage in research.

To fulfill the minimum residence requirements for the PhD degree, a student must register for at least six terms beyond the completion of the master's degree.

Interdisciplinary Courses

PBHL 303 Design and Evaluation of Public Health Programs 2.2; 3 cr.

This course introduces students to the concepts and methods of public health program design and evaluation. Students will develop skills for assessing population needs for the development of health programs. The course then covers public health program design, including developing measurable objectives, identifying evidence-based intervention strategies, and planning for program implementation. Students will learn to select appropriate methods for impact and process evaluation of health programs. Prerequisite: PBHL 310 and PBHL 312 or (PHNU 300 & NFSC 307 & NFSC 301 & HPCH 334 (concurrently)).

PBHL 304 Public Health Policy and Advocacy 3.0; 3 cr.

This course introduces students to the relevant concepts and approaches in public health policy and advocacy. It will provide students with a basic understanding of the public health policymaking process as well as the basic elements of advocacy. The aim is to make MPH students informed of the complex nature of public health policy development, be critical consumers of health policy research and evidence, and analytical of the influence of various actors on the policy process. Students will learn the stages of the policy process (i.e., agenda setting, policy development, policy implementation and policy evaluation). The field draws upon numerous disciplines. As such, course readings will be drawn from political science, sociology, biomedical sciences and policy studies. Students will also cover the basic elements of an advocacy process, including defining the issue, understanding the audiences and crafting advocacy strategies. Case studies, class discussions, and guest speakers will provide tangible examples of public health policy and advocacy processes at the national, regional and international levels. Ethics and equity considerations will be included in discussions related to concepts and application.

PBHL 305 Contemporary Issues in Public Health 0 cr.

The seminar provides a platform to discuss contemporary issues in public health. Students integrate previously acquired knowledge and skills into analyzing local, regional, or global contemporary issues and their impact on public health and the environment. Course content will vary each year in light of salient issues and will be tailored to student interests. Students are expected to be active learners and to participate in the selection of relevant academic articles/media resources (in consultation with the course instructor), and to facilitate class discussions. Prerequisite: PBHL 399A or (EPHD 300, EPHD 310, PBHL 310, and PBHL 312).

PBHL 306 A Workshop Series: Library and Literature Search Skills 0 cr.

A 2-day hands-on compulsory workshop for all MPH students where learners acquire search skills to look for, identify, read, evaluate and save their literature searches in order to write a synthesis for their academic work. The workshop trains learners on the use of major resources at the University libraries (search engines, databases...), search techniques, and the use of databases to search, store and save searches. It also provides them with skills to evaluate the extracted information, synthesize the literature and identify a gap. Based on

this, they write up a short synthesis of a selection of relevant literature.

PBHL 306 B Workshop Series: Proposal Writing and Literature Synthesis for Public Health Research and Practice 0 cr.

This is a required 2-day workshop for all MPH students that enables learners to develop skills for writing a concept note and draft proposal for public health research and practice on a question or topic of their interest that they have discussed or thought through in Public Health Research Methods or a similar course. Given that the field of public health entails both research and intervention, technical skills for developing a project proposal for research and intervention are necessary for the public health practitioner. The workshop addresses the types of concept notes and proposals, their elements and stages of writing. The workshop will also provide learners with an overview of the traits of a good writer and tips from successful proposals as well as with examples of weak or unsuccessful applications. Prerequisites: PBHL 306A & (PBHL 310 or NFSC 301).

PBHL 306 C Workshop Series: Conflict Resolution, Mediation and Negotiation Skills 0 cr.

A two-day workshop where graduate students will be trained on how to manage interpersonal conflict effectively. During this workshop, learners will develop an understanding of different types of interpersonal conflict, as well as causes and prominent human behaviors in a conflict situation. They will also practice negotiation skills and conflict resolution strategies through simulations of various scenarios while using mediation and problem-solving skills. Prerequisite: HPCH 301.

PBHL 307 Public Health and Armed Conflict 3.0; 3 cr.

This is a graduate (3-credit) course that applies a health lens analysis to understanding war and armed conflict. The health lens is useful because health is universal and we can deploy the rich tools of health analysis to wars/armed conflicts. On the one hand, through looking at health, we can appreciate the wide range of consequences of wars/armed conflicts. On the other hand, a health examination illuminates our understanding of wars/armed conflicts themselves (e.g. analysis of attacks on health care give insights about conduct of war and the positions of belligerents towards applicable international laws during conflict). We can then build on the insights generated from a health lens analysis to develop interventions to safeguard health in war/armed conflict and to even impact war/armed conflict. Our approach is informed by human rights and humanitarian principles.

PBHL 308 Methods in Humanitarian Settings 1.0;1cr.

This one-credit course is offered to FHS students who are enrolled in the Certificate of Public Health in Conflict and Protracted Crises. The course: 1) introduces students to the definition, types, and management of humanitarian emergencies; 2) enhances their methodological skills to conduct research and evaluation in complex humanitarian and disease outbreak settings; 3) prepares them to identify and discuss solutions to practical, conceptual, and ethical challenges in humanitarian response. Prerequisites: PBHL 310 and PBHL 312.

PBHL 310 Research Methods in Public Health 2.2; 3 cr.

This course addresses the principles of research design and the methods used in both quantitative and qualitative public health research. The course encourages students to think critically about public health evidence and how it is derived. Topics include the

following: the distinct but complementary roles of quantitative and qualitative research approaches; synthesizing published literature to identify a research gap; formulating research questions; choosing appropriate methods of quantitative data collection for public health; the process of qualitative data collection and qualitative analysis using software; and ethical issues in public health research. Practical and conceptual issues are both discussed.

PBHL 312 Foundations of Public Health 1.5:0.5; 2 cr.

This is a graduate course which introduces learners to the field of Public Health, its principles, values and functions. Students will learn how to use theory in public health to analyze contemporary local and global health issues and their determinants. Course material focuses on biological, psychological, environmental, behavioral, wider social and global determinants of health and their interrelationships. Throughout the course, students use a variety of learning material to apply theory, critical thinking and discuss public health ethics in a broad array of real-world examples. The course will prepare graduate students for further course work and training in PH.

PBHL 315 Global Health Equity 3 cr.

This course focuses on a critical discussion of social and structural determinants of health equity globally. Students are enrolled at the Faculty of Health Sciences, American University of Beirut, Lebanon; College of Health Sciences, School of Public Health, Universidad San Francisco de Quito, Ecuador; The School of Nursing, University of Victoria, British Columbia; and the College of Public Health, University of Iowa, Iowa City. Each site will also have a faculty mentor. The students and faculty mentors will meet virtually in 'real time' around a set of readings which will establish the common base of understanding of health inequities, social and structural determinants of equity and health, and historical injustices in each site. This will be followed by the development of a common photovoice project to highlight common and differing inequities and their impact on wellbeing. Our aim is to leverage technology to create a platform to connect public health students across continents, thereby providing novel perspectives and deepening discussions of health equity. This course is open to upper-level undergraduates with instructor permission.

PBHL 316 Injury as Public Health Priority 2.0; 2 cr.

This course introduces students to injury as a growing public health problem. It provides students with an overview of the concept of injury, injury classification, root causes and factors that affect both risk to and protection from injury. Students will learn about the burden of disease associated with injury both locally in Lebanon and globally. Student will examine key determinants of injury and the factors influencing injury events (e.g., the Haddon Matrix), as well as understand the various types of injury intervention programs. The course also explores sources of injury data that can be used to conduct injury research. The course is comprised of 30 didactic sessions and field visits to expose students to the real-world environments where injuries occur and are treated and analyzed. Field sessions will include visits to the National Traffic Safety Council, and the AUBMC Emergency Department to learn about post-injury care and clinical research, and to learn about surveillance systems for injury. These visits will give students practical insights into the sources of injury data and the challenges of conducting injury research in different environments and introduce students to key stakeholders in the injury ecosystem in Lebanon. Prerequisites: PBHL 310 or its equivalent.

PBHL 317 Injury Seminar 0 cr.

This injury seminar exposes students to various topics of injury research and methodologies.

It advances students' understanding of injury as a public health problem. Seminar topics include methodological approaches to several injuries, traumatic brain injury, occupational injury, road traffic injury, substance use and overdose and other emerging injury topics, as well as the application of policies and laws for injury prevention and control. Throughout the course, students are expected to learn about and understand injury-related topics via: (1) Reading and evaluation of the required journal articles and (2) Active engagement in class discussion related to a) Identification and appraisal of research and grey literature, b) Systematic Review and meta-analysis, c) Critical appraisal of research methodologies.

PBHL 320 Special Topics in Public Health 1-3 cr.

A course that explores special topics, contexts, populations, or skills that influence public health practice and research. The course is focused on applied experiences, dialogue and discussion, and critical thinking. Repeated for credit under different topics. Offered occasionally.

PBHL 399 Integrative Learning Experience I and II 1-2 cr.

The Integrative Learning Experience (ILE) provides an opportunity for students to synthesize the competencies that they have gained during the MPH program by completing a substantive project of public health relevance. Over the course of two consecutive regular terms, students are expected to design and implement a project that addresses their interests while contributing to the field of public health. A variety of project forms are acceptable within the guidelines set by the Graduate Public Health Program. Each student will develop and implement the project under the guidance of a faculty advisor. The ILE is completed over two terms: Integrative Learning Experience I, PBHL 399A (1 credit) and Integrative Learning Experience II, PBHL 399B (2 credits).

Pre-requisite for PBHL 399A: Completion of all but two of the concentration courses. ENHL 301 (concurrent) & PBHL 303 & PBHL 304 & PBHL 310 (concurrent) & PBHL 312 & EPHD 300 (concurrent) & EPHD 310 (concurrent) & HMPD 300 (concurrent) & HPCH 301. Pre-requisite for PBHL 399B: PBHL 399A.

Interdepartmental Courses

IDTH 210 Fundamentals of Medical Research 40.10; 3 cr.

This course provides first year medical students with their first exposure to research methodology. Fundamental principles and concepts of evidence-based medicine, epidemiology and biostatistics are presented and discussed.

IDTH 215 Becoming a Doctor-3: Global Health and Social Medicine 21.21; 2 cr.

This course introduces students to central issues in the practice of social medicine and global health and the connection between them. It examines how social forces become embodied as pathologies; how political, economic and historic trends influence the distribution of disease among different populations; and how new trends in the organization of care affect the most vulnerable members of society.

IDTH 268 Clerkship in Preventive Medicine and Public Health 10.80

A clerkship in which teams of senior medical students assess, critique and propose solutions to problems of public health or clinical significance. The students examine policy, organizational, social and individual challenges to these problems, addressing issues such as equity in health and setting public health programs, and identifying opportunities for

change. Data collection and statistical analysis are secondary objectives.

IPEC 300 Inter-Professional Education and Collaboration 1.1; 1 cr.

This is a required one-credit course for students in the senior year of the Bachelor of Science in Nursing (BSN) and final year of the Master of Public Health (MPH) degree. Students will be introduced to the philosophy of and learn necessary skills for interprofessional practice. The course is taught through case studies on health topics where interprofessional collaboration is critical. Students will attend two plenary sessions and discuss cases together in small groups in four discussion sessions that are facilitated by a faculty member from one of the above professions. At these discussion sessions, students will rotate to serve in the roles of moderator, note taker, and timekeeper. Student learning outcomes have been aligned with both nursing and public health curricula. Prerequisites: For MPH students: Completion of all, or all but one, of the concentration course; PBHL 305 (concurrent). Undergraduate Nursing students must be in their senior year. Enrolment by other students is possible upon the approval of the course coordinator. *MPH students with a BS in Nursing from AUB should register a 1 credit to be considered as an elective if they had already taken IPEC 300 in their undergraduate studies. The elective should be from the list of approved electives.*

Other Programs

Executive Master in Health Care Leadership (EMHCL)

Program Director:	Kassak, Kassem

The Executive Master in Health Care Leadership (EMHCL) is designed for professionals who have significant responsibility in the healthcare sector, including those from health care delivery, pharmaceutical and product manufacturing, healthcare consulting, health management systems, insurance, patient advocacy, public health, and policy and regulatory institutions. The program seeks to identify a highly qualified and diverse student cohort. Candidates representing a broad range of experience in the healthcare sector are chosen for each cohort to ensure a rich peer-to-peer learning experience.

Admission Requirements

An applicant is considered for admission to the program if s/he meets the minimum admission requirements outlined under the Admissions section of this catalogue. Applicants to the program will be evaluated based on their academic and professional achievements with a minimum of a bachelor's degree recognized by AUB, record of previous professional experience (a minimum of five years), two letters of recommendation (academic and professional), and a personal statement. Applicants must be currently employed in a managerial post and demonstrate leadership potential and prospects for academic and professional success. They must also meet the Readiness for University Studies in English (RUSE) as stipulated in the Admissions section of this catalogue.

Applicants who fail to meet the RUSE may be eligible to take the University Preparatory Program (UPP) Graduate Course or enroll in other intensive English courses depending on their test scores. Their enrolment will be contingent upon passing these courses. Furthermore, applicants will be interviewed as part of the selection process. The decision about admission to the program will be based on a thorough review of student applications, supporting documents and the interview.

Program Outline

Curriculum

"The EMHCL curriculum consists of 21 courses, totaling 45 credit hours, distributed across three healthcare themes which include Foundation, Advanced Managerial Functioning, and Health Systems Policy and Reform."

Course Type		Credits
Theme I: Foundation		
EHCL 300	Managing Healthcare Organizations	3
EHCL 301	Communication and Behavioral Change for Health	2
EHCL 303	Health Economics	2
EHCL 305	Research Methods and Application	3

EHCL 306	Evidence Based Management	1.5
EHCL 304	Statistical Tools and Analysis	2
EHCL 302	Epidemiology in Health Care	1.5
		Total 15
Theme II: Advanced Managerial Functioning		
EHCL 310	Health Informatics and Information Technology	2.5
EHCL 313	Data and Decision Making (Use of IT)	1.5
EHCL 307	Leadership	3
EHCL 314	Advanced Program Planning and Evaluation	2
EHCL 315	Strategic Planning and Management	2
EHCL 309	Financial Accounting and Management	2
EHCL 308	Marketing in Healthcare	1.5
EHCL 312	Performance Improvement and Innovation	1.5
EHCL 311	Human Resources Management	2
		Total 18
Theme III: Health Systems Policy and Reform		
EHCL 316	Organizational Restructure and Reform	1.5
EHCL 318	Policy, Politics and Decision Making	2
EHCL 317	Ethics and Law	1.5
EHCL 319	Communicating with Policy Makers	3
EHCL 320	Practicum and Capstone in Leadership	4
		Total 12
		Grand Total: 45

Program Delivery

The EMHCL Program is delivered in a highly interactive modular blended learning format which takes approximately 18 months to complete. This flexible program is delivered through 15 intensive sessions, each of which is offered every five weeks. Each intensive session requires on-campus or residential attendance of 5 days for a total of 75 residential days over the 18-month period.

The program totals 45 credit hours. Each credit hour consists of 12.5 hours of class instruction corresponding to 1.5 on-campus days. Each on-campus day consists of 8 class hours of instruction.

Credit Hour Equivalence to On-Campus Days

Credits (per course)	Equivalent Teaching Days
1	1.5
1.5	2.5

2	3.5
2.5	4.5
3	5

Academic Rules and Regulations

Graduation Requirements

All recommendations for graduation are made by vote of the faculty on the recommendation of the Graduate Studies Committee.

To be eligible for graduation from the EMHCL Program, a student must accomplish the following:

- pass all required courses with a minimum grade of (C+)
- earn a cumulative GPA of at least 3.3
- and successfully complete a minimum of 45 credit hours.

Probation

Students are evaluated for potential placement or removal of probation upon their completion of every 9 credit hours (minimum) in the program.

Placement on Probation

A student is placed on probation if one of the following occurs:

- s/he fails any graduate course taken for credit (passing grade is C+)
- or s/he fails to obtain a minimum GPA of 3.3 on at least 9 credit hours.

A student with an admission score (cumulative and major averages) between GPA 3.0 and 3.3 will be admitted on probation.

Removal of Probation

A student who is placed on probation because of grade and/or average is required to complete a three-week makeup plan mutually agreed upon with the EMHCL Program Director. After completion of the makeup plan, the student is re-evaluated for potential removal of probation.

To remove probation, the student should:

- attain a minimum grade of (C+) in every registered course and
- have an evaluated GPA of at least 3.3

A student admitted on probation will be removed from probation if after completion of at least 9 credit hours, s/he has passed all courses and attained a GPA 3.3.

Dismissal from the Program

A student on probation may be dismissed upon the recommendation of the EMHCL Program Director and the Graduate Studies Committee if one of the following occurs:

- s/he has failed to be removed from probation after the completion of the three-week makeup plan
- or the EMHCL Program Director and Graduate Studies Committee regard the student as not having made satisfactory academic progress or as not having behaved in accordance with the norms and values upheld by FHS or AUB.

Policy on Transfer of Credits

A transfer of credits may be considered when a course is satisfactorily completed with a minimum grade of B+ or equivalent at a recognized university, faculty or program. The transferred credits are accepted in lieu of credits earned in a comparable course in or outside FHS. Request for transfer of credits for EMHCL students is only possible if the student completed the course in which transfer is sought within five years of the transfer request date.

The number of credits that can be transferred in comparable courses cannot exceed 9 credits.

For courses taken at FHS, a transfer of credits may be considered for all passed courses.

Procedure for Transfer of Credits

For a student to be exempted from or to transfer courses from AUB or another university, the candidate should petition the FHS Graduate Studies Committee and attach the following official documents after consulting with the EMHCL Director:

- a letter of request for exemption and/or transfer
- the official catalogue of the transferring institution
- a detailed description of course content and syllabus
- an official statement of records/grades earned for the course(s)

Transferring universities must be considered to have comparable standards to those of AUB.

The EMHCL Director should seek the opinion of the course instructor(s) and the department faculty in writing and then submit the recommendation of the department, along with the supporting documents, to the FHS Graduate Studies Committee for final approval.

Course Descriptions

EHCL 300 Managing Healthcare Organizations 3 cr.
The course addresses the main components, resources and functions of health care systems. It is designed for an experienced audience to identify organizational and health system problems and apply systems thinking in resolving them. Furthermore, the course introduces various management theories and management processes that pertain to the healthcare service sector. Topics covered include strategic management, human resources management, information management and material management. This course equips future leaders of healthcare organizations with the necessary managerial skills needed to reach and implement decisions about future activities.

EHCL 301 Communication and Behavior Change for Health 2 cr.
The aim of this course is to discuss the communication concepts and frameworks that healthcare executives can employ to improve communication within their institution or with both the internal and external customer in order to enhance health and wellbeing. Major emphasis will be placed on the theoretical underpinnings in the field of communication including an understanding of influences on behavior and health, as well as the critical need for attention to ethics, justice and equity to achieve goals of communication for health.

EHCL 302 Epidemiology in Health Care 1.5 cr.
This course presents ways in which epidemiology can support the decision-making process in health services research, policies, management and evaluation.

EHCL 303 Health Economics 2 cr.
A course that covers the application of the principles of microeconomics to the health field, utilization of the techniques of microeconomics to the study of prices and markets in the health field, and developing competence in cost analysis and cost projections.

EHCL 304 Statistical Tools and Analysis 2 cr.
This course introduces basic statistical experimentation methods in addition to general concepts of estimation and inferences. Simple and multiple regression, single factor and multifactor analysis of variance, multiple comparisons, goodness of fit tests, nonparametric procedures, and power of tests are covered. Statistical software packages, such as SPSS, are also introduced.

EHCL 305 Research Methods and Application 3 cr.
The first component of this course presents an overview of the principles of quantitative and qualitative research methods. The second component aims at imparting to students some practical research skills. By becoming familiar with the research process, future healthcare leaders are equipped to critically appraise published research and communicate their research findings.

EHCL 306 Evidence Based Management 1.5 cr.
This course acquaints participants with evidence-based approaches in health care organizations including how information and knowledge can cure organizational ills and dysfunctions and how to gain competitive advantage with evidence. It covers decision-making models and challenges of why leaders and managers do not use evidence in making decisions. The course provides guidance on evidence-based organizations and evidence-based leaders/managers (intuitive versus rational decision-making) and also on how to overcome decision inertia.

EHCL 307 Leadership 3 cr.
This course describes the concept of leadership in healthcare organizations, identifies traditions through which leadership has been analyzed, considers the role of organizational culture, and explains the larger set of roles leaders may play in health care organizations while discussing the evidence from recent research literature on leadership in healthcare organizations.

EHCL 308 Marketing in Healthcare 1.5 cr.

This course addresses the principles of marketing and their application to the healthcare sector. It also sheds light on how these marketing principles need to respond to the changing

environmental forces that are shaping the healthcare service sector. Through the employment of case studies, healthcare leaders learn how to identify and prioritize marketing challenges facing their organizations and develop creative strategies for solving these problems.

EHCL 309 Financial Accounting and Management 2 cr.
This course covers the most important principles and applications of healthcare finance including both accounting and financial management. It discusses the basic foundations of financial management and demonstrates how future healthcare leaders can apply financial management theory and principles to make better decisions that promote the financial wellbeing of their organizations.

EHCL 310 Health Informatics and Information Technology 2.5 cr.
This course explores the theoretical framework of Health Informatics and Information Technology and examines critical issues and challenges within the field as well as opportunities for improving the management of healthcare through information technology. Topics include electronic health records, telemedicine, human computer interfaces, and e-Health among others.

EHCL 311 Human Resources Management 2 cr.
This course highlights how to effectively deal with personnel management by focusing on the importance and impact of human resources on healthcare organizations. Topics to be discussed include: strategic HR management; planning, attracting and selecting human resources; placing, developing and evaluating HR; retention; HRH migration and brain drain.

EHCL 312 Performance Improvement and Innovation 1.5 cr.
This course focuses on the principles and current practices of performance improvement in healthcare settings. It incorporates human technology and service excellence in improving performance within health care settings and ensuring that innovative improvement is an integrated part of organizational and individual behavior. Future healthcare leaders also explore the use of various quality improvement tools including, but not limited to: FOCUS-PDCA, balanced scorecards and reengineering, among others.

EHCL 313 Data and Decision Making (Use of IT) 1.5 cr.
In an unstable and politically charged healthcare environment, the availability and understanding of objective and reliable data is crucial for determining healthcare needs and customer expectations as well as institutional service strategies. This course examines the generation of valid and reliable data and its functional use in decision making.

EHCL 314 Advanced Program Planning and Evaluation 2 cr.
This course aims to prepare healthcare leaders to become more competent planners and evaluators by applying the concepts and tools of planning and evaluation to real situations facing healthcare agencies, hospitals, and ministries of health. The opportunities and challenges that healthcare leaders face in planning and evaluating effective healthcare intervention programs are also covered.

EHCL 315 Strategic Planning and Management 2 cr.
This course imparts to healthcare leaders the skills needed to develop strategic plans to position their organization for long-term success. Major attention is placed on the management framework for identifying, communicating, crafting and managing strategic goals throughout a healthcare organization.

EHCL 316 Organizational Restructure and Reform 1.5 cr.
This course is designed to help future healthcare leaders develop a deeper understanding

of the differences in organizational structures and the mechanisms and processes of coordination among different structures. It helps develop the capacity to influence the behavior of others in present-day health organizations. Emphasis is placed on small group relationships, communication networks, and the human side of the organization.

EHCL 317 Ethics and Law 1.5 cr.
This course examines the ethical and legal principles which health leaders in Lebanon and the region need to take into consideration when making systems decisions. The course draws a distinction between public health ethics and medical ethics, and it provides tools for ethical decision-making in healthcare.

EHCL 318 Policy, Politics and Decision Making 2 cr.
This course provides a comprehensive perspective of 'systems thinking' with regard to policy development and analysis processes. It introduces the participants to the field of health policy analysis and relevant concepts and methods in understanding the policy development cycle. Discussion includes the relationship between policy and politics, how politics can impede reform efforts and how policy analysts can influence policy makers and politicians during the policy process. The course is based on case studies debating policy issues at the national, regional and international levels.

EHCL 319 Communicating with Policy Makers 3 cr.
This course discusses the main tools to communicate with policy makers including evidence informed policy, priority setting and policy dialogues. It provides skills on how to prepare policy briefs and effective tips on how to communicate evidence (both published and tacit) with policy makers. Participants work on key questions that can be used to guide those preparing and using policy briefs to support evidence-informed policymaking.

EHCL 320 Practicum and Capstone in Leadership 4 cr.
This course offers the healthcare leader the chance to put into practice the theories and knowledge acquired in previous courses. Students need to identify and develop a healthcare project that puts their leadership skills and competencies into practice.

Joint Programs

Scholars in Health Research Program (SHARP)

Director:	El Hajj Fuleihan, Ghada
Diploma Director:	Tamim, Hani
Executive Committee:	Tamim, Hani; Nabulsi, Mona; Sibai, Abla; Kanafani, Zeina

Background

The Scholars in HeAlth Research Program is a joint FM and FHS graduate program that consists of a 12-credit summer diploma, a 12-credit two-semester diploma, as well as a 35-credit master's degree. The summer diploma, two-semester diploma, and the MS degree are open to graduates of health fields. Social scientists and humanities graduates interested in Non-Communicable Diseases (NCD) can also enroll in the program, provided they fulfill admission and selection criteria and have the necessary background to follow the course curriculum. Credits earned for the SHARP summer diploma and two-semester diploma can be credited towards the Master of Science in Health Research requirements. These credits can also be credited in full or partly towards other post-graduate degrees at FM, FHS, FAFS, or HSON and possibly at other institutions.

SHARP provides graduates with the required foundation to pursue a career in clinical and translational research. Although focused on NCD, a major cause of mortality and morbidity in the region, the garnered skills are applicable to other areas of clinical research. The Program helps create and sustain a cadre of highly trained researchers who conduct patient-oriented and population-oriented studies on NCD. It also equips trainees with management and leadership skills needed to become "change agents" and lead research groups, academic departments or other health care settings. Management and leadership courses are offered in collaboration with faculty at the Olayan School of Business.

Mission

The Mission of the Scholars in HeAlth Research Program (SHARP) at the American University of Beirut (AUB) is "To provide superior didactic education complemented with state-of-the-art interactive and practical training in health research, with a focus on Non-Communicable Diseases research. It is intended for physicians and other health care professionals, to improve and advance the health care agenda for Non-Communicable Diseases in Lebanon and the region."

SHARP Diploma Curriculum

The SHARP diploma is a 12-credit module that provides the essential foundations in quantitative methods and fundamental skills to conduct research. The core disciplines covered include epidemiology, biostatistics, research ethics and library sciences/informatics. These are complemented with a practical hands-on training course in the analysis and reporting of large health-related datasets in NCD. The SHARP diploma is offered as an intensive summer program and as a two-semester online program.

SHARP Master of Science in Health Research

Admission to the Program

The application deadline for the summer diploma is in March, and the acceptance is in April of each academic year calendar. The application deadline for the two-semester diploma is in March, and the acceptance is in May of each academic year calendar. The application deadline for the MS degree in Health Research is in June, and the acceptance is in July of each academic year calendar. The SHARP diploma (either summer or two-semester) is a prerequisite for the SHARP MS program, and the performance in the diploma is evaluated to ensure the candidate is suitable for continuing in the MS path. Students should apply to the MS program by early June and are accepted upon successful completion of the diploma program (minimum GPA 3.3). While the 2-year program is approved for all, the 1-year program is approved by the Lebanese Ministry of Education for medical doctors only. For more details, please refer to the Admissions section in this catalogue, page 35.

Criteria for Admission

All applicants to the SHARP summer diploma and two-semester diploma and the Master of Science in Health Research must satisfy the criteria established at AUB for enrollment into a master's degree program, namely the Readiness for University Studies in English (RUSE) (see page 38 of this catalogue) and a minimum degree of BS with a minimum GPA of 3.3 or its equivalent.

In addition, applicants should express/demonstrate commitment to a career in NCD research in the statement of purpose submitted along with their application.

Applications for the summer program are reviewed by the SHARP executive committee.

Applications for the MS program are reviewed by the joint FM/FHS Graduate Studies Committee.

The Application Process

An applicant is considered for admission to the SHARP summer diploma, two-semester diploma and the MS program if s/he meets the following minimum admission requirements:

- an undergraduate cumulative GPA of at least 3.3 for MS and 3.0 for diploma (or standardized equivalent from other institutions of higher learning) leading to a bachelor's degree or its equivalent from recognized institutions of higher learning
- Have a graduate degree
- Have good quantitative skills as assessed by MCAT, GRE or GMAT with a score of at least 50th percentile (Applicants with MD or master's degree from AUB are exempted)
- Have good oral and written English skills as assessed by IELTS, TOEFL iBT, or Duolingo (AUB graduates are exempted)
- at least two letters of recommendation
- a statement of purpose (500-word limit) indicating the purpose for applying to the program and specifying the applicant's research interests and/or practical experience

Applicants to any graduate program, other than AUB graduates and graduates of recognized

colleges or universities in North America, Great Britain, Australia and New Zealand must demonstrate proficiency in the English language. See Admissions section in this catalogue, page 29.

Graduation Requirements

See General University Academic Information in this catalogue, page 72.

Incompletes

See General University Academic Information in this catalogue, page 72.

Probation

See General University Academic Information in this catalogue, page 72.

Program Outline

The 35-credit master's degree requirements can be completed over one full-time year (available to Doctor of Medicine graduates only) or two part-time years. The total number of allowed credits per term is 16 unless otherwise approved by the joint FM/FHS Graduate Studies Committee. The degree consists of the 12-credit diploma in addition to 15 credits in required courses, 2 credits of electives and 6 credits for the thesis. The thesis is a mentored research project culminating in the completion of a project revolving around Non-Communicable Diseases. In compliance with AUB requirements, scholars must also sit for a 0-credit comprehensive exam (Pass/Fail) during their last term.

Program Delivery

The 35-credit program is divided as indicated below:

- **Summer diploma and two-semester diploma:** The 12-credit diploma, taken as either an intensive diploma in the summer, or an online two-semester diploma, consists of five courses: Biostatistics (4 cr.), Principles of Epidemiology (4 cr.), Introduction to Research Ethics and Responsible Conduct of Research (1.5 cr.), Analysis and Reporting of Large Clinical Datasets (2 cr.) and Library Science/Informatics (0.5 cr.). These courses consist of didactic lectures, faculty-facilitated discussion groups, laboratory sessions and group projects. The courses in epidemiology and biostatistics are held in conjunction with the Faculty of Health Sciences (FHS), while the Introduction to Research Ethics and Responsible Conduct of Research is held in conjunction with the Salim El-Hoss Bioethics and Professionalism Program (SHBPP).

- **Courses:** Students are required to take a total of 15 credits in required courses, 2 credits of elective courses.

- **Thesis:** Each student is required to select a clinical research project and identify advisor(s) from among the Faculty of Medicine (FM) and FHS faculty engaged in clinical research. Mentors and projects are approved by the joint FM/FHS Graduate Studies Committee (GSC). For those pursuing the 2-year track, the research project typically begins in the Spring term of the student's first year and culminates in a thesis document and oral thesis defense delivered before the end of the second academic year. For those choosing the 1-year track, the process begins early in the Fall term and ends in the Spring term of the same academic year. All projects are supervised by a thesis committee.

Comprehensive Examination

Each student is expected to pass a 0-credit comprehensive examination course after completion of all required courses. If a student does not pass the comprehensive exam, s/he is allowed to take it a second time in the following term as per AUB regulations. The Comprehensive Examination has a Pass (P) or Fail (F) format, and timing of the examination is set by the program.

Tracks

Master of Science: 1-Year Program

12 Credit Diploma / Course Title	Course Number	Faculty	Credits
Principles of Epidemiology/Design and Analysis of Epidemiological Studies	SHRP 300/320	FM	4
Basic Biostatistics	SHRP 310	FM	4
Introduction to Research Ethics and Responsible Conduct of Research	SHRP 315	FM	1.5
Analysis and Reporting of Large Clinical Datasets	SHRP 330	FM	2
Library Science /Informatics	SHRP 325	FM	0.5
Fall – 13 credits	**Course Number**	**Faculty**	**Credits**
Design and Analysis of Clinical Trials	EPHD 321	FHS	2
Clinical Trial Protocol	SHRP 321A	FM	2
Leadership and Behavior in Organizations	MNGT 306	OSB	3
Thesis	SHRP 400	FM	6
Spring – 10 credits	**Course Number**	**Faculty**	**Credits**
Systematic Review and Meta-Analysis	EPHD 328	FHS	3
Public Health Policy and Advocacy	PBHL 304	FHS	3
Comprehensive Examination	SHRP 395A	-	0
Elective	-	-	0
Advances in NCD Research	SHRP 340	FM	2
Thesis	SHRP 400A	FM	0

Master of Science: 2-Year Program

12 Credit Diploma / Course Title	**Course Number**	**Faculty**	**Credits**
Principles of Epidemiology/Design and Analysis of Epidemiological Studies	SHRP 300/320	FM	4
Basic Biostatistics	SHRP 310	FM	4
Introduction to Research Ethics and Responsible Conduct of Research	SHRP 315	FM	1.5
Analysis and Reporting of Large Clinical Datasets	SHRP 330	FM	2
Library Science /Informatics	SHRP 325	FM	0.5
Fall I – 4 credits	**Course Number**	**Faculty**	**Credits**
Design and Analysis of Clinical Trials	EPHD 321	FHS	2
Clinical Trial Protocol	SHRP 321A	FM	2
Spring I – 9 credits	**Course Number**	**Faculty**	**Credits**
Systematic Review and Meta-Analysis	EPHD 328	FHS	3
Thesis	SHRP 400	FHS	6
Fall II – 5 credits	**Course Number**	**Faculty**	**Credits**
Leadership and Behavior in Organizations	MNGT 306	OSB	3
Thesis	SHRP 400A	FM	0
Elective	-	-	2
Spring II – 5 credits	**Course Number**	**Faculty**	**Credits**
Public Health Policy and Advocacy	PBHL 304	FHS	3
Advances in NCD Research	SHRP 340	FM	2
Thesis	SHRP 400B	FM	0
Comprehensive Examination	SHRP 395A/B	-	0

Course Descriptions

Required Courses

SHRP 300 Principles of Epidemiology 2 cr.
A course in principles, concepts and application of epidemiology tools relevant to public health and clinical practice. The course covers basic principles of epidemiology related to disease occurrence, distribution and determinants. Topics include rubrics of epidemiology, morbidity and mortality measures, sources of data, epidemiologic study (cross-sectional, case-control, cohort studies and clinical trials), casual inference and causation in epidemiology. The course consists of lectures, assigned readings and complementary practical sessions. Equivalent to EPHD 300.

SHRP 320 Design and Analysis of Epidemiological Studies 2 cr.
The course covers in detail methodological issues related to study design and conduct, data analysis, interpretation of results and inference in epidemiological research. Problems of exposure and disease definitions, information and selection biases, confounding and effect modification are considered. Students are required to critique and discuss epidemiological studies and to lead in the write-up of a research study protocol for design and conduct of an epidemiologic study. Equivalent to EPHD 320.

SHRP 310 Basic Biostatistics 4 cr.
This course is an introduction to basic statistical techniques applied to health sciences and related fields. The objectives are twofold: descriptive statistics, which encompass techniques for organizing and summarizing data, and inferential statistics, from estimation to confidence interval and testing of hypotheses. Applications include probability distribution, comparing population means (t-tests) or proportions (X2 squares) for data obtained from paired or independent samples, significance testing, sample size calculation and power, stratified and matched analyses, and one-way ANOVA. Also, it introduces simple linear regression, correlations, logistic regression and nonparametric methods for data analysis. Focus will be on problems that are commonly encountered in health services and biomedical research. Equivalent to EPHD 310.

SHRP 315 Introduction to Research Ethics and RCR 1.5 cr.
This course introduces students to the fundamentals of responsible conduct of research, emphasizing the ethical practice of human and animal research. The course recaps the history of ethical principles and the development of research codes of conduct and ethical practices, familiarizes investigators and faculty members with the different kinds of ethical issues that they might come across throughout their careers, and allows scholars to reflect critically about what it means to be an ethical and responsible researcher. In RE & RCR, students will attend lectures, participate in discussions, analyze actual case studies and watch audio-visual material. Most importantly, they will know how to conduct and assess research from an ethical standpoint.

SHRP 325 Library Science/Informatics 0.5 cr.
This introductory course spans five 1.5 hours sessions, and focuses on effective and efficient searching skills of the various medical and health-related resources. It also includes an introduction to the evidence-based practice concept and where and how to locate such documents, in addition on how to design a high sensitive search strategy for systematic reviews. Delivery of this course is through a mixture of live demonstration, hands-on exercises, and solving clinical scenarios.

SHRP 330 Analysis and Reporting of Large Clinical Datasets I 2 cr.
This course will put into practice the statistical analysis and other computing skills introduced to scholars in EPHD 300/SHRP 300, EPHD 310/SHRP 310 and SHRP 325. The training format is a mixture of demonstrations, hands-on exercises and clinical scenarios. The course will simulate previously executed/published analyses on previously collected de-identified health research datasets. Scholars will go through the entire process experience of data handling, hypothesis-driven analysis design and culminate in the execution of statistical analysis (modeling) and presentation of results. In addition, this course will use existing datasets to familiarize scholars with commonly used health data analysis methods including survival analysis methodology and Cox regression multivariate modeling of survival data, and finally introduce propensity score approaches for risk-adjustment.

SHRP 340 Advances in Non-Communicable Diseases Research 2 cr.
The course examines a number of selected non-communicable diseases (NCD) given their morbidity and mortality burden at the local and regional level. Expert guest speakers are invited to discuss the public health importance of the topic/its burden; epidemiology (prevalence, patterns, determinants); theoretical and practical methodological challenges and opportunities in the conduct of epidemiologic studies; most recent findings in NCD research conducted in Lebanon and the region; and strategies for the prevention and control of NCDs. The course is an opportunity for students to be acquainted with researchers in Lebanon active in the field and to appreciate the scope and findings of the NCD studies conducted in Lebanon and the region. Students are expected to lead on a scoping review of a selected research question.

EPHD 321 Design and Analysis of Clinical Trials 2 cr.
A course that focuses on issues in the design and organization of randomized controlled clinical trials: ethical and legal issues, patient selection, recruitment, masking and randomization, endpoint definition, protocol development and statistical analysis.

SHRP 321A Clinical Trial Protocol 2 cr.
This is a 2-credit course designed to complement EPHD 321 (Design and Analysis of Clinical Trials). It is structured around the development of a clinical trial protocol based on principles/concepts covered in parallel in EHPD 321. The course systematically covers all standard key items needed to describe a clinical trial protocol using the 33 items checklist of the 2013 SPIRIT (Standard Protocol Items: Recommendations for Intervention Trials) document. These items include detailed content description for: administrative information, protocol registration, participants, interventions, outcomes, assignment of interventions, data collection, data management, data analysis, monitoring, data sharing, ethics and dissemination. Weekly assignments are designed to guide students in the production of a clinical trial protocol, covering sequential items of the SPIRIT checklist. The final paper consists of a fully developed protocol to implement a clinical trial that is suitable for submission for competitive funding and for publication in a peer-reviewed journal. Students will also give a PowerPoint presentation at the end of the course describing the protocol developed prior to submission of their final paper.

EPHD 328 Systematic Review and Meta-Analysis 3 cr.
The course is structured around the steps of executing a systematic review of trials of interventions: specifying the PICO question, searching for potentially relevant articles; selecting eligible studies; abstracting data; assessing risk of bias, conducting a meta-analysis; grading the certainty of evidence; and interpreting results. Weekly assignments are designed to guide students in the production of a systematic review. The final paper consists of a report of the systematic review suitable for publishing in a peer-reviewed journal. Prerequisites: EPHD 310 and EPHD 300 or their equivalent courses (SHRP 310 and 300), or consent of instructor.

MNGT 306 Leadership and Behavior in Organizations 3 cr.
This course sets the base for proper understanding and micro-level analysis of the role of individual and group behavior in organizations. It is designed as two independent modules. Module I concerns organizational behavior while Module II concerns leadership. The course will serve as an introduction to behavioral aspects of the modern workplace, including such processes as leadership, communication, motivation, conflict resolution and team building, and the influence that the environment has on such behavioral patterns. The course will help students assimilate the different roles people play in an organization irrespective of their departmental positions or functional affiliations, and recognize the interactions inherent among people, structures and environments. Particular attention is accorded to leadership as a focal point of group processes and a critical ingredient in successful organizational endeavors and transformations. Through this course students will analyze, evaluate and apply management and organizational behavior concepts, approaches and tools to both novel business problems and situations and to managerial decision-making situations.

PBHL 304 Public Health Policy and Advocacy 3 cr.
This course introduces students to the relevant concepts and approaches in public health policy and advocacy. It will provide students with a basic understanding of the public health policymaking process as well as the basic elements of advocacy. The aim is to make MPH students informed of the complex nature about public health policy development, be critical consumers of health policy research and evidence, and analytical of the influence of various actors on the policy. Students will learn the stages of the policy process (i.e., agenda setting, policy development, policy implementation and policy evaluation). The field draws upon numerous disciplines. As such, course readings will be drawn from political science, sociology, biomedical sciences and policy studies. Students will also cover the basic elements of an advocacy process, including defining the issue, understanding the audiences and crafting advocacy strategies. Case studies, class discussions, and guest speakers will provide tangible examples of public health policy and advocacy processes at the national, regional and international levels. Ethics and equity considerations will be included in discussions related to concepts and application.

SHRP 395A Comprehensive Examination 0 cr.
Each student is expected to pass a comprehensive examination after completion of all required courses. Examinations may be written, oral or both. Timing of the examination is set by the program.

SHRP 400 Research Thesis 6 cr.
This is a 6-credit master's research course generally completed over two-three terms or more, after the SHARP required summer certificate program. The thesis research track for the SHARP MS degree program will be flexible provided its primary focus is related to NCD. The focus would be clinical trial based, or pertaining to NCD related outcomes or clinical epidemiology, or to the formulation of a health policy related to NCD. A meta-analysis is allowed as a thesis topic pending approval of the joint FM/FHS GSC. A passing grade on the comprehensive exam is also required and it will be followed by a thesis defense and document submission as required by AUB academic guidelines.

Electives

SHARP MS students are allowed a total of 2 credits of electives that can be taken either as established offered courses at any of the following faculties: FM, FHS, OSB, FAFS and HSON (including those listed below), or as tutorials (credits) and seminars (1 credit),

provided they are post-graduate courses and are approved by the SHARP Director.

EPHD 324 Special Topics in Biostatistics 1-3 cr.
A course that covers selected topics in biostatistics of special interest to researchers and trainees in epidemiology and population health. Prerequisite: EPHD 310 or consent of instructor.

EPHD 312 Analysis of Continuous Data 3 cr.
A course that deals with concepts and methods for the analysis of continuous outcomes. The main focus is on multiple linear regression. Analytical means to control confounding and effect modification while maximizing precision is explored. The methods of regression diagnostics are explained. Basic theory is considered; however, the emphasis is on application. Applications of the statistical techniques are carried out using the statistical package SPSS. Prerequisite: EPHD 310 or consent of instructor.

EPHD 313 Analysis of Categorical Data 3 cr.
A course that covers univariate and multivariate statistical techniques for categorical data. Topics include distributions; measures of association and inference for categorical data; log-linear models for multi-contingency tables; and logistic regression for binary, polytomous and ordinal responses. In addition, the concept of maximum likelihood estimation is introduced. Applications of the statistical techniques are carried out using the statistical package STATA. Prerequisite: EPHD 310 or consent of instructor.

HPCH 334 Qualitative Health Research 3 cr.
A course in which students advance their qualitative social research methodology and methods for public health research. Students revisit the underlying paradigms and use of qualitative methodology. Throughout this course, students refine their interviewing skills, train on how to manage qualitative data, apply systematic data analysis and produce a rigorous account of qualitative research findings through practical applications in Arabic and English. Prerequisite: PBHL 310 and PBHL 312 or (PHNU 300 & NFSC 307 & NFSC 301).

HMPD 300 Health Care Systems 3 cr.
This course deals with all the main components, resources and functions of health care systems. It is designed for graduate students to identify organizational and health system problems and apply systems thinking in resolving them. The course also introduces graduate students to the policy making and analysis of health system issues with particular focus on Lebanon and the Middle East region.

PBHL 310 Research Design 3 cr.
This course discusses principles of research design and the methods used in both quantitative and qualitative social research methodologies. Topics include formulation of research questions, literature review, sampling issues, methods of data collection and analysis. Practical ethical issues are also discussed.

HMPD 314 Project Management 2 cr.
A course that exposes students to current project management trends, best practices, and strategies that can aid in better management of projects and programs in health care settings.

SHRP 333 Longitudinal correlated measures 1 cr.
This course builds on the basic biostatistics course by developing regression models to analyze studies that involve correlated outcome data. Correlated outcomes occur in many study designs ranging from classic longitudinal follow-up studies to hierarchical designs

where patient level outcomes are influenced by their physician and their health clinic. The correlation may adversely or beneficially affect the power of the study, leading to the need to estimate and adjust for the degree of correlation during analysis, as well as to adjust sample size calculations during the design of the study. Thirteen lectures will cover relevant topics including the concept of correlation, its impact on study design, the specific forms a correlation matrix can assume, and a detailed investigation of modeling longitudinal outcome data. Alternative methods for fitting correlated data including generalized estimating equations, random effects models, and fixed effects models, will be covered.

BIOM 375 Principles of Learning and Assessment 2 cr.
This course provides students with the theoretical background and approaches to teaching science at the university level with emphasis on the nature of science and learner cognition. In addition, students are expected to apply principles and techniques of teaching and assessment of science in a teaching context. Course offered to PhD students in Biomedical Sciences.

SHRP 329A Guideline Development and Adaptation 1 cr.
This course familiarizes the students with the process of developing guidelines in the clinical, public health and health policy fields. It discusses local adaptation of international guidelines. It provides students with the methodology for developing recommendations and guideline adaptation.

SHRP 332 Applied Survival Analysis 1 cr.
This course is focused on the analysis of studies with time to event outcomes. It includes understanding the concept of censoring, applying the Kaplan Meier Method to obtain summary statistics, comparing two survival curves using log rank test, performing bivariate and multivariate analyses including Cox regression, testing for assumptions for statistical methods used and discussing alternatives when such assumptions are not met. The course will also include sample size computation for randomized clinical trials whose main outcome is of the time to event type. The course is applied in nature focusing on hands on application using a statistical software such as STATA or IBM-SPSS.

SHRP 355 Global Health and Cardiovascular Diseases 1 cr.
The course is offered as an elective to graduate students. This course will focus on cardiovascular burden, preventative interventions, and care in low and middle-income countries (LMICs). CVD disease prevention and interventions that have been implemented in LMICs will be discussed by students through addressing both the disease and its risk factors. Scientific literature will be drawn upon to help students understand and critique available cutting-edge research in the field.

MS in Public Health Nutrition

The Master of Science in Public Health Nutrition is a graduate program offered jointly by the Faculty of Agricultural and Food Sciences (FAFS) and the Faculty of Health Sciences (FHS) at AUB. Students may pursue the Master of Science in Public Health Nutrition in either a thesis or a non-thesis track. The successful completion of the degree requires 40 credit hours for both tracks. Credits must be earned within the Faculty of Agricultural and Food Sciences and the Faculty of Health Sciences.

For the non-thesis track, 38 credits out of the required 40 credits should be earned as core

program courses, including a culminating experience and a practicum. Two credits must be acquired as one or two elective courses either earned within or at both faculties.

For the thesis track, students must complete a total of 34 credits as core courses and must work on a 6-credit thesis under the supervision of a thesis advisor and thesis committee, and defend their thesis as per AUB graduate program policies.

The credit requirements for both the thesis and non-thesis track options are tabulated below.

Students who do not have a Public Health background are required to take PBHL 312 (2 cr.) as a pre-requisite. Students who do not have a Nutrition background are required to take NFSC 221 (3 cr.) as a pre-requisite.

Credit requirements for the Master of Science in Public Health Nutrition

		Non-Thesis Track Credits	Thesis Track Credits
Year 1			
Course	Title	Crs	Crs
NFSC 301	Statistical Methods for Nutrition and Food Sciences	3	3
NFSC 306A	Community Nutrition	2	2
NFSC 307	Nutritional Epidemiology	3	3
PHNU 300	Fundamentals of Public Health Nutrition	3	3
PBHL 303	Design and Evaluation of Public Health Programs	3	3
PBHL 304	Public Health Policy and Advocacy	3	3
PBHL 306A	Workshop Series: Library and Literature Search Skills	0	0
PHNU 304	Nutrition in Emergencies	2	2
HPCH 331	Theories in Health Promotion	2	2
HPCH 334	Qualitative Research in Health Promotion	3	3
Total year credits		**24**	**24**
Year 2			
HPCH 333	Social Marketing in Health Promotion	2	2
FSEC 310	Food and Nutrition Security	3	3
PHNU 301	Nutrition in the Life Cycle	3	3
PHNU 302	Nutrition-related Chronic Disease	3	3
PHNU 390	Practicum	2	0
PHNU 391	Integrative Learning Experience	3	0

PHNU 396	Comprehensive Exam	0	0
PHNU 399	Thesis	0	6
Total year credits		**17**	**17**
Total credits		**40**	**40**

Core Courses

NFSC 301 Statistical Methods for Nutrition and Food Science 2.3; 3 cr.
This is an intermediate level course of statistics. Topics include introduction to designs in Nutrition and Food Science research; critical appraisal of literature; methods of describing data; statistical inference for means and proportions; linear and logistic regression, and an introduction to multiple regression. Prerequisites: STAT 210 or EDUC 227 and CMPS 209 or equivalent undergraduate course in statistics. Offered Fall and Spring.

NFSC 306A Community Nutrition 2.0; 2 cr.
In this course, students will be trained on the role of nutrition in improving the health and wellbeing of communities and will be equipped with skills required to conduct community-based assessment, as well as plan, implement, and evaluate community nutrition programs and policies. The course combines theory and practice where students will discuss, analyze, and experiment with the theories of behavioral change and will apply the principles of nutrition education when tackling specific nutritional problems. Students will be provided with experiential learning opportunities to assess the health and nutritional needs of specific population groups. In addition, this course will give students the opportunity to plan, implement, and evaluate small-scale nutrition interventions to improve the health and well-being of individuals within select communities. Offered Spring.

NFSC 307 Nutritional Epidemiology 3.0; 3 cr.
This course deals with the design, conduct, analysis, and interpretation of epidemiologic studies related to nutrition, particularly the relationship between nutritional status, diet and disease. Prerequisites: STAT 210 or EDUC 227 and CMPS 209 or equivalent undergraduate course in statistics. Offered Fall.

PHNU 300 Fundamentals of Public Health Nutrition 3 cr.
This course introduces students to the field of public health nutrition, covering the fundamental pillars of the field; nutrition status and needs assessments and planning, monitoring, and evaluating nutrition interventions. Students will be exposed to the theories and conceptual frameworks behind addressing nutrition-related health issues at a population level. Offered Fall.

HPCH 331 Theories in Health Promotion 2.0; 2 cr.
This course focuses on theories utilized to understand health determinants and outcomes, and to promote individual and population health. Students will critically examine perspectives from health promotion and other social science disciplines through theoretical readings and empirical case studies. They will also discuss the merits and challenges of using theory to analyze health and to intervene at multiple levels from the individual to the structural levels. Pre-requisites- PBHL 312 or (PHNU 300 and NFSC 307). Offered Spring.

HPCH 334 Qualitative Health Research 2 cr.
A course in which students advance their qualitative social research methodology and methods for public health research. Students revisit the underlying paradigms and use of qualitative methodology. Throughout this course, students refine their interviewing skills, train on how to manage qualitative data, apply systematic data analysis and produce a rigorous account of qualitative research findings through practical applications in Arabic and English. Prerequisites: PBHL 310 and PBHL 312 or (PHNU 300 & NFSC 307 & NFSC 301).

PHNU 301 Nutrition in the Life Cycle 3.0; 3 cr.
This course covers the nutritional needs of individuals in different stages of the life cycle, with a focus on maternal and child nutrition and nutrition in the elderly. Offered Fall.

PHNU 302 Nutrition-related Chronic Disease 3.0; 3 cr.
This course covers the epidemiology, etiology, and the medical and nutritional management of chronic diseases whose etiologies are nutrition-related. Offered Fall.

HPCH 333 Social Marketing in Health Promotion 2.0; 2 cr.
In this course, students will learn the theoretical underpinnings of social marketing, a framework used to develop strategies aimed to address social and public health issues and to design effective, sustainable, and ethically sound public health campaigns. As a service-learning course, students apply concepts acquired into the development of a social marketing plan for a local community partner organization, responding to selected public health issues. This course is offered in blended learning format and is based on a combination of different modes of delivery (online and face-to-face) and diverse models of teaching and learning styles, providing students with an interactive and meaningful learning environment. Prerequisites: HPCH 331 and PBHL 303. Offered Fall.

FSEC 310 Nutrition Security: Assessment and Intervention Strategies 3.0; 3 cr.
This course introduces students to basic principles of nutrition security, community nutrition, and nutritional ecology, and highlights the role that nutrition plays in improving the health and wellbeing of communities. The course aims to equip students with the knowledge and skills required to conduct population-based nutrition research, assess the nutrition needs of a population, to plan, implement and evaluate community nutrition programs and policies based on evidence-based practice and taking into consideration cultural, social, and contextual dimensions. Offered Spring.

PHNU 304 Nutrition in Emergencies 2.0; 2 cr.
This course covers evidence-based community nutrition interventions in emergency situations that place vulnerable populations at risk of food insecurity and consequent malnutrition. Offered Summer.

PBHL 303 Design and Evaluation of Public Health Programs 2.2; 3 cr.
This course introduces students to the concepts and methods of public health program design and evaluation. Students will develop skills for assessing population needs for the development of health programs. The course then covers public health program design, including developing measurable objectives, identifying evidence-based intervention strategies, and planning for program implementation. Students will learn to select appropriate methods for impact and process evaluation of health programs. Prerequisites: PBHL 310 (waived for PHNU students) and PBHL 312 or (PHNU 300 & NFSC 307 & NFSC 301 & HPCH 334 (concurrently)). Offered Spring.

PBHL 304 Public Health Policy and Advocacy 3.0; 3 cr.
This course introduces students to the relevant concepts and approaches in public health policy and advocacy. It will provide students with a basic understanding of the public health policymaking process as well as the basic elements of advocacy. The aim is to make MPH students informed of the complex nature about public health policy development, be critical consumers of health policy research and evidence, and analytical of the influence of various actors on the policy process. Students will learn the stages of the policy process (i.e., agenda setting, policy development, policy implementation and policy evaluation). The field draws upon numerous disciplines. As such, course readings will be drawn from political science, sociology, biomedical sciences and policy studies. Students will also cover the basic elements of an advocacy process, including defining the issue, understanding the audiences and crafting advocacy strategies. Case studies, class discussions, and guest speakers will provide tangible examples of public health policy and advocacy processes at the national, regional and international levels. Ethics and equity considerations will be

included in discussions related to concepts and application. Offered Spring.

For thesis track:

PHNU 396 Comprehensive Exam 0 cr.
Comprehensive Exam.

PHNU 399 MS Thesis 6 cr.
MS Thesis.

For non-thesis track:

PHNU 390 Practicum 2.0; 2 cr.
The practicum is considered an essential part of the curriculum of students. Students gain practical experience working with organizations engaged in developing, implementing and /or evaluating community-based public health nutrition programs. This experience may be purely research-based for students aiming for more academic careers. Offered Spring.

PHNU 391 Integrative Learning Experience 3.0; 3 cr.
This course will allow students to apply knowledge and skills acquired throughout their graduate courses. Through this course, students will develop an understanding of how to conduct a community-based project or a research project beginning with the conception of ideas and concluding with depicting written results and discussing them, along with proper citations and procedures. Part I offered Fall and Part II offered Spring.

List of Elective Courses

HPCH 301 Health Communication 2.0; 2 cr.
Health communication is an area of study that examines how human and mediated communication can influence the outcomes of healthcare and health promotion efforts. This core MPH course introduces the students to the basic concepts of health communication and its scholarship, including the focal areas of health literacy and patient-provider communication, social marketing, health campaigns, risk communication, crisis communication, and health advocacy. In the course, students will discuss the ways communicating about health is influenced by individual, social, and societal factors. The course will provide students with tools to critically evaluate existing health campaigns and to outline strategies to effectively communicate with different audiences about health-related topics. They will also design culturally appropriate, evidence-based health messages, designed for specific publics. Through this course, students will also learn how to effectively communicate scientific information with different audiences (e.g., general population, experts, the media), appropriately choosing oral and written materials and communication channels.

NFSC 395 Graduate Seminar in Nutrition and Food Science 1.0; 1 cr.
Offered Fall and Spring.

Diplomas

Diploma in Humanitarian Engineering and Public Health Innovations

The **Diploma in Humanitarian Engineering and Public Health Innovations** is a joint FHS/MSFEA interdisciplinary diploma.

The Diploma is open to professionals as well as AUB students currently enrolled in graduate programs from all majors wishing to gain academic knowledge and skills in the field of Humanitarian Engineering and Health Innovations. The program is a multidisciplinary offering that provides graduate students and professionals with the skills required to find innovative design solutions for challenges faced in humanitarian settings by taking into consideration two complementary perspectives, public health perspective and engineering perspective.

Learning Outcomes of the Diploma

Students who complete the diploma will be able to:

1. Apply participatory needs assessment tools and analyze the different dimensions of a public health problem
2. Apply formal design methods to develop practical, feasible, scalable, and sustainable humanitarian engineering and public health innovations and interventions
3. Apply skills required to manage complex projects while working in multidisciplinary teams
4. Demonstrate entrepreneurial skills to take a solution/intervention from prototype to product
5. Articulate and adhere to ethical standards in the process followed and, in the intervention, designed
6. Present and document a problem and its solution to a diverse target audience

Requirements for the Diploma

It is composed of 15 credits of course work, that include:

- HEHI 301, “Foundations of Humanitarian Engineering and Public Health Innovations”
- HEHI 302, “Capstone: Humanitarian Engineering and Public Health Innovations”
- One design course from the following list: AGSC 330, ARCH 344, CHEN 619, CHEN 798A , CIVE 552, CIVE 601, CIVE 628, CIVE 686, EECE 675, ENMG 663, ENMG 698E, ENSC 633, ENST 300, FSEC 310, FSEC 315, LDEM 633, NFSC 306, PBHL 303, URDS 664, URPL 641
- One ethics course from the following list: MHRM 304 , PSYC 305
- One social entrepreneurship course from the following list: ENMG 654, ENTM 320, MFIN 359

HEHI 301 - "Foundations of Humanitarian Engineering and Public Health Innovations"; 3 cr.
This is a multidisciplinary course that covers the fundamentals of designing solutions for health challenges faced by disadvantaged populations. It introduces tools for identifying humanitarian and/or development needs and designing practical, scalable and sustainable solutions and interventions. The course is offered to students from all majors. Students will be exposed to health and health system challenges in addition to design fundamentals including participatory needs assessment, formal multidisciplinary design processes, and relevant technologies and tools with real world applications and case studies.

HEHI 302 - "Capstone: Humanitarian Engineering and Public Health Innovations Capstone"; 3 cr.
The capstone project course is an interdisciplinary service-learning design course focused on development and humanitarian engineering solutions for health challenges. In the capstone, students apply all tools learned in HEHI 301. Students work in multidisciplinary teams with disadvantaged communities, under joint supervision of at least two mentors from MSFEA, FHS, and other faculties.
The capstone is divided into two sub-courses, HEHI 302A (1cr.) and HEHI 302B (2cr.), and must be registered in 2 consecutive semesters. HEHI 302A has as a prerequisite: HEHI 301. HEHI 302B has as a prerequisite HEHI 302A.
If the student has achieved one or more of the core competencies in Ethics or Entrepreneurship through previously passed undergraduate or graduate courses, only one elective course can be waived. The student will have to register at least one course from the approved list of Design courses, and another course from either the list of Ethics courses or the list of Entrepreneurship courses.
If the student has achieved two or all of the core competencies through undergraduate courses, only one course can be waived, and the student will have to register at least one course from the approved list of Design courses, and another course from either the list of Ethics courses or the list of Entrepreneurship courses.
Thesis/capstones of graduate students can be counted towards the fulfillment of the diploma. Students interested to enroll in the diploma are encouraged to inform the coordinators of the program at healthengineering@aub.edu.lb to benefit from adequate advising on study plans and ensure completion of all requirements.
The diploma is planned to include arrangements to encourage on-going graduate students to enroll with no or limited additional credit burdens. It is composed of 15 credits of graduate course work.

Eligibility criteria

For professionals:

To be eligible for admission to the diploma program, an applicant must hold an undergraduate university degree recognized by AUB with an average of at least 75 or demonstrate "reasonable potential for academic success".

For AUB students:

To be eligible for admission to the diploma program, an applicant must be in good academic standing. Applications are reviewed by the Steering Committee of the Humanitarian Engineering Initiative, and admissions recommendations are voted on by both MSFEA and FHS Graduate Studies Committee.

Registration process

Professionals who want to pursue the diploma should submit an application to the Office of Admissions. Current AUB graduate students need to fill out a petition form for completion of diploma.

Department of Environmental Health

Chairperson:	Jurdi, Mey
Professors:	Habib, Rima; Jurdi, Mey; Massoud, May; Nuwayhid, Iman
Associate Professor:	Dhaini, Hassan
Lecturer:	Nasr, Joumana
Instructor:	El Helou, Nida

The Department of Environmental Health offers a graduate program leading to the MS degree in Environmental Sciences (Major: Environmental Health). For details regarding the MS degree, refer to the Master Degree Program in Environmental Sciences section of this catalogue.

In view of the increasing interest in development and its impact on the human environment, a variety of courses offered by this department are made available to students in other fields.

Graduates of the MSES-Environmental Health program may occupy senior or intermediate posts in the following:

- governmental agencies, such as the Ministry of Health, Ministry of the Environment, municipalities or health centers
- the private sector, which offers a variety of job opportunities in industry, research institutions, universities, schools and private businesses
- international agencies

Course Descriptions

ENHL 301 Environmental Health and Sustainable Development 1.0; 1 cr.
The course introduces the field of environmental health and highlights its role in contributing to sustainable development. Students discuss the environmental system and the interactions of its physical, socio-economic and political components impacting human health and ecologic vitality. Emphasis is placed on assessing, preventing, and controlling environmental hazards that pose major risks to humans, animals and ecosystems.

ENHL 307 Food Safety and Health 3.0; 3 cr.
The course focuses on the safety and management of processed food products. It addresses the advantages and limitations of food processing techniques and, in specific, the application of food additives. Areas covered relate mainly to food safety and quality control, health impacts, types and limitations of food processing methods, use of food additives, exposure estimation, toxicological implications, risks and benefits governing use and quality control measures and applications both at the national and international levels.

ENHL 308 Tutorial 1–3 cr.
A tutorial on special environmental health projects of interest to students. Students are required to submit a written report.

ENHL 310/ENSC 640 Toxicology and Environmental Health Hazards 3.0; 3 cr.
The course presents toxicology in three sections. In the first section, the fundamental principles and essentials of toxicology are introduced, particularly dose-response, toxicokinetics, and cellular mechanisms of action. In the second section, the course discusses toxicity of main organ systems. Classic toxicants that adversely affect health, emerging hazardous human exposures, and special topics are discussed in the last section of the course. The course includes lecture-style presentations, collective case- studies activities and student-led discussions. Topics of local and regional relevance are also introduced through hosting guest speakers.

ENHL 311 Human Health Risk Assessment 3.0; 3 cr.
Thousands of chemicals are currently in common use and hundreds are introduced newly every year. The toxic effects of these compounds on humans are of significant public health concern. Human Health Risk Assessment (HHRA) studies the nature and probability of adverse health effects in humans who may be exposed to chemicals in contaminated environmental media. HHRA is an essential basis for decision-makers in remediation of environmental contamination and public health protection. This course introduces students to concepts, sources of data, and methods, which are used in the field of human health risk assessment, and provide them with an understanding of current issues in this field. The course examines in detail the four components of risk assessment: hazard identification, dose-response evaluation, exposure assessment, and risk characterization. Additionally, concepts in risk management and risk communication are discussed. The course includes lecture-style presentations, in-class exercises and assignments, and student lead discussions of reports/articles. Students will obtain enough experience to be able to successfully evaluate a health risk assessment report, which will be demonstrated in the final student presentations.

ENHL 312/ENSC 641 Occupational Health 2.3; 3 cr.
This course overviews the general principles of occupational health, relating work, the work environment, and workers' health and wellbeing to general principles of social equity and justice. The course surveys research on the social, economic, political, environmental, and health elements of a workplace using multidisciplinary approaches. Students who join the course are able to identify occupational hazards and work-related injuries and illnesses in workplaces and propose monitoring, management and prevention strategies to lessen their impact on workers. With its emphasis on social justice, the course discusses the factors that make some workers' groups more vulnerable than others. Its unique approach emphasizes global perspectives and popular imaginations of workers through academic publications, newspaper journalism, cinema, lectures and class discussions. This course is designed for students of multiple educational and training backgrounds and does not require prerequisite knowledge.

ENHL 315 Environmental and Occupational Health Seminar 0 cr.
The Environmental and Occupational Health (EOH) seminar series presents information on current research topics and emerging issues in the EOH field. It exposes students to a broad range of environmental and occupational research, practice, and policy issues. Throughout the seminar series, students will learn about and understand EOH-related topics of current importance to the health of workers and the general population via: (1) careful reading and evaluation of assigned journal articles and (2) active listening to EOH experts and participation during the seminar.
Seminar topics would cover multiple themes, such as occupational health and safety in different work settings, toxicology, qualitative and quantitative methodologies and tools used

for the recognition, assessment, and evaluation of environmental and occupational hazards, and environmental and occupational health ethics. Issues related to environmental justice, sustainable development, and policymaking will run across the series.

ENHL 320 Special Topics in Environmental Health 1-3 cr.
A course that covers selected topics such as risk analysis, environmental ethics and justice, or environmental policy and allows focused examination of special topics of interest to trainees in Environmental Health.

ENHL 314/ENSC 642 Environmental Management Systems 3.0; 3 cr.
The implementation of an Environmental Management System (EMS) integrates the precautionary and polluter pays principles into firms' operations and demonstrates commitment to sustainable development. This course provides an overview of the most common international standards for environmental management systems, primarily the International Standards Organization (ISO) harmonized management systems, and its implications for different organizations. It provides students with the skills to formulate and evaluate such management systems. Though the first part of the course is mainly lecture based, student participation in the form of questions and discussion is always welcomed and encouraged. Critical thinking will be promoted throughout the course. Students will be expected to formulate an EMS for an organization and prepare a technical report to communicate project findings to their colleagues through verbal presentation. Emphasis is placed on solving environmental problems using an integrated management approach in order to achieve an optimized environmental performance. Alternate years.

ENHL 325 Environmental Exposure Assessment; 2 cr.
The course will introduce students to the tools and strategies used to evaluate air, water and physical stressors encountered by individuals and populations in indoor, outdoor and occupational environments. Indirect and direct methods of assessing exposures in environmental and occupational settings are reviewed. Criteria for evaluating the quality of an exposure assessment and exposure data in occupational and environmental epidemiology studies are discussed. This course will cover the design of exposure assessment strategies for research and public health practice, the techniques and methods for sampling and analysis, and interpretation of data. In addition, this course will incorporate aspects of inequities in environmental exposures (environmental justice). The class will consist of lectures, discussions of readings and exposure data, and hands-on exposure monitoring.

ENSC 699 Thesis 6 cr.
Thesis.

ENSC 697 Project 3 cr.
The project must be undertaken, in partial fulfillment of the requirements for the degree, upon the completion of at least 27 credits of core and elective courses. A student who is unable to finish the project in one term can register for it one additional time.

Department of Epidemiology and Population Health

Chairperson:	Chaaya, Monique
Professors:	Chaaya, Monique; DeJong, Jocelyn; Sibai, Abla
Professor of Public Health Practice:	Adib, Salim
Associate Professors:	Ghandour, Lilian; Jaffa, Miran
Associate Professor of Public Health Practice:	Fouad, Fouad
Assistant Professors:	El-Asmar, Khalil; Mumtaz, Ghina
Assistant Professor of Public Health Practice:	McCall, Stephen
Instructors of Public Health Practice:	Akl, Christelle; Saad, Ghada
Affiliates:	Akl, Elie; El Bejjani, Martine; Tamim, Hani
Adjunct:	Al Hazoury, Adina

The Department of Epidemiology and Population Health offers courses in epidemiology, biostatistics, and population health to graduate students in the Faculty of Health Sciences and the Faculty of Medicine. The Department is committed to improving public health in Lebanon, the region, and beyond, by training students and public health professionals to become epidemiologists capable of undertaking independent quantitative research for advancing knowledge and informing policy and practice. Its academic programs, adapted to meet the needs of the region encourage learners to work on projects that address the public health needs of the region.

The course offerings to students in the Master of Public Health (MPH) program, the Master of Science (MS) in Epidemiology program, and Doctor of Philosophy (PhD) in Epidemiology are given as core, required, and elective courses. In addition, members of the department offer courses in statistics and epidemiology to students in the Medical Degree program and coordinate and participate in teaching courses in preventive medicine and public health programs in the Faculty of Medicine.

EPHD 300 Principles of Epidemiology 1.5:1.5; 2 cr.
This course introduces graduate students to the basic principles and methods of epidemiology and the application of the epidemiological approach to public health research, policy and practice. The course consists of weekly lectures and practical application sessions. Students will learn about the rubrics of Epidemiology, dynamics of disease transmission, common sources of epidemiological data, measures of morbidity and mortality, observational study designs, measures of association, biases and confounding, and general principles of causation in epidemiology. The main concepts will be covered during the lecture. The application sessions (e.g., problem-solving exercises, case-studies, journal critiques, mapping...) will allow students to apply their acquired epidemiological knowledge and understand the role of epidemiological evidence in current practices of public health policy and practice.

EPHD 310 Basic Biostatistics 2.2; 3 cr.
This course is an introduction for graduate students to statistical techniques applied to health and biomedical related data. The objectives are twofold: descriptive and inferential statistics. This course will provide theoretical and applied foundation that are needed to: 1) Carry out statistical analyses appropriate for the data and the study design, 2) Deduce accurate inferences and conclusions that concern the study population, 3) Disseminate and interpret biostatistical results and conclusions in a proficient manner. At the end of this course, students will be well rounded with the different analytical techniques that range from basic descriptive analysis, to mid- level analysis that distinguishes between the various distributions and applies the tests suitable for the outcome under examination, in addition to advanced modelling techniques using regression approaches linear, logistic and non-parametric methods.

EPHD 312 Analysis of Continuous Data 1.5-1.5; 2 cr.
In this course, students will learn to use regression analysis to address a research question. It covers basic exploratory data analysis for univariate (outcome) continuous observations with single or multiple covariates, followed by regression methods and diagnostics with a main focus on multiple regression. The emphasis of the course is on the application of statistical techniques that are carried out using the statistical package STATA and R. Lectures include lab sessions, article reading and appraisal as well as group discussions. Prerequisite: EPHD 310 or consent of instructor.

EPHD 313 Analysis of Categorical Data 2.2; 3 cr.
This course aims at introducing biostatistical approaches to analyze categorical and count data. In particular, students will learn about (1) probability distribution for binomial and multinomial data, (2) measures of association and test of association for nominal and ordinal data, (3) analysis for Two Way and Three Way contingency tables including interaction and confounding (4) generalized linear models (5) logistic regression for independent, matched case-control data, and data with small sample size and rare events (6) Poisson and Negative Binomial regressions for count and rates with and without over-dispersion, (7) Multi-category logit for nominal and ordinal data. The statistical package STATA will be used in this course. Prerequisite: EPHD 310 or consent of instructor.

EPHD 314 Data Management and Manipulation 1.2; 1 cr.
The data management course is an introduction to data manipulation and management using Stata, SPSS and Epi-data. The course covers data structure design including data checking as well as data manipulation, data imputation and basic statistical programming. The course is offered at the computer lab where students can have hands-on experience in dealing with real data sets. In case an enrolled student has a project specific data, she/he has the chance to directly apply the acquired course material on the dataset. Weekly assignments are given to allow the students to explore advanced and customized application of the material offered in the classroom.

EPHD 315 Nonparametric Data Analysis 1.2; 2 cr.
Nonparametric tests are often used in place of their parametric counterparts when certain assumptions about the underlying population are questionable. This course introduces the students to the theory and applications of nonparametric statistics. Methods include estimation and testing of hypotheses for the one sample location problem, two sample location problem, multi-sample location problem, correlation, regression and tests for proportions. Prerequisite: EPHD 310 or graduate basic Biostatistics course.

EPHD 316 Epidemiology, Prevention and Control of Communicable Diseases 2.0; 2 cr.
The course explores the epidemiology, prevention and control of selected communicable diseases with major public health significance locally, regionally and globally. For each disease, the course will cover the morbidity, mortality, burden, associated risk factors, social and behavioral determinants, as well as public health strategies for prevention and control. Prerequisite: EPHD 300 or consent of course instructor.

EPHD 317 Epidemiology of Non-Communicable Diseases and Mental Health Disorders 1.5-1.5; 2 cr.
The course will begin with a comprehensive overview of Non-Communicable Diseases (NCDs) and Mental Health Disorders (MHDs), and then proceed with the two modules. Module 1 focuses on the epidemiology of select MHDs that are major sources of morbidity, mortality and disability worldwide and in the region. The second module focuses on major NCDs and their shared behavioral risk factors. The course is designed to advance both epidemiological knowledge and skills. The lectures will provide the students with a summary of the epidemiological evidence of a select NCD/MHD, presenting the latest available estimates on morbidity, mortality and burden, as the main commercial and psychosocial determinants, as well as evidence-based effective prevention strategies and interventions. During the discussion session, and through various learning modalities (article discussion, case scenarios, short videos) the students will address the issue from an epidemiological perspective, critically appraising the methodological issues related to measurement, study design, data interpretation as well as control/prevention strategies. Throughout the course, students are expected to learn about and understand the epidemiology of the selected NCDs and MHDs via: (1) active listening and participation during the lectures and discussion sessions; (2) careful reading and evaluation of the required peer-reviewed journal articles and other sources of information; and (3) critically reviewing the literature when working on their own paper. Prerequisites for the course include EPHD300 or any equivalent graduate or undergraduate-level course in Epidemiology.

EPHD 318 Introduction to Mathematical Modelling of Infectious Diseases 1.5-1.5; 2 cr.
Mathematical modelling of infections is increasingly developing as a key tool for understanding transmission patterns, emergency planning, and assessing control strategies - hence playing a critical role in policy making. This graduate course introduces students to the basic concepts of mathematical modelling of infectious diseases and allows them to acquire a hands-on practical experience in designing simple, yet informative models to predict the course of epidemics and estimate the impact of interventions. The course consists of lectures and practical sessions that include class exercises and discussion, computer applications, and article discussion. Applications to different types of infectious diseases and control interventions will be discussed. Students will build and run basic disease models using Berkeley Madonna, a user-friendly mathematical package. Students should be comfortable with basic calculus and have an interest in infectious diseases epidemiology.

EPHD 319 Advanced Quantitative Methods in Epidemiology 1 cr.
This course will provide students with an overview of the theory and applications of advanced quantitative methods in epidemiology. The purpose of the course is to assist students in answering complex etiological research questions in epidemiology. The course includes two main modules: (1) Cox models with time varying coefficients, and (2) Competing risk analysis. Pre-requisites: EPHD 320, EPHD 313 or Instructor's approval.

EPHD 320 Epidemiology Beyond the Basics 1.5-1.5; 2 cr.
The course provides advanced knowledge of epidemiologic studies and covers in detail methodological issues concerning the design and the analysis of observational studies (cross sectional, case control and cohort studies). It also introduces design and analysis of

randomized clinical trials. The course addresses key validity issues related to selection of study subjects, accuracy of measures, confounding bias, and discusses effect modification. The course is blended and relies on didactic teaching, applications on and class discussion of selected articles, online discussion sessions, and designing of two observational studies. Ethical considerations in epidemiologic research are discussed throughout the course. Prerequisites: EPHD 300 and EPHD 310, or consent of instructor. Equivalent to SHARP 320.

EPHD 321 Design and Analysis of Clinical Trials 1.2; 2 cr.
A course that focuses on issues in the design and organization of randomized controlled clinical trials: ethical and legal issues, patient selection, recruitment, masking and randomization, endpoint definition, protocol development, and statistical analysis. Designs such as cross-over designs, factorial-designs, and meta-analysis are discussed. Prerequisites: EPHD 300 and EPHD 310, or consent of instructor.

EPHD 322 Special Topics in Epidemiology 1-3 cr.
A course that covers selected topics of special interest to trainees in epidemiology. Examples include assessment of disease burden using epidemiological studies, occupational epidemiology, epidemiology of aging, epidemiology of maternal-child problems, or nutritional epidemiology. Prerequisite: EPHD 300 or consent of instructor.

EPHD 324 Special Topics in Biostatistics 1–3 cr.
A course that covers selected topics in biostatistics of special interest to researchers and trainees in epidemiology and population health. Prerequisite: EPHD 310 or consent of instructor.

EPHD 327 Field Epidemiology 0.2; 1 cr.
The field epidemiology course is an introduction to the concepts of epidemiology as it relates to applied field epidemiology. This course covers the key steps of an outbreak investigation and introduces main concepts of surveillance, its analysis and importance. This course focuses on problem-based, interactive methods: students can have a hands-on experience in dealing with basic outbreak investigation steps and surveillance data through real life case-studies which are discussed in group-work in class. Prerequisite: EPHD 300 or any undergraduate or graduate basic epidemiology course.

EPHD 328 Systematic Review and Meta-Analysis 2.2; 3 cr.
The course is structured around the steps of executing a systematic review of trials of interventions: specifying the PICO question; searching for potentially relevant articles; selecting eligible studies; abstracting data; assessing risk of bias, conducting a meta-analysis; grading the certainty of evidence; and interpreting results. Weekly assignments are designed to guide students in the production of a systematic review. The final paper consists of a report of the systematic review suitable for publishing in a peer-reviewed journal. Prerequisites: EPHD 310 and EPHD 300 or their equivalent courses (SHRP 310 and 300), or consent of instructor.

EPHD 331 Population Change and Health 3.0; 3 cr.

Population change is central to public health. This course provides a broad introduction to the field of population. It identifies core topics in population, discusses their relation to development and health, and emphasizes measurement issues. Topics covered include population size and growth as they relate to resources and to population health; components of population change including fertility and mortality, their links to development and consequences for health; population composition by age and gender and by socioeconomic status, and related inequalities; and population movements including forced, internal and

international migration as factors of population change and health. Special focus is given to the Arab World and the Middle East Region.

EPHD 332 Population and Health Policy 3.0; 3 cr.

A course designed to explore the links between population, health, and development issues, with a focus on population policies and programs in the Middle East and North Africa. Topics include demographic trends and their implications for health policies; family planning programs and policies; the reproductive health paradigm; HIV/AIDS; gender and population policy; special health needs posed by the youth 'bulge' and population aging; political dimensions of population policies; and debates between the policy objectives of reducing population growth at the macro level and promoting individual well-being.

EPHD 333 Special Topics in Population Health 1- 3 cr.

An examination of specific topics in population health such as aging, burden of disease, reproductive health, fertility of adolescents, social determinants of population health, and the demography of refugee populations.

EPHD 334 Reproductive Health 3.0; 3 cr.

A course that examines selected issues in reproductive health with a focus on developing countries. Topics covered include pregnancy and childbirth, unintended pregnancy, maternal mortality, infertility, gynecological morbidity including sexually transmitted infections, sexuality, birth spacing and family planning, and reproductive rights. Particular emphasis is placed on conceptual issues and recent debates about reproductive health within the context of the international agenda on reproductive rights established at the 1994 Cairo Conference on Population and Development.

EPHD 336 Tutorial in Epidemiology 1–3 cr.

Tutorial in Epidemiology.

EPHD 337 Tutorial in Biostatistics 1–3 cr.

Tutorial in Biostatistics.

EPHD 338 Tutorial in Population Health 1–3 cr.

Tutorial in Population Health.

EPHD 365 Practicum 0.30; 2 cr.

The practicum offers students the opportunity to practice their obtained knowledge and gain research experience in epidemiology and biostatistics mainly through the design of epidemiological studies or data collection and analyses of various types of data. Students are advised internally by a faculty member and externally by an outside preceptor in the practicum site. Practicum sites may include the Ministry of Public Health, Ministry of Social Affairs, non-governmental agencies, UN agencies (UNICEF, ESCWA, UNFPA), and health services organizations. Prerequisites: Completion of all, or all but one, of the core and/or concentration courses. Prerequisites: PBHL 399A.

EPHD 395 Comprehensive Exam 0 cr.

Comprehensive Exam.

EPHD 399 Thesis 6 cr.

Thesis.

EPHD 403 Advanced Epidemiology Methods: Case Control and Cohort Studies 2.2; 3 cr.

The main objective of the course is to enhance students' ability to design and conduct unbiased and efficient research. It is specifically designed to expand students' understanding of the methods of sampling for case control and cohort studies, and train students on hybrid designs (case cross over designs, nested case controls and case cohort). Prerequisite: EPHD 320 or its equivalent.

EPHD 404 Introduction to Causal Inference Methods 2.0; 2 cr.

This course provides an overview and understanding of key concepts and theoretical frameworks of causal inference without and with models. The course will cover causation in health research, Directed Acyclic Graphs (DAGs), and epidemiologic methods for causal inference such as inverse probability weighting and marginal structural models. Other topics such as mediation and instrumental variables will also be covered. The course will involve lectures and practical applications through journal club, lab sessions with data, homework, and class projects. Prerequisite: EPHD 320 or SHRP 300/320 (or any equivalent intermediate level course in Epidemiology and Basic Biostatistics).

EPHD 405 Social and Behavioral Factors in Epidemiology 2.0; 2 cr.

This course is about the influence of the social context on the distribution of disease and its consequences, and about conducting epidemiological and public health research that is mindful of social and behavioral factors. While social epidemiology has come to be identified with the study of social inequalities, understanding how society and culture influence health requires a broader view of social determinants than the statistical analysis of the effects of socioeconomic variables on health outcomes. The course situates itself at the intersection of epidemiology and the social sciences. It draws on a range of approaches to illustrate the ways that social forces affect health. Prerequisites: PBHL 310, EPHD 300, and EPHD 310 (or an equivalent basic epidemiology course).

EPHD 406 Epidemiology in Action 2.2; 3 cr.

This course aims at exploring different public health modalities, strategies, interventions and approaches during man-made (conflict) and natural disasters. It also enables public health practitioners capable of selecting those most relevant to each situation's type, context and type of population affected. Skills needed in the management of disaster situation will be introduced as an integrated component, such as coordination and communication skills. In natural disasters, outbreak investigation methods will be included, using case studies of local, regional and global disease outbreaks. The response plan to natural and man-made disasters such as storms and earthquakes, injuries from armed conflicts will be developed. Prerequisites: EPHD 300 (or its equivalent of basic epidemiology course).

EPHD 407 Global Health 2.0; 2 cr.

The course reviews the evidence on the distribution and determinants of major causes of death and ill-health in the world, the initiatives that have been launched to address them and the challenges to improving health in different parts of the world. It provides students with the knowledge and skills to examine how mortality and morbidity vary over time and across countries, the determinants of these changes, and the role of interventions to improve health.

The course draws on epidemiology, economics, health policy and the social sciences to compare health across populations, assess the factors that account for variations, and review major policies and programs designed to improve health.

EPHD 410 Applied Multivariate and Longitudinal Methods in Health Sciences 2.2; 3 cr.

Data are often complicated by high dimensionality and inter-observation correlations. This course aims at providing a solid grounding in the analysis of multivariate data, repeated measure data and correlated data. Specifically, students will learn to (1) distinguish between univariate and multivariate outcomes, (2) group comparison for multivariate outcomes using One-Way and Two-Way MANOVA, (3) multivariate analysis using General Linear Model, (4) analysis of longitudinal data and (5) analysis of correlated clustered data. SAS, STATA and SPSS will be used in this course as statistical packages. Prerequisites: EPHD 310, EPHD 313, and EPHD 312.

EPHD 411 Statistics for Psychosocial Research Psychometrics and Measurement of Latent Constructs 2.2; 3 cr.

This course will introduce students to the principles of measurement, reliability and validity, as well as latent-variable based measurement models, including factor analysis. By the end of the course, students should be able to describe the basic principles of classical test theory and latent variables; conduct reliability and validity tests; conduct exploratory factor analysis; describe the basic steps and components of scale development, and critically appraise the process of validation of a scale. Students will be able to also read and evaluate scientific articles relevant to measurement in public health. The instructional method consists of lectures, in-class exercises, hands-on sessions in the computer lab, and assigned problem sets. Problem sets will require active manipulation of datasets provided by the instructor, using Stata and M-plus. Prerequisites: EPHD 300 and EPHD 310.

EPHD 412 Survival Analysis 1.2; 2 cr.

The course introduces fundamental concepts in survival analysis. The emphasis is on statistical methods which are useful in medical follow-up studies and in general time-to-event studies. The following topics are included in this course: censoring, truncation, hazard and survival functions, Kaplan-Meier estimator, log-rank tests, and Cox proportional hazards model.

EPHD 440 Doctoral Seminar 0 cr.

Doctoral Seminar.

EPHD 445 Writing Research Grants 0 cr.

Writing Research Grants.

Thesis Courses

EPHD 480 Qualifying Exam Part I: Comprehensive Exam 0 cr.

Every term.

EPHD 481 Qualifying Exam Part II: Defense of Thesis Proposal 0 cr.

Every term.

EPHD 482 PhD Thesis 3 cr.

Every term.

EPHD 483 PhD Thesis 6 cr.

Every term. Listed as 483A when registered the second time.

EPHD 484 PhD Thesis 9 cr.

Every term.

EPHD 486 PhD Thesis 0 cr.

Every term. Taken after 24 credits of thesis are completed in case further thesis work is necessary.

EPHD 487 PhD Thesis Defense 0 cr.

PhD Thesis Defense.

EPHD 366 Practicum 0.30; 1 cr.

Practicum for students who receive a partial waiver. Prerequisite: PBHL 399A.

EPHD 320A Epidemiology Beyond the Basics 2 0.5-1.5; 1 cr.

The course complements and expands on materials and activities covered in EPHD 320 (Epidemiology beyond the Basic), which provides advanced knowledge of epidemiologic studies and covers in details methodological issues concerning the design and the analysis of observational studies (cross sectional, case control and cohort studies) as well as key validity issues. EPHD 320A aims at reinforcing students' skills in designing and evaluating observational epidemiological studies. Topics discussed include causality, potential outcomes and counterfactuals, Confounding and DAGS, interaction and effect modifications, biases, and key features of setting up a cohort study and challenges in follow up. Prerequisites: EPHD 300, EPHD 310 and EPHD 320 (could be taken concurrently).

Department of Health Promotion and Community Health

Chairperson:	Makhoul, Jihad
Professors:	Abdulrahim, Sawsan[3] ; Makhoul, Jihad
Associate Professors:	Kabakian-Khasholian, Tamar
Assistant Professor:	Sieverding, Maia
Senior Lecturer:	El Kak, Faysal[4]
Lecturers:	Al Barazi, Rana[4]; Kanj, Mayada; Khawam, Grace
Instructor:	Maddah, Diana
Instructors of Public Health Practice:	Kalot, Joumana; Najem, Martine
Research Associate:	Salloum, Ramzi

Departmental courses are designed to introduce students to the field of health promotion and community health. Health promotion is the process of enabling people to increase control over and improve their health through a wide range of social and health-related interventions. Community health is concerned with the improvement or maintenance of the health characteristics of communities. Emphasis is placed on the role of health promotion specialists to design, implement and evaluate health-promoting interventions with participation of communities and groups. Ethical issues in health promotion and community health are emphasized in all courses.

The following courses are offered by the department:

HPCH 301 Health Communication 2.0; 2 cr.
Health communication is an area of study that examines how human and mediated communication can influence the outcomes of healthcare and health promotion efforts. This core MPH course introduces the students to the basic concepts of health communication and its scholarship, including the focal areas of health literacy and patient-provider communication, social marketing, health campaigns, risk communication, crisis communication, and health advocacy. In the course, students will discuss the ways communicating about health is influenced by individual, social, and societal factors. The course will provide students with tools to critically evaluate existing health campaigns and to outline strategies to effectively communicate with different audiences about health-related topics. They will also design culturally appropriate, evidence-based health messages, designed for specific publics. Through this course, students will also learn how to effectively communicate scientific information with different audiences (e.g., general population, experts, the media), appropriately choosing oral and written materials and communication channels.

[3] On leave (LWOP)
[4] Part-Time

HPCH 331 Theories in Health Promotion 2.0; 2 cr.
This course focuses on theories utilized to understand health determinants and outcomes and to promote individual and population health. Students will critically examine perspectives from health promotion and other social science disciplines through theoretical readings and empirical case studies. They will also discuss the merits and challenges of using theory to analyze health and to intervene at multiple levels from the individual to the structural levels. Prerequisite: PBHL 312 or (PHNU 300 and NFSC 307).

HPCH 332 Community Health Promotion, Organizing and Advocacy 2.0; 2 cr.
In this course, students learn about the notion of community health, and the principles of community organizing to identify needs, values and resources, and priority public health issues in a community setting. Students will use community-based participatory approaches to conduct a community assessment and prioritization exercise. Topical areas cover community organizing, types of community assessments, community-based participatory approaches, advocacy strategies, community organizing, and advocacy ethics. Prerequisite: PBHL 312.

HPCH 333 Social Marketing for Health Promotion 2.0; 2 cr.
In this course, students will learn the theoretical underpinnings of social marketing, a framework used to develop strategies aimed to address social and public health issues and to design effective, sustainable, and ethically sound public health campaigns. As a service-learning course, students apply concepts acquired into the development of a social marketing plan for a local community partner organization, responding to selected public health issues. This course is offered in blended learning format, which means based on a mix of different modes of delivery (online and face-to-face), models of teaching and learning styles, providing students with an interactive and meaningful learning environment. Prerequisites: HPCH 331 and PBHL 303.

HPCH 334 Qualitative Research in Health Promotion 3.0; 3 cr.
The course develops learners' qualitative research skills to address a research question relevant to health promotion. Students engage through classroom discussions, role play and assignments to gain hands-on experience in conducting qualitative research beyond class settings. Students learn about qualitative research designs and methods and then apply the research process by generating data and analyzing the data to answer a research question of their choice. They will also learn how to evaluate the quality or rigor of a qualitative research proposal or manuscript. Topics include in-depth interviews, observations, focus groups, thematic analysis, research rigor and research ethics. Prerequisites: PBHL 310 and PBHL 312 or (PHNU 300 & NFSC 307 & NFSC 301).

HPCH 335 Implementation Research for Public Health 2.0; 2 cr.
This course introduces implementation research, its frameworks, methods, and applications. Through readings and case studies, students will develop an understanding of implementation strategies at the individual, organizational and policy levels, and will discuss issues related to sustainability and scaling-up. They will develop a project where they articulate an implementation research problem of importance in their context, identify implementation strategies, select the appropriate study design, and consider the ethical aspects of the work. This is a required course for all students enrolled in the graduate program on the WHO-TDR scholarship scheme. Prerequisite: PBHL 303.

HPCH 339 Tutorial in Health Promotion and Community health 1-3 cr.
A guided study in particular topics in health behavior and health education as defined by instructor and student.
]

HPCH 341 Special Topics in Health Promotion and Community Health - Special Populations 1-3 cr.
A course in which students explore the personal, social and community determinants that influence the health of special populations such as women, children and adolescents, or an aging population. Issues of assessment as well as design, implementation, and evaluation of interventions at a variety of levels to promote the health of such special populations are discussed.

HPCH 342 Special Topics in Health Promotion and Community Health - Exploring the Context of Intervention 1-3 cr.
A course in which students explore social and political determinants affecting health and health behavior in Lebanon, generally, and in rural and urban contexts, among others. Through group projects and investigations, students learn how culture, laws, policies, economics, kinship and communal ties interact and produce health inequalities in Lebanon today. At the end of this course, students build up case studies analyzing social and political forces surrounding a contemporary health issue of their choice within a particular context.

HPCH 343 Forced Migration 3.0; 3 cr.
This course provides: 1) an introduction to key legal and theoretical frameworks on forced migration (internal and cross-border) and the meanings of the term refugee as a political and social construct; 2) a survey of global actors in the vast field of refugee humanitarian relief; and 3) a description and critique of the refugee "humanitarian relief industry." The course addresses forced migration as a global phenomenon, but synthesizes conceptual and legal writings on the subject with refugee experiences in the Arab region. It incorporates readings from multiple disciplines (including literature), invited talks by practitioners and activists, and learning opportunities outside the classroom. The course's thematic focus is health, broadly conceived, and its philosophical orientation is embedded in demands for human rights and justice for all refugees.

HPCH 365 Practicum 0.30; 2 cr.
A practicum in which students gain field experience in the assessment, development, implementation and/or evaluation of interventions for health promotion at the individual, interpersonal, organizational, community or policy levels. Students integrate knowledge and theory learned in the classroom setting with the realities of public health practice. Sites for practicum can include community health centers, hospitals, local or international NGOs, governmental organizations, schools or academic field projects. Prerequisites: Completion of all, or all but one, of the core and/or concentration courses. Prerequisite: PBHL 399A.

HPCH 366 Practicum 0.30; 1 cr.
Practicum for students who receive a partial waiver. Prerequisite: PBHL 399A.

Department of Health Management and Policy

Chairperson:	Kassak, Kassem
Professors:	El-Jardali, Fadi; Saleh, Shadi
Associate Professor of Public Health Practice:	Kassak, Kassem
Instructor:	Germani, Aline
Instructors of Public Health Practice:	Abou Samra, Clara; Bou Karroum, Lama; Fadlallah, Racha; Jamal, Diana

The Health Management and Policy Department (HMPD) advances the field of health systems, policy and management through excellence in education, research and practice that is relevant to Lebanon and the Global south. HMPD is considered as a leader in producing health systems and policy research in the Arab World. Through the Master of Public Health (MPH) program, HMPD provides graduate students with the skills they need to lead and manage health care organizations and systems. Research interests of departmental members include areas related to health policy, policymaking, health financing and management, human resources for health, quality of care, patient safety, accreditation, role of civil society in policy, health in conflict, and the role of community networks in impacting health.

HMPD prepares students and learners to become leaders and influencers in health care organizations and systems. The multidisciplinary curriculum at HMPD allows students to gain conceptual, analytical and practical skills in health management, health policy and decision-making, strategic planning, human resources management, performance improvement, health information systems, budgeting, program and policy evaluation and knowledge translation.

Throughout the years, HMPD has informed and influenced health systems, management practices and policies in Lebanon and the region. HMPD has strong connections to overseas institutions, and its faculty members have direct links with policymakers, stakeholders and influencers in Lebanon and the region. Our departmental members have a wide range of expertise not limited to Lebanon but also extending to the Arab region and beyond. In addition to their teaching, they are also engaged in research that is impact oriented and aims to improve health systems. Departmental members regularly engage with policymakers and stakeholders in effort to build and sustain collaborations and partnerships; students are regularly exposed to these interactions through course work and get the opportunity to listen to real life experiences and understand the roles of different stakeholders in the decision-making process.

Graduates from HMPD have assumed leadership roles in public health systems at the national, regional and global levels. The department hosts the Executive Master of Healthcare Leadership (EMHCL) which is designed for professionals who have significant responsibility in the healthcare sector - including those from care delivery, pharmaceutical and product manufacturing, healthcare consulting, health management systems, insurance, patient advocacy, public health, policy and regulation institutions. HMPD also have a Health Leadership Academy (HLA), an Executive Program that offers a set of consecutive modules,

three days each, addressing key topics under the broad theme of leadership in healthcare and bringing hands-on experience of leading experts in the field.

The following courses are offered by the department:

HMPD 300 Health Systems Management 3.0; 3 cr.
This course is designed for public health graduate students to identify organizational and health system challenges and apply systems thinking in resolving them. The course is a core MPH module that examines the organization, delivery and funding of health care and addresses the main components, resources and functions of health systems at several levels including national, regional and international. It critically integrates analyses of structural biases and social inequities as barriers to equitable public health and health care systems. Although the course topics have relevance to national and regional challenges, an international comparative approach is adopted.

HMPD 306 A Workshop on Microeconomics for Healthcare 0 cr.
This course aims to introduce students to the basic economic principles and its application in healthcare as a prerequisite for the advanced Health Economics course; HMPD 351. The course shall cover the basic economic principles, including costing, opportunity cost, demand and supply for health care, consumer behavior and elasticity, as well as market equilibrium, monopoly, oligopoly and types of competitions in the health sector.

HMPD 314 Project Management 2.0; 2 cr.
A course that exposes students to current project management trends, best practices, and strategies that can aid in better management of projects and programs in healthcare settings.

HMPD 315 Performance Improvement 3.0; 3 cr.
HMPD 315 is a service-learning course that blends the theory and practice of performance improvement in healthcare settings. Special attention will be dedicated to discussing organizational culture for quality improvement, and the application of quality improvement tools to healthcare from a global perspective. Prerequisite: HMPD 300.

HMPD 318 Policy and Decision Making in Health Systems 2.0; 2 cr.
This course introduces students to concepts, approaches and strategies to promote evidence-informed policy making in health systems. It provides students with the knowledge and skills of how to define and frame health systems and policy problems and assess underlying factors; develop and frame policy options; and assess options in terms of benefits, harms, risks, stakeholder reactions and implementation considerations. Students will be introduced to ways to use knowledge translation tools such as briefing notes, policy briefs and rapid response in order to promote the use of evidence in policy and to effectively communicate with policy makers to influence action. Real world health systems case studies will be provided in class. Prerequisites: PBHL 304 and HMPD 300.

HMPD 319 Strategic Management of Health Care Organizations 2.0; 2 cr.
A course that provides knowledge of fundamental strategic management skills applicable in health care organizations. Its purpose is to prepare students to think strategically and build knowledge to develop, implement and evaluate effective strategies in healthcare organization.

HMPD 320 Governance in Health Care 2.0; 2 cr.
The course examines the multiple levels of governance in health care systems, including theory, dynamics, approaches, dysfunctions and challenges. The objectives of the course

are to: (1) introduce students to governance and accountability at the organizational, clinical, national, regional, and global levels; (2) convey an understanding of governance and accountability of different healthcare structures; (3) examine actors roles, responsibilities, interactions and challenges at each level of governance, including the international; and (4) Factual interaction with principal stakeholders to grasp the governance decision making process and the operation inside concerned institutions. This course will assist students in understanding the theory and practice of governance and accountability of health care. What does governance at different levels mean; how these levels are interrelated; how this operates in the real world; what are the implications of the existing challenges to achieving change – represent issues among the key questions that will be explored in this course.

HMPD 321 Foundations of Health Administration II 3.0; 3 cr.
A course that deals with current issues in healthcare, such as primary healthcare, healthcare reform, and integration of social sciences in health sciences.

HMPD 325 Quality Management and Accreditation in Health Care 2.0; 2 cr.
A course that examines at multiple levels the theory and practice of quality management and accreditation in healthcare organizations. The objectives of the course are to: (1) convey an understanding of quality of care, with particular attention to conceptual frameworks for continuous quality improvement, quality assessment, improvement and patient safety including approaches, methods and tools; (2) explain how to develop a quality improvement plan, performance indicators and measurement systems for quality and accreditation; and (3) address ethical issues related to quality management, risk management and patient safety with particular attention to Lebanon and the region.

HMPD 339 Tutorial in Health Management and Policy 1–3 cr.
Tutorial in Health Management and Policy.

HMPD 342 Financial Management and Accounting in Health Care Organizations 3.0; 3 cr.
Financial Management and Accounting in Health Care Organizations covers significant issues in the areas of cost accounting, financial ratios and statement, working capital management, capital financing, cost analysis and rate setting, budgeting, reimbursement, contracting, and cost controls. The course has been developed to maximize student opportunities for independent analysis through the development of PC-based problem-solving applications, and through in-class discussion and evaluation of pertinent financial issues and problems. An emphasis is placed on uses of information generated through accounting and financial management systems to control operations in healthcare organizations. To promote such understanding, students receive problem-oriented assignments and examinations in which they can apply knowledge and reasoning techniques gained from this and other courses to reach logical decisions that would effectively control operations in the simulated exercises. Prerequisite: HMPD 300 or NURS 507.

HMPD 351 Health Economics 2.0; 2 cr.
This course builds on HMPD 306 and expands on the application of micro- and macroeconomics to healthcare. It will focus on the study of prices and markets in the health sector to help students develop competence in cost analysis and cost projections. Furthermore, it will examine socioeconomic disparities, provider payment mechanisms, and economic evaluations. Prerequisites: HMPD 300 and any of the following courses: HMPD 306, ECON 211, AGSC 212 or other undergraduate micro-economics course pending approval of course instructor.

HMPD 354 Special Topics in Health Management and Policy 1-3 cr.
A course that presents students with analytical tools for an in-depth understanding of current

or emerging health policies that are debated in the healthcare industry, as well as tools for generating health policy documents.

HMPD 365 Practicum 0.30; 2 cr.
A course that constitutes an administrative residency program in a healthcare setting such as a hospital, insurance facility, governmental or non-governmental agency, or any other healthcare facility. Through hands-on experience, this practicum prepares students to assume increasing levels of responsibility with competence in these settings. Prerequisites: Completion of all, or all but one, of the core and/or concentration courses. PBHL 399A.

HMPD 366 Practicum 0.30; 1 cr.
Practicum for students who receive a partial waiver. Prerequisite: PBHL 399A.

Center for Research on Population and Health (CRPH)

A/Director:	McCall, Stephen
Affiliates:	Campbell, Oona; Fahme, Sasha; Jamaluddine, Zein; Makhlouf, Carla; Millet, Christopher

The Center for Research on Population and Health (CRPH) leads and supports methodologically robust research at the intersection of population and health to improve the health and well-being of populations in Lebanon, the Arab region and globally.

CRPH is a hub for high-impact population and health research. We invest in people through training and capacity building and provide infrastructure for the conduct of rigorous research.

The Center promotes interdisciplinary research and innovative approaches to research, and fosters exchanges and collaborations among AUB faculty, graduate students and colleagues in the Arab region and beyond through conferences, workshops and seminars.

The Center hosts MPH practicum students, MS thesis projects and provides students and researchers at FHS with support in survey development and data management and analyses; access to regional data sets; and support for new areas of research. CRPH also hosts researchers who wish to visit the Faculty of Health Sciences with the goal of collaborating with FHS faculty or of pursuing innovative research or writing activities.

Center for Public Health Practice (CPHP)

Director:	Germani, Aline
Affiliates:	Kalot, Joumana; Najem, Martine

The Center for Public Health Practice advances evidence-based public health practice in Lebanon and the region. It creates opportunities for innovation and engagement that enrich the academic experience of students and faculty. The Center nurtures the culture of collective responsibility, partnership building, diversity and social justice.

Within the framework of its mission, CPHP has adopted the following strategic goals:

- Generate and disseminate knowledge to inform public health practice, research, policy and curriculum.
- Respond to public health priorities and emerging crisis through innovative programming and sustained partnerships for health and development.
- Lead the field of workforce development in public health locally and regionally.
- Establish platforms for meaningful community engagement of FHS students, faculty and staff.

CPHP collaborates closely with a variety of partners including national, regional and international entities such as academic institutions, ministries, UN agencies, NGOs, municipalities and local communities in Lebanon and throughout the Arab world.

CPHP Tracks

- Training and Workforce Development; in person and e-courses
- Evaluation of Programs/Implementation Research
- Designing Health and Development Programs
- Documenting Best Practices/Knowledge Dissemination
- Developing Resource Material
- Organizing and Delivering Courses for Students
- Creating joint courses and programs with other faculties and universities

CPHP Themes

Youth development, refugee health, sexual and reproductive health, maternal and child health, ageing, health communication, school health and environment, tobacco, child protection and child rights, gender and gender-based violence, NGO management, among others.

CPHP Reach

Egypt, Iraq, Jordan, Kuwait, Libya, Oman, Syria, Tunisia, Lebanon.

Knowledge to Policy Center (K2P)

Director:	El-Jardali, Fadi
Instructors of Public Health Practice:	Abou Samra, Clara; Bou Karroum, Lama; Fadlallah, Racha; Jamal, Diana

Knowledge to Policy (K2P) Center draws on an unparalleled breadth of synthesized evidence and context-specific knowledge by producing briefs and conducting policy dialogues to impact policy agendas and action. K2P produces high quality policy products to help policymakers and stakeholders have the clearest understanding of the most important messages, options and recommendations to address pressing health and social system problems.

K2P harnesses the best available evidence on pressing health and social systems priorities; convenes concerned policy makers, stakeholders, thinkers, researchers and doers; and prepares leaders to meet pressing health issues by building their capacity in public policymaking.

The K2P team comprises a program manager, communication officer, an advocacy lead and several evidence lead specialists.

K2P Functions and Activities:

- Inform the production, packaging and sharing of research data and evidence in an objective manner and based on current and emerging policymaking priorities
- Utilize a rapid response system to inform policymaking in an objective manner using the best available evidence that can be prepared and packaged within time and resource constraints
- Conduct evidence informed advocacy and support implementation in policy and practice
- Conduct policy tracing research and develop models for knowledge translation that are context-specific, culturally appropriate, relevant and effective for the region
- Support research networks, civil society, researchers, policy makers and the media
- Engage with citizens to enhance their involvement in the decision and policymaking process on high priority issues
- Build the capacity of researchers, policymakers and media in Knowledge Translation (KT) and evidence communication methods to influence policy, practice and action

K2P develops a diverse set of KT products including K2P Policy Briefs, K2P Briefing Notes, K2P Rapid Response, K2P Evidence Summaries, K2P Dialogue Summaries, K2P Advocacy Briefs, K2P Citizens Briefs, K2P Citizen Consultation Summary, and K2P Media Bites. The center has the K2P Mentorship Program that supports research and policy organizations in the six regions of the World Health Organization (WHO). K2P leads the COVID-19 Rapid Response Series.

Collaborations

K2P collaborates with national and international partners including Center for Systematic Reviews on Health Policy and Systems Research (SPARK) and Issam Fares Institute for Public Policy and International Affairs (IFI) at the American University of Beirut; and McMaster Health Forum in Canada and the Evidence Informed Policy Network (EVIPNet) at the World Health Organization (WHO) in Geneva.

WHO Collaborating Center for Evidence-Informed Policy and Practice

Since 2015, the World Health Organization (WHO) has designated K2P Center twice as a WHO Collaborating Center for Evidence-Informed Policy and Practice. This designation, effective for another four-year term, is unique since the K2P Center is the only WHO Collaborating Center for Evidence-Informed Policy and Practice in Lebanon and the region, and is the second WHO Collaborating Center of this kind globally after McMaster Health Forum in Canada.

The Center for Systematic Reviews on Health Policy and Systems Research (SPARK)

Co-Directors:	El-Jardali, Fadi; Akl, Elie

The Center for Systematic Reviews on Health Policy and Systems Research (SPARK) at the American University of Beirut (AUB) is one of four Systematic Review Centers on Health Policy and Systems Research and the first of its kind in the Region. The Center is a joint collaboration between the Faculty of Health Sciences (FHS) and the Faculty of Medicine (FM). SPARK Center was appointed as the General Secretariat of the Global Evidence Synthesis Initiative (GESI).

SPARK specializes in the production of high-quality and timely systematic reviews and rapid reviews that respond to health policy and systems research priority issues at the national and the regional level. SPARK also invests in developing individual and institutional capacity in the Region in conducting systematic reviews and rapid reviews of Health Policy and Systems Research.

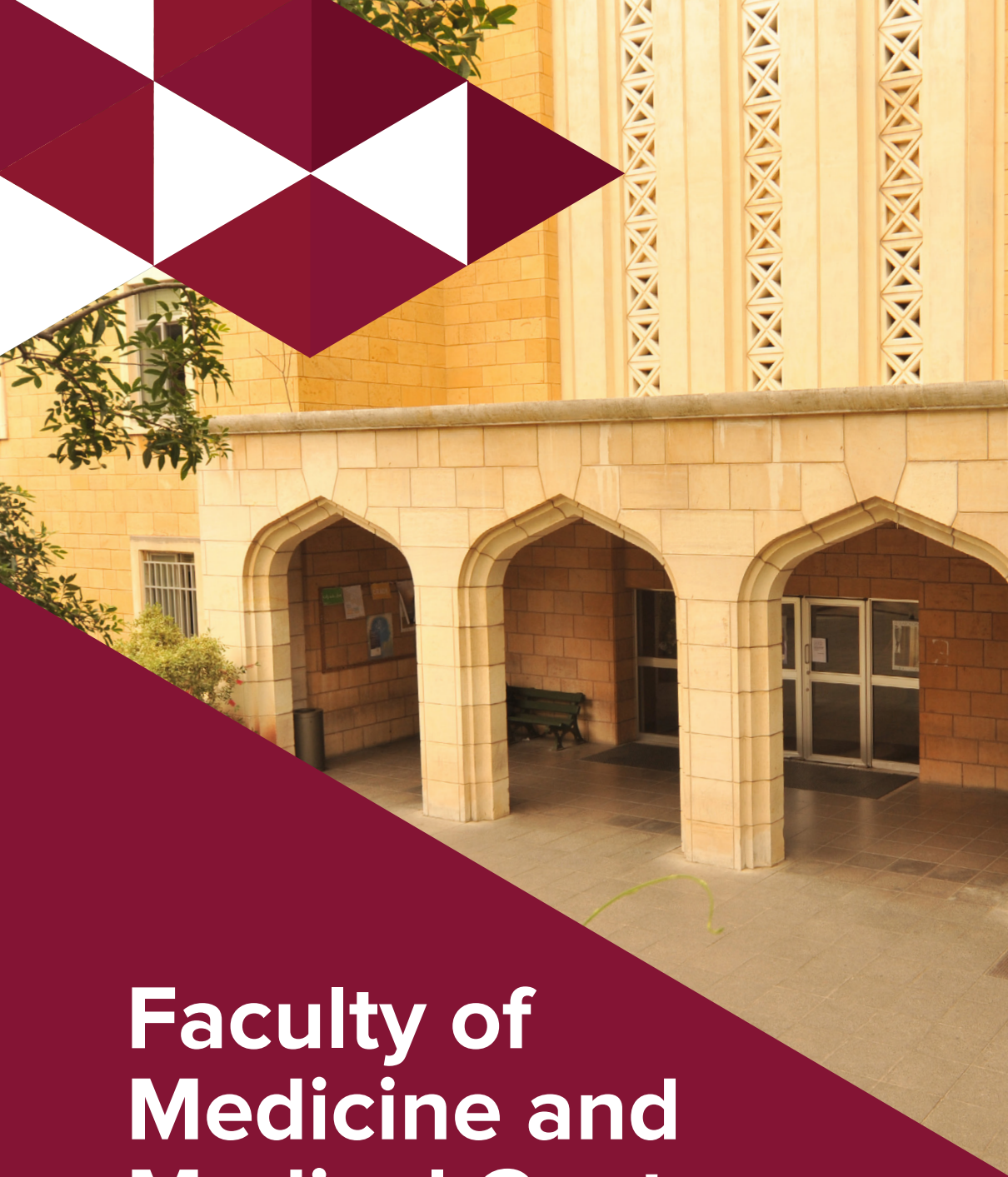
SPARK Activities

- Conduct priority setting exercises with policymakers and other stakeholders, researchers, and civil society to prioritize review topics on health policy and systems research
- Produce timely systematic reviews and rapid reviews on prioritized topics and review questions
- Hold national and regional capacity-building workshops to develop individual and institutional capacities in conducting different types of research evidence syntheses
- Prepare SUPPORT summaries and hold deliberative dialogues to promote the uptake of evidence from systematic reviews and rapid reviews into policies
- Contribute to the methodology of research synthesis and knowledge production

SPARK develops a diverse set of products including systematic reviews, rapid reviews, scoping reviews, SUPPORT summaries, and evidence gap maps.

Collaborations

SPARK collaborates with national and international partners including the Knowledge to Policy (K2P) Center at the American University of Beirut; WHO Alliance-funded Centers for systematic reviews in China, South Africa and Chile.



Faculty of Medicine and Medical Center (FM/AUBMC)

Fadlo R. Khuri	President of the University
Zaher Dawy	Provost
Raymond Sawaya	Vice President for Medical Affairs and the Raja N. Khuri Dean of Medicine
Joseph Otayek	Medical Center Director
Elie Akl	Associate Dean for Clinical Research
Samir Alam	Associate Vice President for Health Affairs
Kamal Badr	Executive Associate Dean for Medical Education
Assaad Eid	Associate Dean for Basic/Translational Research and Graduate Studies
Souha Kanj-Sharara	Associate Vice President for Global Affairs
Ramzi Sabra	Associate Dean for Educational Development
Hassan Solh	Executive Associate Vice President for Business and Finance
Fuad Ziyadeh	Executive Associate Dean for Faculty Affairs
Salah Zeineldine	Assistant Dean for Graduate Medical Education
Ali Taher	Associate Vice President for Communication and Creativity Services
Zeina Kanafani	Assistant Dean for Student Affairs
Umayya Musharrafiyeh	Director of Undergraduate Clinical Education
Nathalie Khoueiry Zgheib	Director of Undergraduate Pre-clerkship Education

Faculty Administrative Support

Mahmoud H. Harb	Medical Education Unit Coordinator
Rami Hawi	Instructional Designer and Assessment Specialist
Rania Jaber	Graduate Medical Education Manager
Hala Kaidbey	Research and Education Grants Manager
Houssam Khalil	Clinical Skills and Medical Simulation Officer
Khalil Kreidieh	FM Academic and Special Projects Coordinator
Nabil Mansour	Director of Operations
Ali Nabbouh	Graduate Student Officer
Reem Saad	Accreditation and Faculty Development Manager
Ruaa Saadeddine	Medical Student Affairs Coordinator
Miriam Saliba	Executive Officer

Historical Background

Since 1867, the founding date of the Faculty of Medicine, both the Faculty of Medicine and the Medical Center have continuously been providing services in the realms of medical education, training and health care to their immediate constituencies in Lebanon and the Middle East region. To date, the Faculty of Medicine has graduated 4,225 physicians, and there is a large postgraduate training program of over 280 residents in most of the departments. The Faculty of Medicine programs have been approved by and registered in the Education Department of the State of New York on a continual basis since 1867. In 1957 the faculty became an institutional member of the Association of American Medical Colleges. It enjoyed this status until 1988, when the new rules of the association precluded

membership of institutions outside the confines of the North American continent.

The AUB Medical Center has been accredited by the Joint Commission International (JCI) as of October 2007. Previously, the Medical Center was accredited by the US-based Joint Commission on Accreditation of Healthcare Organizations (JCAHO) from 1965 until 1983, when the civil war in Lebanon prevented review teams from continuing with their periodic site visits. The JCI is the international arm of the JCAHO. The National Board Examinations were administered to the faculty's undergraduate students for credit between 1966 and 1982. The faculty was a regional center for the administration of the examinations of the Educational Commission for Foreign Medical Graduates between 1959 and 1993. In addition, the faculty takes pride in having had very close links with prestigious American medical schools and centers including Columbia University from 1945 to 1955, Harvard School of Medicine from 1955 to 1965, and a formal affiliation with the Johns Hopkins School of Medicine from 1965 to 1975, which was supported by the Commonwealth Fund.

The Faculty of Medicine and the Medical Center have revived and established a number of links and affiliations with the following:

- Columbia University College of Physicians and Surgeons for student elective exchange (since 2002)
- University of George Washington School of Medicine in Washington, DC (as of September 8, 2004)
- Medical University of South Carolina (MUSC) (as of April 1, 2003) for an MD–PhD program that admits up to three medical students annually from AUB/FM
- Johns Hopkins University School of Medicine (as of May 10, 2004) for collaboration in research, education and the provision of medical services training
- University of Paris 7 Denis Diderot for cooperative cancer research (as of December 8, 2004)
- University of Poitiers (France) for cooperative neurosciences research (as of February 3, 2006)
- St. Jude Children's Research Hospital (as of April 19, 2000)
- Laval University in Quebec, Canada
- M.D. Anderson Cancer Center (as of June 6, 2007)
- Palermo University (as of April 23, 2007) for cooperation in research and higher education
- University of Montpellier (France) (as of August 3, 2007)

The Faculty of Medicine and the Medical Center (FM/AUBMC) are currently accredited by the following American-based accreditation bodies:

- The Middle States Commission on Higher Education
- The Joint Commission International (JCI) for hospital accreditation
- Accreditation of AUBMC by the Lebanese Ministry of Public Health
- Accreditation of the School of Nursing by the Commission on Collegiate Nursing Education (CCNE)
- Accreditation of the Nursing Services at AUBMC by the American Nurses Credentialing Center (ANCC)

- The College of American Pathologists (CAP)

In addition, the Faculty of Medicine, with its Medical Center, is a member of the following organizations:

- Alpha Omega Alpha (AOA) Gold Humanism Honor Society (GHHS) – AUB Faculty of Medicine was successful in establishing the AUB GHHS chapter in 2020 rendering it the first in the Arab Region to be accepted in the Gold Humanism Honor Society network. Honor Medical Society (The Faculty of Medicine is the only member of the AOA outside North America since 1958)
- The American Medical College Application Service
- The American College of Physicians/American Society of Internal Medicine
- The Association of Program Directors in Internal Medicine

The MD Program

The Faculty of Medicine offers a 4-year medical program leading to the MD degree, which follows the American model of medical education. Students can elect to pursue the regular track or the scholarship track; the latter allows them to pursue independent research during years 2, 3 and 4, for which they obtain a special certificate on graduation.

Mission

The mission of the Faculty of Medicine is to provide optimum, advanced, state-of-the-art, comprehensive, timely and cost-effective medical education for each student. The faculty aims to reach this objective by implementing innovative teaching techniques, and by recruiting and retaining outstanding faculty and students. The faculty also strives for improved student performance and career opportunities, as well as improved basic and clinical research, more effective patient management, and new and innovative medical approaches. The faculty focuses on enhancing the regional and global reputation of the AUB Medical Center (AUBMC) by encouraging the development of additional centers of excellence and developing more effective uses of physical resources and funds.

Vision

The vision of the Faculty of Medicine is to continuously upgrade the quality of education provided to its medical students and postgraduate physicians in the various medical and surgical subspecialties. This vision is implemented by the strong commitment of the faculty to educate young men and women to become excellent physicians with humane and high ethical standards as well as technical expertise. The faculty also aims at providing a better environment for personal growth and recognition for all its students by inspiring them to become leaders in their fields. The Faculty of Medicine will always endeavor to provide opportunities for its students to develop individual initiative, creative ability and professional leadership through participation in extracurricular seminars, discussion groups, research projects and student organizations.

The Scholarly Concentration Track in the MD Program

The Faculty of Medicine offers medical students the option of pursuing the Scholarly

Concentration Track towards the MD. This track allows students to link to a faculty member and pursue a scholarly project during years 2, 3 and 4 of the medical program. The time devoted to this track will be equivalent to a 3-credit course in year 2 and 12 weeks of elective clerkships during the 4th year. Additionally, students may elect to work on it during their free time within those 3 years. Completion of the scholarly project with a public presentation and a product of scholarship are requirements for graduation. The project may be in any of the following domains so long as it has some relevance to medicine and health: the basic biological and biomedical sciences; the clinical sciences; public health, epidemiology, community medicine and global health; the arts, humanities and social sciences (includes bioethics); engineering, architecture and the physical sciences; business administration and management; agricultural and nutritional sciences.

The MD-MBA Dual Degree Program

Students enrolled in the Faculty of Medicine MD program can choose to pursue a dual MD-MBA degree. This requires them to take one year off between the 3rd and 4th year of the MD program to pursue studies at the Olayan School of Business. At the end of the year (which includes fall, spring and summer semesters), the students will return to the Faculty of Medicine to complete their 4th year of the MD program, while they continue working on their 3-credit project for the MBA degree. Thus, the dual degrees will be completed in 5 years instead of 6 years if they were pursued separately. Students enrolled in this program will be considered as following the scholarly concentration track of the MD program, thus 3 4-week elective rotations in their 4th year of the MD program will double as 9 credits of elective courses for the MBA degree.

Admission Requirements: For the dual MD-MBA degree, the GMAT requirement and the work experience normally required for admission to the MBA program will be waived, whereby the MCAT would replace the GMAT, and the MD student's rotations during their MED III would be considered as equivalent to the required MBA work experience.

To be considered for admission, the MD student must be in good standing academically (no failed courses or clerkships) and professionally (no disciplinary action on record). A committee from representatives of both faculties shall interview and screen applicants and come up with admission recommendations. Each committee member has the option to separately review the file and interview the applicants to ensure their fit within the program. The decision of the committee shall be communicated to the student by the middle of the 3rd year in the MD program.

Admission

The Faculty of Medicine was established to give properly qualified candidates, particularly from Lebanon and the Near East, the opportunity for sound education in both the art and science of medicine. All applicants must hold a bachelor's degree and must have completed the premedical requirements as well as the Medical College Admission Test (MCAT). Applicants in their senior year expecting to graduate with a bachelor's degree in June are eligible to apply provided they have completed the premedical requirements and have taken the MCAT by the end of the first of their senior year. For applicants holding (or expecting) a bachelor's degree, consideration for acceptance is limited to students with a minimum cumulative GPA of 3.0 in each of the following: 1) all courses, 2) the required premedical core courses, and 3) major courses. For applicants from North American colleges, a minimum GPA of 3.3 is required. Applications from individuals holding (or expecting by June of the same year) a master's or a doctoral degree are encouraged. These applicants will be considered based upon their academic performance and their research productivity; in these cases, some of the premedical requirements may be waived depending on the field of study.

Interviews are granted to a selected group of applicants based on their MCAT scores and their academic achievement. Granting an interview does not necessarily imply that the applicant will be accepted. Students are accepted to medical school on the basis of their academic qualifications, their MCAT score and the results of their interviews. In addition, due consideration is given to the applicants' letters of recommendation from their teachers and mentors, their curriculum vitae, as well as their personal statements. Among the traits that the successful applicant will demonstrate are humanistic and ethical attitudes, good communication and interpersonal skills, emotional maturity, and personal integrity. Previous experience in research, community service and volunteer work are considered positive attributes.

The Faculty of Medicine at AUB does not discriminate on the basis of age, gender, nationality, ethnic origin or religion.

The minimal premedical requirements are summarized below:

A bachelor's degree in any field of study is required. Historically, the vast majority of applicants to the Faculty of Medicine have been holders of bachelor's degrees in biology or chemistry. In an effort to diversify the pool of applicants, graduates from other majors are strongly encouraged to apply as long as they complete the premedical core courses required for admission to the Faculty of Medicine. Students can take some of the premedical courses as electives in their respective majors.

Premedical core course requirements: Students who matriculated before fall 2024 should follow instructions published in previous catalogue(s).

Students who matriculated as of fall 2024 should follow the requirements listed below:

As of 2024-2025, the minimal course requirements for admission to the MD program at AUBFM will be as listed below (the courses in parentheses are AUB courses that fulfill the requirements), irrespective of the track followed in high school or the Lebanese Baccalaureate.

Biology: 7 credits: one course in general biology with laboratory (BIOL 201, 4 credits) and one course in biochemistry (BIOL 220, 3 credits).

Chemistry: 8 credits: 3 credits in general chemistry (CHEM 201, 3 credits); 5 credits in organic chemistry with lab (CHEM 208, 3 credits; CHEM 209, 2 credits). Biology and Chemistry majors will take CHEM 210, 211 and 212 to fulfill the requirements of organic chemistry.

Computer Science: 3 credits in introductory programming (CMPS 203, 3 credits).

English: 6 credits in academic English (ENGL 203 and 204).

Physics: 4 credits in a physics course for the life sciences with laboratory (PHYS 206 and 206L, 4 credits). Biology and Chemistry majors may take other courses as dictated by their majors in lieu of PHYS 206 (e.g. Biology majors will take PHYS 204, 204L, 205 and 205L and Chemistry majors will take PHYS 211 and PHYS 211L).

Psychology: 3 credits in general psychology (PSYC 201, 3 credits).

Sociology: 3 credits in general sociology (SOAN 201, 3 credits).

Humanities: 6 credits. Any two courses recognized by the university as fulfilling the "humanities" requirements may be taken, excluding some courses listed under point 2 below. At AUB, students are encouraged to consider minoring in the medical humanities. The following possibilities are recommended - but not mandatory - to fulfill the humanities requirements:

1. Any 2 CVSP/CHLA courses
2. One CVSP/CHLA course and one English or Arabic literature humanities course, excluding those listed below:
   a. ENGL 227: Introduction to Language
   b. ENGL 228: Phonetics
   c. ENGL 229: History of the English Language
   d. ENGL 233: Introduction to Translation
   e. ENGL 211/212: Survey of Arabic Grammar
   f. ENGL 213/214: Introductory Biblical Hebrew
   g. ENGL 215: Introductory Syriac
   h. ENGL 224: Arabic Stylistics and Metrics
   i. ENGL 227: Arabic Linguistics
   j. ENGL 228: Arabic Linguistics
3. One CVSP/CHLA and one philosophy course from the following:
   a. PHIL 210 Introduction to Ethics
   b. PHIL 214 Modern Philosophy
   c. PHIL 216 Political Philosophy
   d. PHIL 221 Philosophy of Mind
   e. PHIL 222 Philosophy of Science
   f. PHIL 224 Philosophy of Religion
   g. PHIL 225 History of Moral Philosophy
   h. PHIL 230 Philosophy of Plato

MCAT. A competitive score in the MCAT, which may be taken twice only, is required. If taken twice, the higher score is considered. The MCAT score must be available at the time the application is submitted. The MCAT has sections on the biological sciences, chemical and physical sciences, social, psychological and behavioral sciences, and critical analysis and reasoning skills. Students are encouraged to review the content of the MCAT and plan their studies accordingly.

Applicants expecting to receive a bachelor's degree after the deadline for application should be aware of the following:

- Applicants must be in their senior year.
- The cumulative GPA of 70 credits or more (at the time of application) should be equal to or higher than 3.0 for students from AUB or its equivalent for those from other universities. All required core courses must have been completed by the end of the fall term of the senior year with GPA of at least 3.0. The cumulative GPA in the major courses completed by the end of the fall term of the senior year must also be equal to or greater than 3.0.
- Admission to medical school is contingent upon completion of graduation requirements and obtaining the bachelor's degree, which should be achieved by the end of the spring term of the student's senior year.

Applicants expecting to receive a master's or doctoral degree after the deadline for application should be aware of the following:

- A minimum cumulative grade GPA of 3.3 or its equivalent is required.
- Admission to medical school is contingent upon completion of graduation requirements and obtaining the master's or doctoral degree, which should be achieved by the end of the spring term.

Conditional acceptance to the faculty is issued by the middle of April and is finalized upon completion of the requirements for the bachelor's, master's or doctoral degree.

Graduation Requirements

To be eligible for the degree of Doctor of Medicine, a student must satisfactorily complete the curriculum of the Faculty of Medicine and must be recommended by the Academic Committee. The degree may be granted with distinction to students who achieve, in years 1 and 2, a cumulative average ≥ 88%, and, in years 3 and 4, a grade of "Excellent" in at least 50 percent of the credits and a grade of "Pass" in no more than 20 percent of the credits in years 3 and 4, and who have no failures in any course or clerkship.

The Faculty of Medicine offers post-graduate training positions in the various academic departments at AUBMC to AUB and non-AUB medical graduates. However, these positions are limited and are granted on a highly competitive basis.

Dean's Honor List

To be placed on the dean's honor list, a student must be full-time and must not be repeating the year. The dean's honor list is those ranking in the top 15 percent of the class and is offered in years 3 and 4 of the medical program only.

Academic Rules and Regulations

See General University Academic Information on page 72.

Attendance

Regular attendance is required at lectures, laboratories, clerkships, examinations and other assigned duties. Credit is not given for work not performed. Students absent on account of illness or other valid reasons are requested to confer with course or clerkship coordinators or the Director of Student Affairs. The committees concerned will review prolonged or repeated absences and decide on the appropriate course of action.

Language Requirement

The language of instruction is English. However, students must have speaking knowledge of Arabic before entering the third year. This requirement may be waived by special vote of the Academic Committee.

Promotions and Deficiencies

In the first and second years, the performance of students is evaluated as either pass or fail based on absolute standards of grading, with no ranking. Numerical grades will be kept in the students' records for reference, and may be used for providing a descriptive account of student performance and for recommendation letters by the Dean's Office. Numerical grades may be used to decide on graduating students with distinction, granting of awards (e.g. Penrose Award, Alpha Omega Alpha Honor Medical Society) and if requested by students for scholarship or financial aid granting bodies that require them. In the third and

fourth years, absolute standards are used to determine the Pass-Fail margin. For those who pass, performance is evaluated as Excellent (E), Good (G), or Pass (P), based on normative grading. In this case, the distribution of grades in a class is as follows: the top 10-15 percent are granted an "E", the following 35-40 percent a "G", and the remaining 50 percent a "P". The evaluation of the student in each subject is based on his/her total performance and not solely on the results of examinations.

The student's performance is evaluated by appropriate class teaching committees, which make recommendations to the Academic Committee. The action of the Academic Committee is final. The class teaching committees and Academic Committee give due consideration to a general evaluation of fitness for a career in medicine. Only those students who, in the opinion of the committees, give promise of being a credit to themselves, the faculty and the medical profession are advanced.

To be promoted, a student must attain a grade of Pass or better in all courses or clerkships and must be recommended by the committees concerned. However, a student with a grade of Pass in all courses or clerkships may, at the discretion of the committees, be promoted on probation, be asked to do remedial work and pass the re-examinations in designated courses or clerkships or repeat the year.

In the first or second year, a student who fails less than 25 percent of the credits may be asked either to satisfactorily complete remedial work and/or pass re-examinations in the courses concerned in order to be promoted, repeat the year, or leave the program. A student who fails more than one re-examination will be asked either to repeat the year or leave the program. A student who fails only one re-examination may, at the discretion of the committees concerned, be allowed to take another and final re-examination for the same course. A student who fails this second re-examination will be asked either to repeat the year or leave the program.

A student in the first or second year who fails 25 percent or more of the credits may be asked either to repeat the year or leave the program.

At the discretion of the committees concerned, a student who is to repeat the first or second year may be allowed to repeat some of the courses, not all of them.

In order to pass a clerkship in the third or fourth year, a student must demonstrate competence in both clinical performance and knowledge of the discipline. Failure of either component is considered a failure of the clerkship.

In the third or fourth year, a student who fails less than 50 percent of clerkship and course hours may be asked to satisfactorily complete remedial work and/or pass re-examinations, repeat a clerkship, repeat the year or leave the program (refer to the section entitled Specific Guidelines for Clinical Clerkships for further information). A student who fails more than one re-examination, remedial work or repeated clerkship or course may be asked to either repeat the year or leave the program. A student who fails only one re-examination, remedial work or repeated clerkship may, at the discretion of the committees concerned, be allowed to have another attempt at passing them. A student who fails this second attempt will be asked either to repeat the year or leave the program.

A student in the third or fourth year who fails 50 percent or more of clerkship and course hours may be asked to either repeat the year or leave the program.

At the discretion of the committees concerned, a student who is to repeat the third or fourth year may be asked to repeat some of the clerkships/courses, not all of them, and to complete clerkships shorter than the original ones.

A student in the medical program may not fail more than one academic year. A student who

fails a second academic year will be asked to leave the program. A student who repeats a year and fails any course or clerkship may be asked to leave the program.

A student who is placed on probation cannot graduate unless probation has been removed.

Specific guidelines for clinical clerkships:

Decisions regarding failed clerkships or parts of clerkships are normally made at the end of the year, when the overall performance of the student is reviewed. Below are guidelines that describe potential courses of action, but the final decision is made by the Academic Committee based on an overall assessment of the student's performance and fitness for promotion or graduation. The following guidelines apply to students who fail less than 50% of clerkship hours in a year.

- In order to pass the clinical clerkships in years 3 and 4, students must demonstrate acquisition of adequate clinical performance and skills, as shown by performance evaluations, OSCE scores and other assessment measures defined by the specific clerkship, and an appropriate fund of knowledge as demonstrated primarily by a passing grade on the final written examination (usually an NBME examination). Failure of either component is considered a failure of the clerkship.
- If a student fails both the clinical performance and the final written examination of a clerkship, he/she will be required to repeat it in its entirety: the clinical components and the final written examination.
- If a student fails only the final examination of a clerkship, he/she will be required to repeat it. If the student fails a second time, he/she will be required to repeat the clerkship in its entirety: both the clinical components and the final written examination.
- If a student fails only the clinical performance component, he/she will be asked to repeat the clinical components of the rotation (totally or partly as determined by the department concerned). If the student fails the clinical component a second time, he/she will be required to repeat it in its entirety: both the clinical components and the final written examination.

Courses

Numbers Preceding Course Titles

Courses required for the Doctor of Medicine degree are numbered 200 to 299 as follows:

- 200 to 239 indicate courses given in first and second year medicine.
- 240 to 259 indicate courses given in third year medicine.
- 260 to 279 indicate courses given in fourth year medicine.
- 280 to 299 are reserved for clinical clerkships during the year of internship.

For the first and second years, odd numbers refer to first term courses and even numbers to second term courses. Year courses are indicated by a hyphen between the two numbers.

Graduate courses leading to the Master and Doctor of Philosophy degrees are numbered 300 to 399.

Regular medical courses approved for graduate work (MS and PhD programs) have two numbers.

Numbers preceded by the letters ID (Interdepartmental) or FM (Faculty of Medicine)

indicate integrated courses taught by two or more departments together.

Numbers Following Course Titles

The first number following the title of a course indicates the total number of lectures, conferences, and discussion hours given, except where otherwise stated.

The second number indicates the total laboratory or clinical practice hours, except where otherwise stated.

The third number indicates the number of term credit hours. Credit hours are used in conjunction with first and second year courses only.

Course Descriptions

All the following courses, except those listed as electives, are required of students working toward the degree of Doctor of Medicine. The electives designated may be chosen with the consent of the instructor. Detailed course descriptions are available under individual departments.

Curricula

First Year		No. of Weeks	Lecture and Clinical Recitation	Laboratory or Clerkship Hrs.	Total Hrs.	Credits
IDTH 201	Cellular and Molecular Basis of Medicine	15	90	40	118	7
IDTH 202	Clinical Anatomy	15	38	110	148	6
IDTH 203	The Immune System in Health and Disease	8	37	28	75	3
IDTH 204	Basic Pathological Mechanisms	8	29	14	43	2
IDTH 205	Microbiology and Infectious Diseases	9	56	44	100	5
IDTH 210	Fundamentals of Medical Research	9	30	20	50	3
IDTH 211	The Blood	4	30	30	60	3
IDTH 225	The Liver and Gastrointestinal System	4	40	40	80	4
IDTH 229	The Skin	2	20	20	40	2
IDTH 213	Becoming a Doctor 1: Clinical Skills -I	45	20	80	100	4
IDTH 214	Becoming a Doctor 2: Physicians Patients and Society - I	16	16	16	32	2

IDTH 215	Becoming a Doctor 3: Global Health and Social Medicine	21	21	21	42	2
IDTH 216	Becoming a Doctor 4: Learning Communities	45	0	36	36	1
				Total	**924**	**44**

Second Year		**No. of Weeks**	**Lecture and Clinical Recitation**	**Laboratory or Clerkship Hrs.**	**Total Hrs.**	**Credits**
IDTH 226	The Cardiovascular System	4	40	40	80	4
IDTH 227	The Respiratory System	3	30	30	60	3
IDTH 228	The Kidneys and Urinary System	4	40	40	80	4
IDTH 212	Endocrinology and Reproduction	6	46	46	80	5
IDTH 230	Brain and Cognition	8	80	80	160	8
IDTH 231	Human Development and Psychopathology	4	40	40	80	4
IDTH 232	Research Design and Development	30	10	80	90	3
IDTH 233	Physicians Patients and Society-II	20	20	20	40	2
IDTH 234	Clinical Skills-II	30	20	50	70	3
IDTH 235	Learning Communities-II	30	0	30	30	1
IDTH 237	Introduction to Evidence Based Medicine	-	14	6	20	1
				Total	**790**	**38**

Third Year	**No. of Weeks**	**Lecture and Clinical Recitation**	**Laboratory or Clerkship Hrs.**	**Total Hrs.**	**Credits**
Clinical Conferences	46	240	–	240	–

INMD 246	Clinical Clerkship Internal Medicine	12	120	500	620	_
FMMD 242	Physicians, Patients and Society III	2	16	24	40	–
INMD 254	Infection Control	–	6	34	40	–
PSYT 252	Clinical Clerkship Psychiatry	4	25	180	205	–
OBGY 247	Clinical Clerkship Obstetrics and Gynecology	8	47	360	407	–
PEDT 246	Clinical Clerkship Pediatrics and Adolescent Medicine	8	35	360	395	–
SURG 246	Clinical Clerkship Surgery	8	45	360	405	–
FMMD 246	Clinical Clerkship Family Medicine	4	30	150	180	
PHRM 333	Clinical Pharmacology	1	16	–	16	–
				Total	**2568**	

Fourth Year		**No. of Weeks**	**Lecture and Clinical Recitation**	**Laboratory or Clerkship Hrs.**	**Total Hrs.**	**Credits**
Clinical Conferences		46	–	240	240	–
INMD 262	Clinical Clerkship Internal Medicine	8	–	360	360	_
NEUR 262	Clinical Clerkship Neurology	4	–	180	180	–
EMMD 262	Clinical Clerkship Emergency Medicine	5	–	230	230	–
PEDT 267	Clinical Clerkship Pediatrics and Adolescent Medicine	4	–	180	180	–
Elective in any department		16	–	720	720	–
IDTH 268	Clerkship in Preventive Medicine and Public Health	3	15	120	135	–
FMMD 262	Clinical Clerkship Family Medicine	4	30	150	180	–
IDTH 262	Capstone Course	1	10	40	45	
				Total	**2270**	

Interdepartmental Courses – Medical Program

First and Second Years

IDTH 201 Cellular and Molecular Basis of Medicine 90.40; 7 cr.
An interdisciplinary course that presents the cellular and molecular concepts and principles that underlie the normal structure and function of the human body. It covers cellular structure and function, including mechanisms and regulation of gene expression, protein synthesis, structure and function, signaling mechanisms, membrane transport, energy metabolism, contractility, and excitability, and the basic principles of drug action. Clinical examples and correlations are presented to illustrate the relevance of cellular and molecular function to medicine.

IDTH 202 Clinical Anatomy 38.110; 6 cr.
A regional dissection of the entire human body supplemented by embryology, clinical lectures and discussions. The student is also introduced to radiographic anatomy based on various imaging modalities in addition to computer-assisted instruction.

IDTH 203 The Immune System in Health and Disease 37.28; 3 cr.
A course that deals with the immune system's responses in states of normalcy and disease, from the molecular to the clinical level, and covers the pathophysiology, clinical manifestations, diagnosis and management of major rheumatologic diseases.

IDTH 204 Basic Pathological Mechanisms 29.14; 2 cr.
The course covers the basic pathological mechanisms of disease at the cellular and molecular levels, their microscopic, gross and clinical manifestation, and some pharmacological interventions that apply to them.

IDTH 205 Microbiology and Infectious Diseases 56.44; 5 cr.
The course provides the principles and concepts of basic and medical microbiology. Emphasis is placed on the basic properties, pathogenesis, preventive measures and laboratory diagnosis of bacteria, viruses, parasites and fungi, and the clinical outcome, management and treatment of patients infected by these etiologic agents.

IDTH 210 Fundamentals of Medical Research 40.10; 3 cr.
The course provides first year medical students with their first exposure to research methodology. Fundamental principles and concepts of evidence-based medicine, epidemiology and biostatistics are presented and discussed.

IDTH 211 The Blood 30.30; 3 cr.
An integrated course that covers the anatomy, histology, physiology, pathology, pathophysiology and pharmacology related to the blood and lymphatic systems. Concepts in social medicine and global health, preventive medicine, epidemiology and medical ethics are explored in relation to diseases of the blood.

IDTH 212 Endocrinology and Reproduction 46.36; 4 cr.
An integrated course that covers the anatomy, histology, physiology, pathology, pathophysiology and pharmacology related to the endocrine and reproductive systems. Concepts in social medicine and global health, preventive medicine, epidemiology and medical ethics are explored in relation to diseases of the endocrine and reproductive systems.

IDTH 213 Becoming a Doctor 1: Clinical Skills – I 20.80; 4 cr.
The course introduces students to the art of medicine: communication skills, history taking, physical examination and clinical reasoning. The course runs throughout the year and is closely integrated with the organ-system based courses being studied by the students to integrate clinical and basic science knowledge and skills.

IDTH 214 Becoming a Doctor 2: Physicians Patients and Society – I 19.19; 2 cr.
The course explores the place of medicine, illness, suffering and the human body in human culture expressed through art, literature and history of medicine, and through close encounters with patients.

IDTH 215 Becoming a Doctor 3: Global Health and Social Medicine 21.21; 2 cr.
The course introduces students to central issues in the practice of social medicine and global health and the connection between them. It examines how social forces become embodied as pathologies, how political, economic, and historic trends influence the distribution of disease among different populations, and how new trends in the organization of care affect the most vulnerable members of society.

IDTH 216 Becoming a Doctor 4: Learning Communities 0.36; 1 cr.
The course covers topics and issues important for the personal and professional development of students, with emphasis on reflection. Students are encouraged to make use of experiences for shared learning and to develop a sense of community and belonging, thus promoting well-being.

IDTH 225 The Liver and Gastrointestinal System 40.40; 4 cr.
An integrated course that covers the anatomy, histology, physiology, pathology, pathophysiology and pharmacology related to the liver and gastrointestinal tract. In addition, concepts in social medicine and global health, preventive medicine, epidemiology and medical ethics are explored in relation to diseases of this system.

IDTH 226 The Cardiovascular System 40.40; 4 cr.
An integrated course that covers the anatomy, histology, physiology, pathology, pathophysiology and pharmacology related to the cardiovascular system. In addition, concepts in social medicine and global health, preventive medicine, epidemiology and medical ethics are explored in relation to diseases of this system.

IDTH 227 The Respiratory System 40.40; 4 cr.
An integrated course that covers the anatomy, histology, physiology, pathology, pathophysiology and pharmacology related to the respiratory system. In addition, concepts in social medicine and global health, preventive medicine, epidemiology and medical ethics are explored in relation to diseases of this system.

IDTH 228 The Kidneys and Urinary System 40.40; 4 cr.
An integrated course that covers the anatomy, histology, physiology, pathology, pathophysiology and pharmacology related to the kidneys and urinary system. In addition, concepts in social medicine and global health, preventive medicine, epidemiology and medical ethics are explored in relation to diseases of this system.

IDTH 229 The Skin 20.20; 2 cr.
This course integrates the anatomy, histology, physiology, pathology, pathophysiology and pharmacology related to the skin. Basic concepts are presented in which students are expected to learn the scientific basis of the normal physiology and pathology of the skin and its appendages including hair and nails as well as mucosal surfaces. Mechanisms of

disease causation are illustrated with clinically relevant examples. Concepts in preventive medicine, epidemiology and medical ethics are explored in relation to diseases of the skin.

IDTH 230 Brain and Cognition 80.80; 8 cr.
This course is intended to provide preclinical medical students with an integrated approach to the structure and function of the nervous system. Basic principles of neuroanatomy, neurocytology, neuroembryology, neuroradiology, neurophysiology and neurology will be related to the function of the normal and diseased human nervous system, and the action of drugs. Concepts in social and preventive medicine, epidemiology and medical ethics are explored in relation to diseases of the nervous system.

IDTH 231 Human Development and Psychopathology 40.40; 4 cr.
This is a multidisciplinary course that integrates human development, psychopathological processes and their underlying neural circuitries along with basic and clinical psychopharmacology and relevant ethical, professional and public health issues. It teaches psychopathology through a lifespan approach and uses a variety of teaching/learning techniques such as didactics, team based learning, case studies and workshops.

IDTH 232 Research Design and Development 10.80; 3 cr.
The aim of the course is to provide the opportunity to learn and apply research methods to investigate a local health problem. It will provide a hands-on research experience, building on the basic knowledge and skills learned in the Fundamentals of Medical Research course in year 1. Students will learn the phases of the research process from conception to design to implementation. Through a combination of class sessions, meetings with research advisors and independent work, students, in groups, will identify a local health problem that is of particular interest to them, and will design and conduct a study relevant to it.

IDTH 233 Physicians Patients and Society – II 20.20; 2 cr.
This course explores medicine, illness and suffering as seen through the lens of bioethics, spirituality in medicine, palliative care and the nursing experience. It will bring together information related to the biophysical, psychological, humane, spiritual and social factors of illness - a holistic approach that focuses on the patient as a person.

IDTH 234 Clinical Skills – II 20.50; 3 cr.
This course is a continuation of IDTH 213 and further develops the student's communication skills, history taking, physical examination and clinical reasoning. It runs throughout the year and is closely aligned with the organ-system based courses being studied by the students in year 2 of medical school, to integrate clinical and basic science knowledge and skills.

IDTH 235 Learning Communities – II 0.30; 1 cr.
The course covers topics and issues important for the personal and professional development of students, with emphasis on reflection. Students are encouraged to make use of experiences for shared learning and to develop a sense of community and belonging, thus promoting well-being.

IDTH 237 Introduction to Evidence Based Medicine
This course runs longitudinally during the second year of medical school. The aims of this course are to train medical students in the skills of evidence-based medicine (EBM), which will enable them to be life-long independent learners and evidence-based practitioners. The students will explore how to generate clinical questions from case scenarios, how to efficiently and effectively search the literature for answers to their questions, and how to critically appraise articles of different designs.

Fourth Year

IDTH 268 Clerkship in Preventive Medicine and Public Health 15.120
In this clerkship, teams of senior medical students assess, critique and propose solutions to problems of public health or clinical significance. The students examine policy, organizational, social and individual challenges to these problems, addressing issues such as equity in health and setting public health programs, and identifying opportunities for change. Data collection and statistical analysis are secondary objectives.

IDTH 264 Capstone Course 10.70.
The two-week course aims to provide students with an opportunity to reflect on their undergraduate experience and the personal, social, emotional and practical issues of transition beyond medical school and graduate training or professional career. It deals with issues of ethics, law, insurance, social medicine, professionalism, life-long learning among many others.

Graduate Studies in Biomedical Sciences

The graduate program in Biomedical Sciences is designed to provide a multidisciplinary educational and training environment that will prepare students for independent research and teaching careers. It is centered in the Faculty of Medicine, where investigative collaborations among basic and clinical scientists are fostered. The program emphasizes concepts and state-of-the-art techniques of molecular and cellular medicine, and integrates students into the extensive and rapidly expanding translational research programs. Students may choose a discipline of study from the several research areas/programs offered by the Faculty of Medicine.

For general requirements about graduate study at AUB, refer to the Admissions section on page 29 of this catalogue.

MS Disciplines

Biochemistry	Refer to page 592
Human Morphology	Refer to page 586
Microbiology and Immunology	Refer to page 608
Pharmacology and Therapeutics	Refer to page 625
Physiology	Refer to page 588
Neurosciences (Interfaculty)	Refer to page 590
Biomedical Engineering (Interfaculty)	Refer to page 574
Scholar Health Research Program (SHARP) (Clinical)	Refer to page 635
Orthodontics (Clinical)	Refer to page 601

Admission to MS Programs

Admission as a regular student	Refer to page 40
Admission on probation	Refer to page 41

Course and Thesis Requirements

Students must complete a minimum of 21 credits of graduate course work with a minimum GPA of 3.3. Graduate students who intend to apply to the medical program should complete 21 credits of graduate courses, 10 credits of which are not integral to the structured medical curriculum. Medical students and medical graduates who wish to join the MD–MS program are required to complete a minimum of 10 credits of graduate courses not integral to the structured medical curriculum and earn a minimum GPA of 3.3. Those with a degree in dental or veterinary medicine are required to complete a minimum of 15 credits of graduate course work. In addition, all students must pass a comprehensive examination and complete a thesis project equivalent to 9 credits. The thesis must be presented and defended to the satisfaction of the examining committee.

Students following the non-thesis master's program are required to take a minimum of 30 graduate credit hours, 3 credits of which may be a project and should follow a course of study approved by the department/program and the concerned faculty Graduate Studies Committee.

PhD Program

Mission

The mission of the Doctoral Program in Biomedical Sciences (DBMS) is to provide excellent educational and research opportunities for students to develop into independent researchers and educators who will enrich the research and teaching output from Lebanon, the Middle East and beyond. The program will provide the students with the theoretical foundations and the special skills and attitudes that will allow them to develop their critical thinking and creative potential, conduct high caliber research in the biomedical sciences, contribute to the advancement of science, uphold the principles of intellectual honesty and become leaders in their chosen fields of study.

Program Objectives

Students are expected to:

- design and pursue pertinent research in biomedical science questions by devising and implementing a research plan to test a novel hypothesis,
- generate and analyze data critically, and utilize such analysis in devising, revising and/or refining a research plan,
- communicate findings, in both oral and written formats, through presentations at scientific meetings, publications in peer-reviewed journals and tutoring of junior students,
- demonstrate knowledge and integration of the fundamental principles of the various biomedical sciences,
- demonstrate theoretical and practical expertise in a specific field of research in the biomedical sciences,
- appreciate the complexity and volume of emerging new scientific information and its technical components, and be able to cope with it and manage one's learning efficiently and effectively,
- appreciate the importance of openness, teamwork and integrity in the advancement of knowledge through research.

PhD Disciplines

- Biochemistry and Molecular Genetics
- Biomedical Engineering
- Cell Biology of Cancer
- Microbiology and Immunology
- Neurosciences Program
- Nutrition (Interfaculty)
- Pharmacology and Toxicology
- Physiology

Academic Governance

Oversight of the DBMS Program occurs at three levels: at the PhD Program Committee level with faculty representation from the department and program of study and the coordinator of the PhD Program, at the Faculty of Medicine Dean's Office represented by the Faculty of Medicine Graduate Studies Committee and at the university level through the Board of Graduate Studies.

Admission Requirements

Admission to the program will be on a competitive basis. Students eligible for admission to the DBMS must have a sound academic record (GPA: 3.7 or its equivalent in the major field of study), a demonstrated, genuine interest in biomedical research and, preferably, research experience.

Minimum requirements for admission into the program are the following:

- Students with a BS degree or its equivalent in mathematics, biology, physics or chemistry in the Faculty of Arts and Sciences, as well as advanced courses in other medical science disciplines, and preferably with research experience, are eligible to apply (accelerated track PhD). Applicants with other degrees such as master's (MS), Medical Doctor (MD), Pharmacist (Pharm D or equivalent), Veterinarian Doctor (VMD), Dental Doctor (DMD, DDS), will also be considered for admission into the program (regular track PhD).
- Students should provide three letters of recommendation.
- General Graduate Record Examination (GRE), which is less than 5 years old, is required (applicant can use unofficial scores in the application and send the official copy after the application submission deadline). A total score of minimum 304 (equivalent to 1100 converted old GRE score) in the verbal and quantitative reasoning sections of the GRE test is required.
- Applicants to the graduate program, other than AUB graduates and graduates of colleges or universities recognized and located in North America, Great Britain, Australia and New Zealand, must meet the Readiness for University Studies in English (RUSE). Refer to catalogue section on Readiness for University Studies in English on page 38.
- Provide a personal statement (500 words maximum).

- Students should be interviewed by the PhD Committee members.
- Students should be recommended for admission by the PhD Committee.

FM accepts applications for the PhD program during fall.

Financial Support

The PhD program offers, on a competitive basis, substantial support which fully covers tuition and includes a monthly stipend and housing. In return, students are expected to help in teaching and in proctoring exams.

Program Requirements

50 credit hours of course work beyond the bachelor's program or 29 credit hours of course work beyond the master's program are required. To fulfill course requirements, 16 required core courses (34 credits), in addition to elective courses, are offered. A maximum of 21 credit hours may be transferred from the master's work if considered within the scope of the program. Students are expected to register for 24 credits of thesis.

Upon admission into the program, each student will be advised by the coordinator of the PhD program. After the first year, each student will have selected a thesis advisor who will design the set of elective courses to meet the student's research interests and career goals. Each student's course of study will be designed individually in light of the student's interests and career goals. All the duties of the coordinator of the PhD program will be transferred to the student's thesis advisor, who must be selected no later than the end of the first year for students entering into an MS program.

Core Courses

First Year		**Credits**	
BIOC 321	Nucleic Acids and Basic Genetics	1	Required
BIOC 322	Protein Biochemistry	1	Required
BIOC 323	Cellular Metabolism and Regulation	2	Required
PHYL 310	Cell Physiology and Biophysics	3	Required
BIOC 325	Receptor and Signal Transduction	2	Required
HUMR 305	Cell and Tissue Biology	3	Required
MBIM 320	Microbiology and Immunology	3	Required
BIOM 491	Laboratory Rotation	1	Required
HUMR 314	Seminar and Journal Club	1	Required
EDUC 401	Certificate in Teaching in Higher Education (C-THE)	0	Required
EDUC 402	Certificate in Teaching in Higher Education (C-THE) II	0	Required
HUMR 310A	Biomedical Research Techniques: Module A	1	Required
HUMR 310B	Biomedical Research Techniques: Module B	1	Required

HUMR 310C	Biomedical Research Techniques: Module C	1	Required
PHRM 315	Principles of Pharmacology	2	Required
BIOM 385	Research Ethics	1	Required

Second Year		**Credits**	
EPHD 310	Biostatistics	3	Required
IDTH 301	Introduction to Medical Science Literature Organ Physiology (Ph.D. candidates: can choose one of these as elective)	2	Required
PHYL 302	Cardiovascular Physiology	2	Required
IDTH 308A	Neuroanatomy	3	Elective
IDTH 308B	Neurophysiology	3	Elective
PHYL 300	Pulmonary – Renal	2	Elective
PHYL 304	GL – Endocrine – Reproductive	3	Elective

For other elective courses, refer to MS disciplines.

BIOC Courses	Refer to page 583
HUMR Courses	Refer to page 586
PHYL Courses	Refer to page 588
IDTH Courses	Refer to page 563
PHRM Courses	Refer to page 625
MBIM Courses	Refer to page 608

Course Descriptions

BIOM 375 Principles of Learning and Assessment 28.0; 2 cr.
This course provides students with the theoretical background and approaches to teaching science at the university level with emphasis on the nature of science and learner cognition. In addition, students are expected to apply principles and techniques of teaching and assessment of science in a teaching context. This is a core course for PhD students in Biomedical Sciences and is an elective for MS students. First term.

BIOM 385 Research Ethics 15.0; 1 cr.
This course introduces the fundamentals of responsible conduct of research, emphasizing the ethical practice of human research. The course recaps history of ethical principles and the development of research codes of conduct and ethical practices, familiarizes students with different kinds of ethical issues that they might come across throughout their careers and allows scholars to reflect critically about what it means to be an ethical and responsible researcher. Summer term.

BIOM 480 Qualifying Exam Part I: Comprehensive Exam 0 cr.
All students admitted to the PhD program must successfully complete a comprehensive

examination. The purpose of the comprehensive exam is to ascertain the student's knowledge in his/her field of specialization and related areas. The exam will cover major topics from within the concentration area and related fields.
Students who do not pass the comprehensive exam may, upon the recommendation of the thesis committee, take it for a second time in the following term. Failure on the second attempt will result in the student's discontinuation from the PhD program.

BIOM 481 Qualifying Exam Part II: Defense of Thesis Proposal 0 cr.
All students must successfully complete a qualifying examination, which is to be taken at least two terms prior to the final defense of the PhD thesis. The qualifying exam, administered by the thesis committee, is an oral exam in which the student presents his/her research proposal.
The objective of the oral exam is to determine whether the candidate's proposal and methodology are adequate for a PhD thesis. The candidate must show positive preliminary results and considerable promise of original research. It is the responsibility of the student to inform and update the thesis committee members about his/her research progress, especially during the period between the comprehensive and qualifying exams. Students who do not pass the qualifying exam are allowed to take it for a second time in the following term. Failure on the second attempt will result in the student's discontinuation from the graduate program.

BIOM 491 PhD Laboratory Rotations 0.30; 1 cr.
During the first year of study, PhD students in Biomedical Sciences must take a minimum of two laboratory rotations (1 credit each) in different faculty research laboratories within the Faculty of Medicine. Students may also enroll in the summer in a third elective laboratory rotation (1 credit). This course aims to familiarize students with potential thesis mentors and expose them to different research environments. Open to PhD students in Biomedical Sciences. First and second terms and summer.

BIOM 499 A/B/C/D/E PhD Thesis 24 cr.
In partial fulfillment of the requirements for the degree of Doctor of Philosophy, a student must submit a thesis (equivalent to 24 credit hours) that is expected to make a significant and original contribution to his/her field of research.

PhD Thesis Requirements

Thesis Committee

The PhD Thesis Committee should consist of at least five members. Two members should be from outside AUB, and the chair of the PhD Thesis Committee should be a faculty member holding the rank of a full professor and different from the thesis advisor. Refer to PhD Thesis Committee under General University Academic Information page 90.

Thesis Defense

After qualifying as a PhD candidate, the student will focus on the doctoral research with continued participation in seminars. The doctoral research, once completed, will be presented publicly and defended immediately after in front of the PhD Thesis Committee. Prior to the defense, all major revisions to the thesis must be completed. The decision of the committee will be by consensus. Refer to PhD Thesis Defense under General University Academic Information page 94.

Publication Requirements

PhD students should have published or have in press one journal publication and one abstract in an international conference related to their thesis topics.

Candidacy and Residency Requirements

All students admitted to the PhD program must successfully complete the qualifying exam part I (written) and qualifying exam part II (oral defense of thesis proposal).

To satisfy the minimum residency requirements for the PhD degree, all students must register and be in residence for at least three years beyond the completion of the master's degree. The requirements for the degree of Doctor of Philosophy must be completed within a period of 5 years after joining the PhD program. Extension beyond the 5-year period will require Graduate Council approval upon the recommendation of the faculty Graduate Studies Committee.

Graduation Requirements

To earn a PhD degree in Biomedical Sciences, a student must fulfill the following graduation requirements:

- attain a minimum cumulative GPA of 3.7 at the PhD level
- pass qualifying exams part I and II
- pass the PhD thesis defense
- satisfy the minimum residency requirements
- have a publication in a leading international journal, based on the PhD research
- have at least one accepted abstract in an international conference, based on the PhD research
- satisfy all pertinent AUB regulations

In addition to the AUB general requirements for graduate study, the Faculty of Medicine graduate study requirements and regulations are as follows:

- **Application and Notification of Acceptance**: For application submission deadlines and admissions decision notifications, refer to Application Procedures under Admissions section on page 38.
- **Acceptance**: Acceptance offers are issued in duplicates including category offered, registration period and date of start of classes. These dates are mentioned in the university calendar issued annually by the Office of the Registrar.
- Candidates must sign a copy of the above letter indicating acceptance and return it to the Office of Admissions on the due date. If acceptance letters are not signed and sent back by the set deadline, positions will be re-assigned to candidates on the waiting list.
- **Periods of Study**: The graduate program, once initiated, proceeds without interruption through the first term, the second term and the summer session.
- **Transfer Students**: See Transfer of Credits into a PhD Degree Program under General University Academic Information section on page 79.
- **Categories of Graduate Students**: The categories applicable at the university in

general are also applicable in the Faculty of Medicine with the following modifications: Students are given a regular graduate student status when they have a cumulative undergraduate GPA in the major field of study of at least 3.3 or its equivalent, and they are given a graduate on special status when they have a cumulative undergraduate GPA in the major field of study or an overall average of 3.0 or higher but lower than 3.3 or equivalent. Graduates on probation status are transferred to regular status upon achieving an overall GPA of at least 3.3 in 9 credits of graduate courses within two terms.

- **Visiting Graduate Students**: is a status applicable to students who pay a fee to attend a period of observer-ship in an ongoing research project.
- **Exchange students**: is a status applicable to students who participate in the graduate program in accordance with formal agreements between the Faculty of Medicine and other institutions.

In all instances, candidates must submit applications which are reviewed and acted upon by the Graduate Studies Committee.

Leave of Absence

See Leave of Absence under General University Academic Information section on page 74.

Interdepartmental Courses – Graduate Program

IDTH 301 Introduction to Medical Science Literature 16.32; 2 cr.
A multidisciplinary approach to the use of medical science publications. Open to beginning graduate students in the Faculty of Medicine.

IDTH 302 Methods 16.64; 3 cr.
Theory and practice of techniques used in various disciplines of medical sciences.

IDTH 303/304/305/306 Integrated Graduate Course I–IV 32.0; 2 cr. (each)
An integrated lecture seminar course introducing graduate students to the thinking in various medical science disciplines (required of all PhD students in the Faculty of Medicine). Four terms. One two–hour session a week each.

IDTH 307 Biomedical Electronics 32.16; 3 cr.
An introductory course in electricity and electronics as applied to biology and medicine. Alternate years.

IDTH 308A Neuroanatomy 31.27; 3 cr.
A course similar to the first part of 208, offered to graduate students, covering the normal structure of the human nervous system. See Department of Human Morphology. Three weeks.

IDTH 308B Neurophysiology 31.27; 3 cr.
A course similar to the second part of 208, offered to graduate students, covering the function of the human nervous system. See Department of Physiology. Three weeks.

IDTH 309 Biology of Nerve and Muscle 48.0; 3 cr.
A multi–disciplinary study of anatomy, physiology, biochemistry, pharmacology, and pathology of nerve and muscle. Alternate years.

IDTH 310 Basic Pathological Mechanisms 29.14; 2 cr.
The course covers the basic pathological mechanisms of disease at the cellular and molecular levels; their microscopic, gross and clinical manifestation; and some pharmacological interventions that apply to them.

IDTH 311 Foundations of Biomedical Science 90.40; 7 cr.
An interdisciplinary course that presents the cellular and molecular concepts and principles that underlie the normal structure and function of the human body. It covers cellular structure and function, including mechanisms and regulation of gene expression, protein synthesis, structure and function, signaling mechanisms, membrane transport, energy metabolism, contractility and excitability, and the basic principles of drug action.

IDTH 317 Perspectives in Medical Sciences 32.0; 2 cr.
A course of selected readings and seminars in the history, philosophy and methodology of medical and related sciences.

IDTH 319/320 Integrated Research Seminars 16.0; 1 cr. (each)
Participation of all PhD students and professors.

IDTH 330 Medical Pedagogy 3 cr.
A tutorial in teaching methods and practical experience under supervision. Open to PhD candidates only.

IDTH 333/334 Projects 2 cr. (each)
Two months half-time in a department other than the student's major occurring toward the end of the PhD candidate's residency.

Biomedical Engineering Graduate Program

Coordinator:	Dawy, Zaher (Electrical & Computer Engineering, MSFEA)
Co-coordinator:	Jaffa, Ayad (Biochemistry & Molecular Genetics, FM)
Coordinating Committee Members:	Amatoury, Jason (Biomedical Engineering, MSFEA) Daou, Arij (Biomedical Engineering, MSFEA) Darwiche, Nadine (Biochemistry & Molecular Genetics, FM) Khoueiry, Pierre (Biochemistry & Molecular Genetics, FM) Khraiche, Massoud (Biomedical Engineering, MSFEA) Kobeissy, Firas (Biochemistry & Molecular Genetics, FM) Mhanna, Rami (Biomedical Engineering, MSFEA) Oweis, Ghanem (Mechanical Engineering, MSFEA)

Background

The Biomedical Engineering Graduate Program (BMEP) is a joint MSFEA and FM interdisciplinary program that offers two degrees: Master of Science (MS) in Biomedical Engineering and Doctor of Philosophy (PhD) in Biomedical Engineering. The BMEP is housed in the MSFEA and administered by both MSFEA and FM via a Joint Program Coordinating Committee (JPCC).

The mission of the BMEP is to provide excellent education and promote innovative research enabling students to apply knowledge and approaches from the biomedical and clinical sciences in conjunction with design and quantitative principles, methods and tools from the engineering disciplines to address human health related challenges of high relevance to Lebanon, the Middle East and beyond. The program prepares its students to be leaders in their chosen areas of specialization committed to lifelong learning, critical thinking and intellectual integrity.

The curricula of the MS and PhD degrees are composed of core and elective courses balanced between biomedical sciences and engineering, and between fundamental and applied knowledge.

The curricula include the following three research focus areas:

- **Biomedical Systems**: This focus area includes research directions such as devices, instrumentation, biomechanics, biomaterials, drug delivery systems and tissue engineering.
- **Biomedical Cybernetics**: This focus area includes research directions such as biomedical and health informatics, computational biology, biomedical signal/image processing and biomedical systems engineering.
- **Cardiovascular and Pulmonary Engineering**: This focus area includes research directions such as fluid mechanics, modeling, simulation, imaging, devices, and implants related to both human cardiovascular and pulmonary systems.

A student may select his/her courses to satisfy the requirements of one of the three focus areas.

The MS and PhD degrees are open to students holding degrees from relevant fields of study including basic sciences, biomedical sciences, computer science, engineering, health sciences, and mathematics. Due to the interdisciplinary nature of the program, eight remedial undergraduate courses in sciences, math and engineering have been identified to cover the needed prerequisite knowledge; the remedial courses required by each admitted students are customized on a case-by-case basis depending on the student's undergraduate degree. Remedial undergraduate courses do not count as credit towards the MS or PhD degree completion. Grades on these remedial courses will appear on the transcript as Pass/Fail with a passing grade of (C+).

Required core courses (18 cr.)		**Credits**
BIOC 321	Nucleic Acids and Basic Genetics	1
BIOC 322	Protein Biochemistry	1
BMEN 600	Biomedical Engineering Applications	3
BMEN 601	Computational Modeling of Physiological Systems	3
BMEN 672	Hospital Lab Rotation	0
BMEN 673L	Biomedical Engineering Lab	1
EPHD 310	Basic Biostatistics	3
HUMR 310 (A, B, or C)	Biomedical Research Techniques	1
HUMR 314	Research Seminar	1
PHYL 346	Human Physiology	4

Restricted elective graduate courses: 6 credits restricted elective courses customized per focus area and required by both thesis and non-thesis options.

Restricted elective courses (6 cr.)		Credits	Systems	Cybernetics	Cardiovascular
BIOC 325	Receptors and Signal Transduction	2		X	
BIOC 326A	Bioinformatics Tools and Applications in Genomics	1		X	
BMEN 603	Tissue Engineering	3	X		X
BMEN 604	Engineering of Drug Delivery Systems	3	X		X
BMEN 605	Biomedical Imaging	3		X	X
BMEN 606	Nanobiosensors	3	X	X	
BMEN 607	Biomechanics	3	X		
BMEN 608	Biomaterials and Medical Devices	3	X		X
BMEN 609 or EECE 605	Computational Neuroscience or Neuromuscular Engineering	3	X	X	
BMEN 610	Micro and Nano Neural Interfaces	3	X		
BMEN 611	Computational Modeling in Biomechanics	3	X	X	X
EECE 601 or EECE 602	Biomedical Engineering I or Biomedical Engineering II	3	X	X	X
EECE 603	Biomedical Signal and Image Processing	3		X	X
EECE 633 or EECE 663 or EECE 667 or EECE 693	Data Mining or System Identification or Pattern Recognition or Neural Networks	3		X	
HUMR 305	Cell and Tissue Biology	3	X		
PHYL 302	Cardiovascular Physiology	2			R
PHYL 300A	Pulmonary Physiology	1			R

Free elective graduate courses for the non-thesis option: 6 credits additional elective courses. These courses should be taken from engineering and should be approved by the student's advisor and the coordinator of the joint program coordinating committee.

Master thesis for the thesis option: 6 credits master's thesis in biomedical engineering. The thesis requirements follow AUB's General University Academic Information as documented in the Graduate Catalogue.

PhD in Biomedical Engineering

Admission Requirements

The application procedures and admission requirements to the PhD program follow AUB's General University Academic Information as documented in the Graduate Catalogue. To be considered for admission, applicants must hold a bachelor's or master's degree in a relevant field of study from AUB or its equivalent, or from a recognized institution of higher learning.

Acceptance into the PhD program is determined by academic performance as well as an assessment of readiness, potential and ability to develop into independent researchers as judged by interviews by faculty members, a written statement, letters of recommendation, GRE scores, and other means of assessment such as publications and industrial experience.

Accepted students are eligible to receive scholarships that fully cover their tuition fees and provide a monthly stipend.

Degree Requirements

General requirements for master's degree holders: Based on AUB's guidelines, a minimum of 48 credit hours beyond those required for the master's degree, of which a minimum of 18 credit hours must be in graduate level course work and a minimum of 24 credit hours of thesis work, must be taken. Requirements also allow a maximum of 3 credit hours out of the 18 credits of coursework as tutorial course and include a 0-credit comprehensive examination preparation course and a 0-credit thesis proposal preparation course.

General requirements for bachelor's degree holders: Based on AUB's guidelines, a minimum of 78 credit hours beyond those required for the bachelor's degree, of which a minimum of 36 credit hours must be in graduate level coursework and a minimum of 30 credit hours of thesis work, must be taken. Requirements also allow a maximum of 6 credit hours out of the 36 credits of coursework as tutorial courses and include a 0-credit comprehensive examination preparation course and a 0-credit thesis proposal preparation course.

To earn a PhD degree in Biomedical Engineering, the student must complete the following requirements:

- Satisfy the course and research credit requirements
- Satisfy the residence requirement and all other pertinent AUB regulations
- Have at least one international refereed journal article based on the PhD thesis
- Have at least one refereed conference paper based on the PhD thesis
- Have a cumulative GPA of (3.7) or above
- Pass the comprehensive and oral qualifying examinations

- Successfully defend the PhD thesis

The following are the graduate level course requirements for students admitted with a bachelor's degree. The total number of credits is at least 36 credits divided among core, restricted elective and free elective courses. Students admitted with a master's degree can waive as many courses as possible without going below the minimum required 18 credits of coursework.

Core graduate courses: 21 credits of core courses from biomedical sciences and engineering.

Required core courses (21 cr.)		**Credits**
BIOC 321	Nucleic Acids and Basic Genetics	1
BIOC 322	Protein Biochemistry	1
BIOM 385	Research Ethics	1
BMEN 600	Biomedical Engineering Applications	3
BMEN 601	Computational Modeling of Physiological Systems	3
BMEN 671	PhD Lab Rotation	1 + 1
BMEN 672	Hospital Lab Rotation	0
BMEN 673L	Biomedical Engineering Lab	1
BMEN 675	Approved Experience	0
EPHD 310	Basic Biostatistics	3
HUMR 310 (A, B, or C)	Biomedical Research Techniques	1
HUMR 314	Research Seminar	1
PHYL 346	Human Physiology	4

Restricted elective graduate courses: 9 credits restricted elective courses customized per focus area.

Restricted elective courses (6 cr.)		**Credits**	**Systems**	**Cybernetics**	**Cardiovascular**
BIOC 325	Receptors and Signal Transduction	2		R	
BIOC 326A	Bioinformatics Tools and Applications in Genomics	1		R	
BMEN 603	Tissue Engineering	3	X		X
BMEN 604	Engineering of Drug Delivery Systems	3	X		X
BMEN 605	Biomedical Imaging	3		X	X
BMEN 606	Nanobiosensors	3	X	X	
BMEN 607	Biomechanics	3	X		

BMEN 608	Biomaterials and Medical Devices	3	X		X
BMEN 609 or EECE 605	Computational Neuroscience or Neuromuscular Engineering	3	X	X	
BMEN 610	Micro and Nano Neural Interfaces	3	X		
BMEN 611	Computational Modeling in Biomechanics	3	X	X	X
EECE 601 or EECE 602	Biomedical Engineering I or Biomedical Engineering II	3	X	X	X
EECE 603	Biomedical Signal and Image Processing	3		X	X
EECE 633 or EECE 663 or EECE 667 or EECE 693	Data Mining or System Identification or Pattern Recognition or Neural Networks	3		X	
HUMR 305	Cell and Tissue Biology	3	R		
PHYL 300A	Pulmonary Physiology	1			R
PHYL 302	Cardiovascular Physiology	2			R

Free elective graduate courses: 6 credits additional elective courses. These courses should be taken based on the student's specific area of research as approved by the student's advisor.

Course Descriptions

BMEN 600 Biomedical Engineering Applications 3 cr.

Biomedical engineering is an interdisciplinary domain which applies principles of engineering to find solutions for biological and health problems. Biomedical engineering aims to improve our fundamental understanding of biological processes and develop approaches for optimized therapeutic/diagnostic healthcare procedures. The field of biomedical engineering involves the development of materials to replace or enhance the operation of damaged or malfunctioning biological entities, development of diagnostic and therapeutic tools, modeling of biological systems, signal processing and bioinformatics. This course will introduce students to biomedical engineering and provide insight into the various applications in the biomedical engineering field. The course will be divided into modules, and each will be given by a specialist in a certain biomedical engineering area.

BMEN 601/MECH 635 Computational Modeling of Physiological Systems 3 cr.
This course focuses on the quantitative modeling of different physiological systems. It provides students with current concepts of the mathematical modeling, and different quantitative descriptions of cellular and organ physiology. At the subcellular/cellular level, we will examine mechanisms of regulation and homeostasis. At the system level, the course will cover basic aspects of anatomical and pathophysiological features of the nervous, neural, cardiovascular and respiratory systems. Several physiological processes are treated as case studies for increasing complexity in modeling dynamic systems. Prerequisite: MATH 202 and PHYL 346, or consent of instructor.

BMEN 602 Computational Modeling of Cardiovascular and Pulmonary Systems 3 cr.
The need for better understanding the mechanics and tools for computational modeling of cardiovascular and respiratory systems in healthy and diseased conditions is constantly increasing. This is a result of the enormous advances made in the science and engineering of both surgical and therapeutic medicine. This course covers the modeling and simulation of cardiovascular and respiratory systems. It will provide the students with a thorough understanding of the anatomy, physiology and mechanics of cardiovascular and respiratory systems as well as the computational tools for modeling and simulation of cardiac, circulatory and respiratory systems in healthy and diseased conditions.

BMEN 603/CHEN 675 Tissue Engineering 3 cr.
In a world of aging population, an ever-increasing demand for improvement of healthcare services and need for replacement organs and tissues are arising. The limited pool of donors together with the problem of donor organ rejection is a strong driver for engineering tissues and other body parts. Tissue engineering is an interdisciplinary field that uses cells, biomaterials, biochemical (e.g. growth factors) and physical (e.g. mechanical stimulation) signals, as well as their combination to generate tissue-like structures. The goal of tissue engineering is to provide biological substitutes that can maintain, restore or improve the function of damaged organs in the body. This course will introduce interested students to the new field of tissue engineering and provide insight into cutting edge applications in this area.

BMEN 604/CHEN 673 Engineering of Drug Delivery Systems 3 cr.
This course focuses on recent advances in the development of novel drug delivery systems. The fundamentals of drug delivery are discussed. Various strategies to tune and control the release of active agents for optimized therapeutic outcomes are explored. The course covers polymers and techniques used to produce drug nanoparticles, with specific examples of nanoparticle-based drug delivery systems. Prerequisites: CHEN 314 and CHEN 411, or consent of instructor.

BMEN 605 Biomedical Imaging 3 cr.
Biomedical imaging offers an unprecedented view into the structure and function of a living body, and as such plays an essential role in medical practice and research. This course will provide students with an overview of the key concepts underlying the primary diagnostic biomedical imaging modalities, including: ultrasound, x-ray, computed tomography, magnetic resonance and nuclear imaging. In particular, students will gain an understanding of the physical principles and theoretical bases governing the operation of each imaging modality, the technology that translates theory into practice, and the basic methods involved in image formation. Students will also learn the limitations of each imaging procedure, while being exposed to their vast applications in the clinic and research.

BMEN 606 Nanobiosensors 3 cr.
This course will provide a comprehensive analysis of the field of nanoengineering with a focus on biosensors including common modalities, basic theoretical considerations for sensor operation, physics of detection and applications in research and medical diagnostics. The course will cover the major types of electronic nanobiosensors for biological signal detection (potentiometric, amperometric, and mass based sensors) and their applications in the fields of neural engineering, DNA sequencing and cardiovascular early disease detection. The course will enable students to have a strong grasp of fundamentals of biosensor design, select sensors for various applications and evaluate new and emerging technologies. Prerequisites: EECE 210 (or equivalent) and BIOL 210 (or equivalent); or consent of instructor.

BMEN 607/MECH 633 Biomechanics 3 cr.
A course on the study of the biomechanical principles underlying the kinetics and kinematics of normal and abnormal human motion. Emphasis is placed on the interaction between biomechanical and physiologic factors (bone, joint, connective tissue, and muscle physiology and structure) in skeleto-motor function and the application of such in testing and practice in rehabilitation. The course is designed for engineering students with no previous anatomy/physiology. Prerequisites: CIVE 210, MECH 320 or CIVE 310; or consent of instructor.

BMEN 608/MECH 634 Biomaterial and Medical Devices 3 cr.
A course that examines the structure-property relationships for biomaterials and the medical applications of biomaterials and devices. The first part of the course focuses on the main classes of biomaterials, metal, ceramic, polymeric and composite implant materials, as well as on their interactions with the human body (biocompatibility). The second part of the course examines the various applications of biomaterials and devices in different tissue and organ systems such as orthopedic, cardiovascular, dermatologic and dental applications. Experts from the medical community will be invited to discuss the various applications. Prerequisite: MECH 340 or consent of instructor.

BMEN 609 Computational Neuroscience 3 cr.
The human brain, perhaps the most complex, sophisticated, and complicated learning system, controls virtually every aspect of our behavior. The central assumption of computational neuroscience is that the brain computes. What does that mean? Generally speaking, a computer is a dynamical system whose state variables encode information about the external world. In short, computation equals coding plus dynamics. Some neuroscientists study the way that information is encoded in neural activity and other dynamical variables of the brain. Others try to characterize how these dynamical variables evolve with time. The study of neural dynamics can be subdivided into two separate strands. One tradition, exemplified by the work of Hodgkin and Huxley, focuses on the biophysics of single neurons. The other focuses on the dynamics of networks, concerning itself with phenomena that emerge from the interactions between neurons. Therefore, computational neuroscience can be divided into three sub- specialties: neural coding, biophysics of neurons, and neural networks. This course will introduce engineers, physicists, computational scientists, mathematicians and other audiences to the neurosciences from the cellular level and the network level as seen from computational lenses. Prerequisite: BIOL 201 (or equivalent) and Math 202, or consent of instructor.

BMEN 610 Micro and Nano Neural Interfaces 3 cr.
Neural interfaces are micro and nano devices that form the connection between the biological neural tissue and the external electronic devices. These devices are designed for mapping, assisting, augmenting, or repairing neural pathways. The course will focus

on physical, chemical and neurophysiological principles of neural interfaces, theoretical and functional basis for their design, micro and nano fabrication techniques and applications in neural prosthesis for Brain Machine Interface. Topics covered in class will include: Neural Engineering, Brain Machine Interface, Microfabrication, Nanofabrication, Soft-lithography, Electrokinetics, Electrochemistry, Neural probes, Biocompatibility, Microelectrodes, NeuroMEMS (neuro microelectromechanical systems, BioMEMS (biomedical microelectromechanical systems).

BMEN 611 Computational Modeling in Biomechanics 3 cr.
This course provides students with a glimpse into the world of computational finite element modeling and simulation in biomechanics to investigate and solve biomedical problems. Students will take a journey through the processes involved in producing a computational finite element model in the biomedical field; starting at construction of model geometry, particularly from medical imaging data (CT/MRI), through to model creation, simulation and visualization using finite element analysis software (ANSYS Workbench). Students will also be exposed to a selection of experimental lab techniques in biomechanics and physiology to acquire data required for model development and validation. In pursuit of developing an appreciation for the areas covered, the course will incorporate a mix of theory, demonstrations, practice, real-world modeling applications and research seminars. In addition to skills gained in modeling and basic experimentation, the course will provide students with an opportunity to enhance vital skills in scientific writing and oral communication.

BMEN 671 PhD Lab Rotation 1 cr.
PhD students in Biomedical Engineering are required to take two laboratory rotations (1 credit each) in different faculty research laboratories within the MSFEA and/or FM. Students may also enroll in a third elective laboratory rotation. This aims to familiarize students with potential thesis mentors and expose them to different research environments.

BMEN 672 Hospital Lab Rotation 0 cr.
MS and PhD students in Biomedical Engineering are required to do a lab rotation in the Medical Engineering Department at AUB Medical Center (AUBMC). This aims to familiarize students with the typical activities and responsibilities of a biomedical engineer in a working environment and expose them to different equipment and tools.

BMEN 673L Biomedical Engineering Lab 1 cr.
This laboratory course aims to introduce students to the practical issues in the areas of biomedical instrumentation design and biological signal processing. A particular emphasis will be placed on signal transduction, electronic circuit design for recording and conditioning physiological signals. The lab will introduce hand-on laboratory experiments on biomedical sensors, analog signal amplifiers and filters, digital acquisition and transmission, and basic digital filtering. In addition, some experiments cover topics that demonstrate the various levels of complexity that characterize biological signals. Signal processing tools include spectral and cepstral analysis, de-noising and artifact removal, filter banks and wavelet decompositions, Hilbert transforms, and information-theoretic measures.

BMEN 675 Approved Experience 0 cr.
Approved Experience.

BMEN 796 Special Project in Biomedical Engineering 3 cr.
Special Project in Biomedical Engineering.

BMEN 797 Special Topics in Biomedical Engineering 1 cr.
Special Topics in Biomedical Engineering.

BMEN 798 Special Topics in Biomedical Engineering 3 cr.
Special Topics in Biomedical Engineering.

BMEN 799T MS Comprehensive Exam 0 cr.
Every term.

BMEN 799 MS Thesis 6 cr.
Every term. Prerequisite: BMEN 799T.

BMEN 980 Qualifying Exam Part I: Comprehensive Exam 0 cr.
Every term.

BMEN 981 Qualifying Exam Part II: Defense of Thesis Proposal 0 cr.
Every term. Prerequisite: BMEN 980.

BMEN 982 PhD Thesis 3 cr.

Every term. Taken while total required credit hours have been completed.

BMEN 983 PhD Thesis 6 cr.
Every term. Taken while total required credit hours have not been completed.

BMEN 984 PhD Thesis 9 cr.
Every term. Taken while total required credit hours have not been completed.

BMEN 985 PhD Thesis 12 cr.
Every term. Taken while total required credit hours have not been completed.

BMEN 986 PhD Thesis 0 cr.
Every term. Taken while total required credit hours have not been completed.

BMEN 987 PhD Thesis Defense 0 cr.
Every term. Prerequisite: BMEN 981.

BIOC 321 Nucleic Acids and Basic Genetics 15.0; 1 cr.
This course discusses the principles of nucleic acid structure and function in eukaryotes. It includes the information for basic genetics in terms of genome structure as well as the diversity of gene regulation. Required from MS and PhD students in biomedical Sciences. Requires consent of coordinator for other graduate disciplines. First term.

BIOC 322 Protein Biochemistry 10.10; 1 cr.
This course deals with the biochemistry of proteins including their basic units, different structures, folding process and protein-protein interactions. It focuses on how changes at the structural level modify function. The course also covers the principles of protein purification and sequencing, and introduces students to protein database, molecular modeling and systems biology. Required from MS and PhD students in biomedical sciences. Requires coordinator approval for other graduate disciplines. First term.

BIOC 325 Receptors and Signal Transduction 25.10; 2 cr.
This course covers classical pathways involved in receptor signaling and activation of downstream targets and the molecular mechanisms involved. It deals with the inter and intracellular communication, from the generation of signaling molecules through the cellular responses. Required from MS and PhD students in biomedical sciences. Requires consent of coordinator for other graduate disciplines. First term.

BIOC 326A Bioinformatics Tools and Applications in Genomics 1 cr.
This course will discuss the relationships among sequence, structure and function in biological networks, as well as advances in modeling of quantitative, functional and comprehensive genomics analyses. It will assess computational issues arising from high-throughput techniques recently introduced in biomedical sciences, and cover very recent developments in computational genomics, including genome structural variant discovery, epigenome analysis, cancer genomics and transcriptome analysis.

BIOM 385 Research Ethics 15.0; 1 cr.
This course introduces the fundamentals of responsible conduct of research, emphasizing the ethical practice of human research. The course recaps history of ethical principles, the development of research codes of conduct and ethical practices, familiarizes students with the different kinds of ethical issues that they might come across throughout their careers and allows scholars to reflect critically on what it means to be an ethical and responsible researcher. Summer term.

EECE 601 Biomedical Engineering I 3 cr.
This course includes an introduction to general instrumentation configuration and performance of instrumentation systems; types and characteristics of transducers; sources and characteristics of bioelectric signals; types and characteristics of electrodes; temperature regulation and measurement; cardiovascular system measurements and diagnostic equipment; blood instruments; patient care and monitoring; and electrical safety of medical equipment. Prerequisites: BIOL 210 or BIOL 202 or PHYL 246, and EECE 210; or PHYS 228 and PHYS 228L; or consent of instructor.

EECE 603 Biomedical Signal and Image Processing 3 cr.
Fundamentals of digital signal processing as implemented in biomedical applications. It provides a concise treatment of the tools utilized to describe deterministic and random signals as the basis of analyzing biological signals: data acquisition; imaging; denoising and filtering; feature extraction; modeling. The course is tightly coupled with a practical component through laboratory projects. Examples include the auditory system, speech generation, electrocardiogram, neuronal circuits and medical imaging. Students should have reasonable software skills in Matlab. Prerequisites: STAT 230 and EECE 340, or equivalent; or consent of instructor.

EECE 633 Data Mining 3 cr.
This course is an introduction to data mining. Data mining refers to knowledge discovery from huge amounts of data to find non-trivial conclusions. Topics will range from statistics to machine learning to database, with a focus on analysis of large data sets. The course will target at least one new data mining problem involving real data for which the students will have to find a solution. Prerequisite: EECE 330 or consent of instructor.

EECE 663 System Identification 3 cr.
This course introduces the basic mathematical tools to fit models into empirical input-output data. General time-series modeling and forecasting, such as stock prices, biological data and others. Topics include nonparametric identification methods: time and frequency response analysis; parametric identification: prediction error, least squares, linear unbiased estimation and maximum likelihood; convergence, consistency and asymptotic distribution of estimates; properties and practical modeling issues: bias distribution, experiment design and model validation.

EECE 667 Pattern Recognition 3 cr.
The course provides an overview of the algorithms used in machine learning. The course discusses modern concepts for model selection and parameter estimation, decision-making

and statistical learning. Special emphasis will be given to regression and classification for a supervised mode of learning. Students will be assigned typical machine learning problems to investigate as projects.

EECE 693 Neural Networks 3 cr.
The course provides a comprehensive foundation to artificial neural networks and machine leaning with applications to pattern recognition and data mining; learning processes: supervised and unsupervised, deterministic and statistical; clustering; single layer and multilayer perceptrons; least-mean-square, back propagation and Al-Alaoui algorithms; radial-basis function networks; committee machines; principal component analysis; self-organizing maps; and current topics of interest.

EPHD 310 Basic Biostatistics 2.2; 3 cr.
An introductory biostatistics course that covers basic concepts in statistical methods. The course demonstrates methods of exploring, organizing and presenting data. The course presents the foundation of statistical inference from estimation to confidence interval and testing of hypothesis. Applications include comparing population means or proportions via data obtained from paired or independent samples, one-way ANOVA. Also, it introduces simple linear regression, correlations, logistic regression and nonparametric methods for data analysis.

HUMR 305 Cell and Tissue Biology 30.33; 3 cr.
Consists of the first half of Basic Histology, HUMR 209, covering cells and tissues. Open to graduate students outside the department.
HUMR 310 (A, B, or C) Biomedical Research Techniques 1 cr.
A guided laboratory course in research methods used in cell biology and physiology. HUMR 310A covers Cell Biology Techniques; HUMR 310B covers Genomics and Proteomics; HUMR 310C covers Mouse Models and In Vivo Studies. Used in cell biology and physiology.

HUMR 314 Research Seminar 0.32; 1 cr.
Presentation and discussion of timely research topics designated by members of the department.

PHYL 302 Cardiovascular Physiology 31.6; 2 cr.
Presents the cardiovascular system with clear reference to pathophysiological and clinical events. Didactic lectures and seminar sessions define physiological concepts and emphasize structure-function relationships. Laboratory sessions familiarize the student with instrumentation and techniques in the cardiovascular field. Open to all graduate students in the department.

PHYL 346 Human Physiology for Paramedical and Undergraduate Students 48; 4 cr.
Outlines fundamental principles of human physiology and the mechanisms governing the function of different body organs. Prerequisites: BIOC 246 and BIOL 201 (or BIOL 210).

Department of Anatomy, Cell Biology and Physiological Sciences

Chairperson:	Eid, Assaad, A.
Emeritus Professor:	Bikhazi, Anwar
Professors:	Barada, Kassem; Bazarbachi, Ali; Eid, Assad, A.; El-Sabban, Marwan; Jurjus, Abdo; Mourad, Fadi; Nasr, Rihab; Saade, Nayef
Associate Professors:	Abou-Kheir, Wassim; Daoud, Georges;
Assistant Professors:	Eid, Stephanie; Hawi, Jihad; Obeid, Makram
Associates:	Husari, Ahmad; Kahhale, Joseph; Kfoury Kassouf, Hala; Oueidat, Doureid; Saad, William
Adjunct Professors	El Osta, Assam

The department offers three disciplines of study: Human Morphology, Physiology, and Neuroscience. Each discipline provides courses for medical, graduate, nursing, nutrition, paramedical, and undergraduate students.

The graduate program is comprehensive, leading to a master's degree (MS) or doctoral degree (PhD) in Biomedical Sciences with a focus on the aforementioned disciplines. Students with a BS degree or its equivalent in mathematics, biology, physics, or chemistry, along with advanced courses in physiology and other medical science disciplines, are eligible to apply. The department may require specific prerequisites in certain disciplines, such as biology and chemistry, as deemed necessary.

Anatomy and Cell Biology

Required courses for the discipline of Human Morphology include: PHYL 310 (3 cr.), HUMR 305 (3 cr.), HUMR 306 (3 cr.), HUMR 308 (3 cr.), HUMR 314 (1 cr.) and HUMR 310 (A&C, 2 cr.).

HUMR 244 Introduction to Human Biology 32.0; 2 cr.
An introductory course that meets the needs of a diverse group of students who are preparing for careers in allied health sciences, medical technologies, or other nonmedical careers like psychology or biomedical sciences. It introduces students to the very basic terms and concepts in anatomy, histology, and physiology. The course covers the basic biology of the cells, tissues, and organs of the human body.

HUMR 246 Human Morphology for Paramedical and Undergraduate Students 32.32; 3 cr.
An introduction to basic gross anatomy and histology. Offered to Nurses and other undergraduate students.

HUMR 248 Human Anatomy and Physiology 60.30; 5 cr.
A course that aims to provide a strong foundation for understanding the structural complexities of the human organism and the related physiological functions. The course, as conceived, will integrate structure and function and offer practical advantages in fine-tuning the balance between anatomy, histology, and physiology. Also, clinical correlations will be included for a vertical integration in addition to horizontal integration. Prerequisite: HUMR 244.

HUMR 305 Cell and Tissue Biology 30.33; 3 cr.
Consists of the first half of Basic Histology, HUMR 209, covering cells and tissues. Open to all graduate students.

HUMR 306 Organ Histology 28.36; 3 cr.
Consists of the second half of Basic Histology, HUMR 209, covering organs and systems. Open to graduate students. Prerequisite: HUMR 305 or equivalent.

HUMR 307 Gross Anatomy 24.198; 7 cr.
A regional dissection of the entire human body supplemented by embryology, clinical lectures and discussions. The student is also introduced to radiographic anatomy based on various imaging modalities, in addition to computer-assisted instruction. Open to all graduate students.

HUMR 308 Neuroanatomy 28.39; 3 cr.
The neuroanatomy component of Neuroscience, IDTH 208A. Open to all graduate students.

HUMR 309 Basic Histology 58.69; 6 cr.
A study of the cells, tissues and organs of the human body at the level of light and electron microscopes, utilizing traditional and advanced methodologies. Structure is related to function with some clinical application. Required of all medical students. Open to all graduate students in the department.

HUMR 310 Biomedical Research Techniques 28.46; 3 cr.
A guided laboratory course in research methods used in cell biology and physiology. Open to graduate students. The course is made of three modules that can all be selected or can be selected as one module per specialty as follows:

HUMR 310A Cell Biology Techniques 10.15; 1 cr.
Cell Biology Techniques.

HUMR 310B Genomics and Proteomics 10.15; 1 cr.
Genomics and Proteomics.

HUMR 310C Mouse Models and In Vivo Studies 8.16; 1 cr.
Mouse Models and In Vivo Studies.

HUMR 312 Anatomy Tutorial 0.64; 2 cr.
A guided literature review of special research topics.

HUMR 313 Directed Reading and Research 0.32-66; 2 cr.
Specific reading and research assignments under supervision of an advisor. At the discretion of the thesis supervisor.

HUMR 314/315 Research Seminar 0.32; 1 cr.; 3 cr.
Presentation and discussion of timely research topics designated by members of the department.

HUMR 346 Human Morphology for Graduate Students 48.32; 4 cr.
A course that includes the embryology component of HUMR 307, HUMR 246 and an experimental anatomy part.

HUMR 395A/B Comprehensive Exam 0 cr.
Prerequisite: Consent of advisor.

HUMR 399 A/B/C/D/E MS Thesis 9 cr.
Original research under faculty supervision leading to the MS degree.

HUMR 260 Elective in Human Morphology 0.180-360 cr.
An elective for Medicine III and IV in which the student can select one or more disciplines within the department including applied immunology, general surgical anatomy, radiographic anatomy, experimental neuroanatomy, neuromuscular disorders, techniques for study of cells and tissues and experimental neuropathology. One to two months.

Physiology

Required courses for the discipline in Physiology include PHYL 300 (2 cr.), PHYL 302 (2 cr.), PHYL 304 (3 cr.), PHYL 308 (3 cr.), PHYL 310 (3 cr.), HUMR 305 (3 cr.), HUMR 314 (1 cr.) and HUMR 310 (A&C, 2 cr.).

PHYL 246 Human Physiology for Paramedical and Undergraduate Students 48; 4 cr.
The course outlines fundamental principles of human physiology and the mechanisms governing the function of different body organs. Prerequisite: BIOL 201 or BIOL 210 or HUMR244 or HUMR 246.

PHYL 346 Human Physiology 48; 4 cr.
The course outlines fundamental principles of human physiology and the mechanisms governing the function of different body organs in the setting of a series of lectures and discussions. Prerequisite: BIOL 201 or BIOL 210.

PHYL 260 Elective in Physiology 0.180-360 cr.
The course covers one or more areas of physiology such as special physiologic techniques, general physiology, experimental gastroenterology, experimental neuroscience, and the physiology of cardiac and vascular smooth muscles. One to two months.

PHYL 300 Homeostasis 32.6; 2 cr.
The course studies the internal environment and its physiological regulation by two homeostatic organs: the lungs and the kidneys. Didactic lectures cover the physiology of the topic, treating internal environment, homeostasis and feedback mechanisms, the lung, the kidney and electrolytes. Open to all graduate students. The course consists of two modules:

PHYL 300A Pulmonary Physiology 10.15; 1 cr.
Pulmonary Physiology

PHYL 300B Renal Physiology 10.15; 1 cr.
Renal Physiology

PHYL 302 Cardiovascular Physiology 31.6; 2 cr.
The course presents the cardiovascular system with clear reference to pathophysiological and clinical events. Didactic lectures and seminar sessions define physiological concepts

and emphasize structure-function relationships. Laboratory sessions familiarize the student with instrumentation and techniques in the cardiovascular field. Open to all graduate students.

PHYL 304 Metabolism 32.12; 3 cr.
The course covers the physiology of the gastrointestinal tract, metabolism and its regulation by the endocrine system, and reproduction. This course consists of lectures, conferences and discussion sessions. Open to all graduate students.

PHYL 308 Neurophysiology 31.27; 3 cr.
The course reviews the physiology and various functions of the human nervous system. Open to all graduate students.

PHYL 310 General Physiology: Cellular Mechanisms 32.16; 3 cr.
A course on aspects of membrane transport processes across symmetrical and asymmetrical cell membranes, electrophysiology, membrane potentials, action potentials in excitable cells, synaptic transmissions and excitation-contraction coupling in muscles. Open to all graduate students.

PHYL 311-312 Advanced Physiology 0.48; 2 cr.
A guided study (experimental and theoretical) of the literature of major topics in physiology, alongside the different research topics being conducted in the department. This course is conducted as a seminar, and it acts as a Virtual Laboratory Rotation. Open to all graduate students.

PHYL 313-314 Physical Methods in Physiological Research 0.64; 2 cr.
A guided laboratory course of the physical methods used in the major branches of physiology.

PHYL 390 Directed Reading and Research 0.32-66; 2 cr.
Assignments based on the research interests of the graduate student and the advisor, aimed at formulating an original research project.

PHYL 391-392 Projects in Physiology 0.64; 2 cr.
A guided study (theoretical and experimental) of different research topics performed at AUB-FM. This course will introduce you to diverse fields of study and it will cover research topics on cancer, stem cells, pain, cardiovascular diseases, diabetes, neuroscience, development and others. In addition, you will learn about the tools and methods that are employed in each specific field and topic. This course is primarily intended for Master and PhD candidates in the Faculty of Medicine but may also be applicable to candidates within the biomedical (basic and clinical) research field in other faculties. This course is designed to offer students, through various components of lectures, presentations, discussions, assignments and literature analysis, a broad overview of the latest research discoveries, their potential applications and results interpretation. This course will act as a virtual rotation for Master and PhD candidates. Open to all graduate students.

PHYL 395A/B Comprehensive Exam 0 cr.
Prerequisite: Consent of advisor.

PHYL 399 A/B/C/D/E MS Thesis 9 cr.
Original research under staff supervision, leading to the MS degree.

Neuroscience

Required courses for the discipline in Neuroscience include PHYL 310 (3 cr.), PHYL 308 (3 cr.), HUMR 305 (3 cr.), HUMR 308 (3 cr.), HUMR 310 (A&C, 2 cr.) and HUMR 314 (1 cr.).

IDTH 208 Basic Neuroscience 6 cr.
See Interdepartmental Teaching.

HUMR 308 Neuroanatomy 28.39; 3 cr.
The neuroanatomy component of Neuroscience, IDTH 208. Open to all graduate students.

PHYL 308 Neurophysiology 31.27; 3 cr.
Similar to PHYL 208 and IDTH 308B. Open to all graduate students.

HUMR 261/PHYL 261 Elective in Basic Neuroscience 0.180-360 cr.
The objective of this elective is to involve students in a basic research project as part of the on-going studies in the neuroscience research laboratories of the department. Open to Medicine III and IV students, graduate students in the combined MS-MD program and visiting medical students.

IDTH 395A/B Comprehensive Exam 0 cr.
Prerequisite: Consent of advisor.

Department of Anesthesiology

Chairperson:	Aouad-Maroun, Marie
Professor Emeritus:	Muallem, Musa
Professors:	Aouad-Maroun, Marie; Jabbour-Khoury, Samar; Khatib, Mohammad; Siddik-Sayyid, Sahar
Associate Professors:	Kaddoum, Roland; Taha, Samar; Zeeni, Carine
Assistant Professors:	Dabbous, Aliya; Karam, Cynthia; Nauphal, Maud; Rizk, Marwan;
Instructors:	Abou Nafeh, Nancy; Khalili, Amro; Rouphael; Christian; Msheik, Fatima
Clinical Associates:	Louis, Faek; Sarkis, Sarine

The Department of Anesthesiology offers a clinical clerkship to third-year medical students. At the graduate level, it offers a four-year residency program and a one-year clinical fellowship in cardiovascular anesthesia.

ANES 247 Clinical Clerkship

A clinical clerkship offered to third year medical students, consisting of instructive lectures given by attending on practical aspects of anesthesiology and pain, as well as cardiopulmonary resuscitation training. Also, the clerkship includes simulation sessions on airway control, intravenous line insertion, as well as general anesthetic management of different diseases. In addition, it offers training opportunities on preoperative assessment in the PAU, different types of anesthesia in the operating room, and pain management in the acute postoperative period.

ANES 268 Elective in the Subspecialties of Anesthesia

Residents focus on all aspects of anesthesiology, such as general anesthesia, regional anesthesia, ICU rotations and pain management. They are exposed to difficult airway management, vascular access, as well as invasive monitoring. They learn the different subspecialties of Anesthesia including Cardiac, Pediatric, Neuro, Obstetric, Regional Anesthesia, Pain Management, Non-Operating Room Anesthesia and Perioperative Medicine. Residents also attend the didactic lectures of the department.

Department of Biochemistry and Molecular Genetics

Chairperson (Interim):	Usta, Julnar
Professors:	Darwiche, Nadine; Jaffa, Ayad; Usta, Julnar
Professors Joint appointee:	Boustany, Rose-Mary; Dbaibo, Ghassan; Kurban Mazen; Refaat, Marwan; Ziyadeh, Fuad
Associate Professors:	Yazbek, Souha
Associates:	Karam, Pascale, El- Khoury Riyad
Adjunct Professors:	Echtay, Karim; Kobeissy, Firas; Nemer, Georges; Slim, Rima

The Department of Biochemistry and Molecular Genetics offers undergraduate courses to students in Allied Health Science Programs enrolled in the: Medical Laboratory Sciences Degree at the Faculty of Public Health and Nursing students at the Hariri School of Nursing.

It also offers courses to medical students and to graduate students in the graduate program leading to a master's degree (MSc) in Biomedical Sciences, MSc Biochemistry and a doctoral degree (PhD) in Biomedical Sciences or Biomedical Engineering.

The requirements for admission to the graduate program are a BS with prerequisites in chemistry and biology courses or a BS degree from a university and an academic record with a cumulative GPA of 3.3 and above. Students should have a background in chemistry, biology, or a related medical science degree. Students will spend a minimum of two years in the graduate program during which they must complete 21 credits of graduate courses, pass a comprehensive exam (BIOC 395 A/B), and submit a thesis (9 credits, BIOC 399 A/B/C/D/E) based on independent research. The 21 credits of graduate courses include a total of 14 credits of required core courses and 7 credits of elective courses.

Required MS courses in Biomedical Sciences track Biochemistry include: BIOC 302 (1 cr.); BIOC 305 (1cr.); BIOC 321 (1 cr.); BIOC 322 (1 cr.), BIOC 323 (2 cr.), BIOC 325 (2 cr.); BIOC 326-A/B (2 cr.); BIOC 330 (2 cr.) and IDTH 301 (2cr.).

Required PhD courses in Biomedical Sciences are listed on page 566 of the Graduate Catalogue.

Undergraduate Courses

The Department of Biochemistry and Molecular Genetics offers undergraduate courses to students in Allied Health Science Programs enrolled in the: Medical Laboratory Sciences Degree at the Faculty of Public Health and Nursing students at the Hariri School of Nursing.

It also offers graduate level courses to medical students and to graduate students in the graduate program leading to a master's degree (MS) in Biomedical Sciences, MSc Biochemistry and a doctoral degree (PhD) in Biomedical Sciences or Biomedical Engineering.

The requirements for admission to the graduate program are a BA with prerequisites in chemistry and biology courses or a BS degree from a university and an academic record with a cumulative GPA of 3.3 and above. Students should have a background in chemistry, biology, or a related medical science degree. Students will spend a minimum of two years

in the graduate program during which they must complete 21 credits of graduate courses, pass a comprehensive exam (BIOC 395 A/B), and submit a thesis (9 credits, BIOC 399 A/B/C/D/E) based on independent research. The 21 credits of graduate courses include a total of 14 credits of required core courses and 7 credits of elective courses.

Required MS courses in Biomedical Sciences track Biochemistry include: BIOC 302 (1 cr.); BIOC 305 (1cr.); BIOC 321 (1 cr.); BIOC 322 (1 cr.), BIOC 323 (2 cr.), BIOC 325 (2 cr.); BIOC 326-A/B (2 cr.); BIOC 330 (2 cr.) and IDTH 301 (2cr.).

Required PhD courses in Biomedical Sciences are listed on page 558 of the Graduate Catalogue.

Course Descriptions

BIOC 246 Biochemistry for Nursing 60.0; 4 cr.
A course that is tailored to nursing students. It provides students with brief and general information in chemistry and functional groups of carbon compounds that are required to understand biochemistry. The course discusses the main biochemical pathways in the cell, alluding to related disorders. It is composed of three units: (a) general chemistry (b) organic chemistry and (c) biochemistry. Offered to BS Nursing students. First semester.

BIOC 255 Biochemistry for MLSP 45.0; 3 cr.
The course is an introductory biochemistry course offered to undergraduate students in the Medical Lab Technology Program and related fields. A course that provides an overview of structure, function, and cellular metabolism of biological micro/ macro molecules. The course elaborates on the normal and abnormal metabolism highlighting their clinical relevance correlating basic information to disease situation. Second semester.

Graduate Courses

Courses in the graduate program are open to all graduate students enrolled in the various Biomedical Sciences programs in the various departments and in Biomedical Engineering as well as to science major graduates, such as Biology, Chemistry or related sciences upon the consent of the coordinator.

Required Courses

BIOC 305 a, b, c Biochemistry Research Seminars 0.30; 1 cr.
A required course that spreads over three terms. During their residency in the master's program, graduate students will register for: BIOC 305 a (0 cr.) during the second term of their first year; BIOC 305 b (0 cr.) during the first term of their second year; and BIOC 305 c (1 cr.), following their completion of a and b, during the second term of their second year. Each of BIOC 305 a, b, c will emphasize one or two biochemical or genetic themes. Students will be asked to present published research or literature reviews on a specific topic as advised by the different coordinators. Required from MS Biochemistry students.

BIOC 321 Nucleic Acids and Basic Genetics 15.0; 1 cr.
This course discusses the principles of nucleic acids structure and function in eukaryotes. It includes the information for basic genetics in terms of genome structure as well as the diversity of gene regulation. Required from MS and PhD students in Biomedical Sciences. Requires consent of coordinator for other graduate disciplines. First term.

BIOC 322 Protein and Enzyme Biochemistry 14.6; 1 cr.
This course deals with the biochemistry of proteins in general and enzymes in specific. It

discusses protein structures, folding process, and protein-protein interactions. It focuses on how changes at the structural level modify function. The course also elaborates on catalytic proteins, enzymes, differentiating Michaelis Menten from allosteric enzymes, estimating kinetic parameters, and emphasizing their regulation. Required from MS and PhD students in Biomedical Sciences and Biomedical Engineering. Requires coordinator approval for other graduate disciplines. First semester.

BIOC 323 Cellular Metabolism and Regulation 25.10; 2 cr.
The course provides a coherent account of structural and metabolic biochemistry. It emphasizes basic concepts of dynamic state and regulatory mechanisms that allow conflicting pathways and reactions to occur while maintaining homeostasis at the organ and inter-organ levels. Required from MS and PhD students in Biomedical Sciences. Requires coordinator approval for other graduate disciplines. Second semester.

BIOC 325 Receptors and Signal Transduction 25.10; 2 cr.
This course covers classical pathways involved in receptor signaling and activation of downstream targets and the molecular mechanisms involved. It deals with inter and intracellular communication, from the generation of signaling molecules through the cellular responses. Required from MS and PhD students in Biomedical Sciences. Requires consent of coordinator for other graduate disciplines. First term.

BIOC 326 A, B Bioinformatics Tools and Applications in Genomics 32.0; 2 cr.
This two-module course (1 credit/module) introduces students to the new field of Next Generation Sequencing (NGS). It covers different NGS applications involved in basic research and precision medicine. Students will learn about modern methods, concepts and techniques that are widely used in the field. The hands-on sessions will allow students to acquire basics of bioinformatics and genomics data analysis using state of the art tools and methods. Cases from the literature on genetics, cancer genomics and diseases in general will be discussed. Open to all graduate students from FM, FAS, FHS, FAFS and FEA. Both modules are required for the students of the Biochemistry and Molecular Genetics Department. Required. Prerequisite: Consent of coordinator. Second term.

BIOC 326A Bioinformatics Tools and Applications in Genomics: A focus on the Basics of Next Generation Sequencing 1 cr.
Bioinformatics Tools and Applications in Genomics: A focus on the Basics of Next Generation Sequencing.

BIOC 326B Bioinformatics Tools and Applications in Genomics: Next Generation Sequencing analysis for functional genomics and precision medicine: 1 cr.
Bioinformatics Tools and Applications in Genomics: Next Generation Sequencing analysis for functional genomics and precision medicine.

BIOC 330 Human Genetics and Genomics 32.0; 2 cr.
This course discusses the genetics and molecular basis of heredity and inherited traits, how genome organization affects the phenotype and the consequences of deregulation on traits and phenotypes including diseases and human evolution. It will introduce the animal models used in genetics research. The course will also discuss key genomic technologies, advances in prognostic and diagnostic genetic tests. It will review methods in determining heritability of traits and diseases by studying the larger population and teach how gene identification can help identify targets for therapeutics intervention and gene therapy. Required. Prerequisite: Consent of coordinator. Open to MS and PhD students in Biomedical Sciences. Requires coordinator approval for other graduate disciplines. Second semester.

BIOC 395A/B Comprehensive Exam 0 cr.
Prerequisites: Completion of 18- 21 credits with a GPA of 3.3 and consent of advisor.

BIOC 399 A/B/C/D/E MS Thesis 9 cr.
A 9 credit-hour course in which students conduct original research under faculty supervision. Faculty research focus includes: molecular mechanisms of inflammation, vascular biology, congenital heart problems, metabolism, metabolic disorders, mitochondrial toxicology, phenotype-genotype studies, Wilson's disease, diabetes and its complications (microvascular and macrovascular), atherosclerosis, sphingolipid metabolism, genetics of autism, dermatological disorder, cancer, cell death, herbal medicine, natural product remedies, liver injury, inflammation, traumatic brain injury causes and mechanisms, proteomics, bioinformatics.

Elective Courses

BIOC 302 Genetic Pathways in Organogenesis 15.0; 1 cr.
A course that aims at drawing all the pathways involved in early organogenesis in mammals. The students will be exposed to all the techniques that helped in understanding these pathways. Detailed mechanisms governing cell differentiation and tissue-specific gene regulation will be explained for select organs. Genetic networks involving genes encoding growth factors and transcription factors will be exposed and contrasted between the different organs. Examples of Mendelian inherited disorders caused by mutations in these genes will be discussed at the end. Required. Prerequisites: BIOC 321 and BIOC 322, or consent of the coordinator. Second term.

BIOC 303 a, b Molecular Biology of Cancer a) 15.0; 1 cr.; b) 30.0; 2 cr.
A 2-module course composed of BIOC 303 a (1 cr.) and BIOC 303 b (2 cr.) that is open to MSc. and or Ph.D.

BIOC 303 a: A course that deals with the regulatory mechanisms of tumor cell growth and cancer formation at the cellular, molecular, genetic and epigenetic levels. This course includes a discussion of recent developments in the intra and/or inter-cellular mechanisms involved in cellular proliferation, cell death and resistance to cancer therapeutics. The 1-credit elective course is open to all graduate students in basic Biomedical Sciences, Biomedical Engineering and Biology. Second term.
BIOC 303 b: A course that deals with more advanced topics in tumor biology, such as invasion and metastasis, cancer stem cells and animal models. The 2-credit elective course is recommended for graduate students whose research interest can benefit from a thorough knowledge of tumor biology. BIOC 303 is a prerequisite for BIOC 303 b. Students can register for both BIOC 303 a and BIOC 303 b. Second term.

BIOC 306 Mediators in Vascular Biology and Inflammation 32.0; 2 cr.
An elective course that deals with the different mediators of vascular biology and inflammation at the molecular and cellular levels. The major cell and mediator components of blood vessels and inflammation and their signaling pathways will be studied. Different inflammation and vascular–related diseases will be presented and discussed. The course will offer opportunities to analyze the recent scientific findings inflammation and vascular systems. Elective. Open to graduate students in basic Biomedical Sciences and Biology, and to medical doctors. Second semester.

BIOC 310 Molecular Basis of Genetic and Metabolic Disorders 16.32; 2 cr.
A course that deals with the molecular basis of genetic and metabolic disorders. This course presents a detailed overview of the molecular basis of known genetic diseases. Students also learn the methods used to map chromosomal aberrations or DNA mutations implicated in congenital diseases. A PhD elective course. Open to all graduates in Biomedical Sciences or related fields of study. Prerequisites: BIOC 321 and BIOC 322, or a background in biology. Second term; alternating years.

BIOC 314 Mitochondria: Genetics, Protein and Disease 15.0; 1 cr.
A course that provides a clear understanding of the biochemistry, molecular genetics and bioenergetics of the mitochondria (mt). It emphasizes the role of the mitochondrial dysfunction (mt-DNA mutations, environmental toxins) in the pathogenesis of mitochondrial diseases. Elective course open to all graduate students in basic Biomedical Sciences and Biology. Second term or summer; alternating years.

BIOC 316 Bioinformatics 0.30; 1 cr.
A course that introduces students to the latest bioinformatics literature. The format is a journal club in which recent journal articles are circulated and discussed. Guest lecturers are invited to present research related to the field. Students are also given an orientation on software currently available in the Computational Science and Bioinformatics Lab. Elective. Open to both basic Biomedical Sciences as well as Arts and Sciences graduate students. Prerequisites: Consent of instructor and graduate standing.

BIOC 317 (a-j) Special Topics in Biochemistry and Genetics 15.0; 1 cr.
A series of special elective courses (a-i), 1 credit each, which will emphasize the basic concepts and introduce recent developments in the fields of (a) Proteomics; (b) Metabolomics; (c) Genomics; (d) Lipidomics; (e) Enzymology; (f) Apoptosis; (g) Biochemistry of Inflammation; (h) Biochemical Toxicology; (i) Congenital Heart Problems; (j) Grant and Proposal Writing; (K) Forensic Biomedical Sciences part-1; (L) Forensic Biomedical Sciences part-2. Courses are open to medical doctors who would like to update their knowledge and to MSc/PhD graduates in biomedical and /or related fields. Elective. Prerequisite: Consent of coordinator. First/second /summer term.

BIOC 327 Precision Genomics: Cancer and Diabetes 15.0; 1 cr.
A 1-cr elective course that will explore the genetic and genomic alterations in diseases including cancer, and diabetes. It will review how genetics and genomics are currently being used in prediction of drug response, medical decisions, practices and applications. In addition, it will address the challenges faced when implementing genomics into the clinic setting, while addressing the ethical considerations. Elective. Prerequisite: Consent of coordinator. Open to Biomedical Science Graduates: MS, PhD as well as Medical students. Requires coordinator approval for other graduate disciplines. First semester.

Department of Dentofacial Medicine

Chairperson:	Ghafari, Joseph
Professors:	Barakat, Nabil (Adjunct Clinical); Geha, Hassem (Adjunct Clinical); Ghafari, Joseph (Tenured); Sabri, Roy (Adjunct Clinical)
Associate Professors:	Haddad, Ramzi; Macari, Anthony; Makary, Christian Pierre (Adjunct Clinical); Saadeh, Maria (Adjunct Clinical)
Assistant Professor:	Zeno, Kinan
Instructors:	Abou Chebel, Naji (Clinical); Ammoury, Makram (Adjunct Clinical); Chalala, Chimene (Adjunct Clinical)
Clinical Associates:	Abou Jaoude, Nadim; Abou Obeid, Fares; Afeiche, Nada; Anhoury, Patrick; Bou Assi, Samar; Chedid, Nada; El Chekie, Michelle; Feghali, Roland; Ghogassian, Saro; Hanna, Antoine; Itani, Mohammad; Kassab, Ammar; Kamel, Nadine; Karam, Ingrid; Metni, Hoda; Rezk-Lega, Felipe; Tabet, Kristel

The Department of Dentofacial Medicine offers post graduate residency training to dental graduates. The specialty program lasts 36 months and is designed to carry clinical activities in a scholarly environment where basic science and clinical orthodontics are integrated. A major part of the postdoctoral program consists of clinical education and training with a spectrum of treatment ranging from childhood to adulthood, including patients who require orthognathic surgery. In addition, residents are enrolled in the Master of Science (MS) in Orthodontics program. The completion of a research project and defense of a corresponding thesis, related to clinical or basic sciences, is a requirement toward certification. Under specific conditions related mainly to the research thesis PGY II and PGY III residents are allowed to spend a period of one month per year in approved US programs under appropriate conditions of attendance in the program.

Program and Curriculum

The curriculum leading to the degree of Master of MS in Orthodontics and a residency certificate is structured after the scientist-practitioner model with dual emphasis on the scientist and practitioner aspects of the profession. The program covers, in addition to achieving competence in clinical practice, two essential requirements (also stipulated for accreditation by the American Dental Association's Commission on Dental Accreditation) which are the following:

- The inclusion of core credits of basic science courses (e.g. somatic, craniofacial growth and development biomechanics of tooth movement, research design and statistics)
- The conduct of original research and the corresponding successful defense of a written thesis

The degree is pursued concurrently with the clinical specialty training, which is also subject to defined requirements for clinical certification.

Basic knowledge courses include material on growth and development of the craniofacial complex and body, anatomy, anthropology, imaging of the head, scientific method, biostatistics, dental materials and biomechanics.

Daily seminars and classes are scheduled in a planned sequence over the three years and cover the basic topics as well as those related to orthodontics and other specialties necessary for multidisciplinary treatment, such as periodontics, restorative and cosmetic dentistry, minor oral and orthognathic surgery, temporomandibular dysfunction and pediatric dentistry.

Technical clinical courses and actual treatment requirements are non-credit activities commensurate with the AUBMC residency requirements. The clinical sessions include treatment delivery in the dentofacial clinic, encompassing specific requirements for the correction of malocclusions in children, adolescents, and adults, as well as discussions of treatment planning, treatment progress and case reports. Practice is based on scientific evidence interpreted to the individual conditions of each patient.

The degree is awarded after successful completion of both didactic coursework and research (thesis defense).

Admission

Admission is offered on a highly selective basis only to students who have shown distinct academic ability and success on the entrance examination. The applications to the Residency and MS in Orthodontics are separate. The application process follows the conditions currently used at AUB and AUBMC for the MS degrees and the Residency. Final acceptance in the MS program will be through the Graduate Committee (MS requirements) and the Graduate Medical Education Committee (Residency), then through the institutional process.

The specific prerequisites for acceptance in the MS program include, in addition to the AUBMC general conditions for admission in an MS program, the following:

- Only applicants possessing the doctoral degree in Dental Medicine or its equivalent (Dental Surgery, Dentistry) from a recognized institution in Lebanon or abroad are accepted. The course requirements are designed to build upon the basic biological sciences common to those required for the dental doctoral degree.
- A cumulative average in dental school of at least 3.3 or its equivalent is required if ascertained by a school using a different grading system. The candidate may be accepted on probation if the grades are between B and B+.
- The candidate must pass the entrance examination that includes practical (wire bending), written exam, and oral exams. This balanced and comprehensive examination helps evaluate the candidate's critical and scientific approach to dentistry in general and orthodontics in particular.
- Evidence of proficiency in English is required by passing the English Language Proficiency Requirement or its equivalent as required by AUB. (refer to the requirements listed in the Graduate Studies section of the AUB graduate catalogue).
- Applicants will also be interviewed.

Courses and Credits

The total number of credits required for the proposed MS in Orthodontics is 30. The Graduate Studies Committee may waive a maximum of 6 credits of graduate course work taken as part of the candidate's dental graduate studies upon the proposal of the Orthodontic Admissions Committee. Accordingly, a total of 24 credits including the 9 research thesis credits represent the minimal requirement. Elective courses are offered as part of the MS courses within the scope of potential research topics from clinical to interdisciplinary research. Didactic courses make up nearly a third of the curriculum. They include lectures, seminars, literature review sessions, journal club, research presentations and case discussions.

Typically, the core courses and related course work will be completed within the first two years of the program. The clinical specialty training will span over the three years of study. Most of the research will take place in years two and three, with a major focus on the research project and thesis defense in the third year. The degree will not be awarded no earlier than three years after matriculation in the program.

Clinical Curriculum

The clinical component encompasses a spectrum of treatments ranging from childhood to adulthood, including management of patients who require orthognathic surgery and those with craniofacial anomalies (e.g. cleft lip/palate). Trainees will be exposed to a variety of disorders and training experiences. Each resident will have a range of problems to treat that cover a full scope of malocclusions and craniofacial anomalies, as well as a spectrum of treatment approaches and mechanics, including orthognathic surgery of skeletal dysplasias. Supervised clinical activities are supplemented with classroom activities (seminars, case presentations, literature review).

Research

The research project may be clinical or basic. Each student will have the opportunity to develop strong research skills and conduct an original study fulfilling rigorous scientific norms. Students will register for courses in clinical and basic research methods (relative to applicable research) and elective basic medical and health sciences that are needed for the conduct of the specific project. The residents will be initiated into the formulation of research hypotheses, research design, and statistical analyses that should provide them with the skills required to complete theses of publishable quality.

Collaborative projects between AUB faculties foster the concept of inter-professional cooperation, bringing together medical/dental disciplines with not only public health (most natural alliance) and business (e.g. medical management, third party pay and insurance development), but also engineering (e.g. biomedical engineering developments) and education (e.g. education policy, higher education management). Participation of mentors from other faculties/departments is based on mutual interests between the specialties and actual professors from both sides.

Faculty

All faculty members in the program are full-time or part-time associated faculty. Depending on the courses and instruction they provide, their role is either in the basic studies, the clinical program or both. Credentials of the teaching faculty are distinguished including clinicians with certification from highly recognized orthodontic programs, including the AUB program, and American or European specialty boards.

Course Descriptions

The Department of Dentofacial Medicine offers postgraduate courses to dentists specializing in Orthodontics at the American University of Beirut Medical Center/Faculty of Medicine. The courses required for the MS in Orthodontics are listed below. They do not include elective courses listed in the catalogue of graduate FM, FHS and other AUB faculties.

ODFO 301 Craniofacial Growth and Development 48; 3 cr.
This course focuses on basic growth concepts and mechanisms (including underlying biological and cellular growth events), the main craniofacial components (cranial base, maxilla and mandible, and their interrelationships at different stages of growth), the tissues involved in facial growth (bone, cartilage, muscle and teeth), the relationship between main somatic and facial growth, and the development of growth deformities. Lectures, seminars, review of key articles and presentations by residents of selected assignments.

ODFO 302 Craniofacial Imaging, Craniofacial Imaging I, Principles and applications of advanced radiology, Craniofacial Imaging II, Cephalometric method and science 48.0; 3 cr. 8.0; 0.5 cr. 30; 1.9 cr.
This multifaceted series includes lectures and laboratory applications through assignments to impart knowledge on correspondence of cephalometric radiographs to anatomy, assessment of craniofacial growth and maxillofacial orthopedic treatment, visualization of orthodontic/orthognathic surgical treatment, simulation of growth and treatment outcome. Lectures, seminars, review of key articles and presentations by residents of selected assignments.

Craniofacial Imaging III Applications of 3D Imaging in Orthodontics 10.0; 0.6 cr.
This advanced knowledge series encompasses current and developing methods utilizing 3D technology related to: diagnosis and treatment planning of specific conditions (e.g. impacted canines, orthodontic- surgical treatment, airway assessment, placement of mini-implants); biologic boundaries of tooth movement; use of CBCT in orthodontic research (e.g. volume assessment of palate and chin); assessment of treatment changes upon 3D cephalometric and palatal rugae superimpositions; modelling and prediction of tooth movement, including the utilization of finite element analysis. Lectures, seminars, review of key articles and presentations by residents of selected assignments.

ODFO 303 Biology and Mechanics of Tooth Movement and Properties of Wire 48; 3 cr.
Biological responses to and physical principles of tooth movement. Lectures, seminars, review of key articles and presentations by residents of selected assignments.

ODFO 304 Research Science: Method, Design and Conduct 26.12; 2 cr.
A guided laboratory course in methods used as aids in morphologic research. Lectures, seminars, review of key articles and presentations by residents of selected assignments.

ODFO 305A/ODFO 305B General and Maxillofacial Medicine Issues in dentistry and medicine. 16; 1 cr.
Lecture series by invited speakers from various medical and dental fields pertinent to the science of orthodontics and medical/dental care (e.g. nose anatomy and physiology, pediatric Otorhinolaryngology, head and neck pathology, genetics principles, counseling and prenatal diagnosis, sleep apnea, practical concepts on general anesthesia, pharmacology, and pain management).

ODFO 306 Journal Club 1 cr.
Weekly

ODFO 307 Craniofacial Seminar 1 cr.
Monthly over 3 years.

ODFO 395 Comprehensive Exam 0 cr.
Comprehensive Exam

ODFO 399 MS Thesis 9 cr.
Original research under staff supervision leading to the MS degree.

ODOC 3800/ODOC 3900 Clinical Clerkship 0 cr.
The course includes pretreatment (record taking, diagnosis and treatment planning) and treatment (morning and afternoon sessions in the Dentofacial Clinic). Modules. Daily.

ODOC 3000 Courses in Orthodontics 0 cr.
Exposure to orthodontics and its allied fields. Daily.

ODFO 301S Community Service Project 0 cr.
Development of, or involvement in, project that benefit the community.

Residency and Master of Science in Clinical Orthodontics

Orthodontics Postgraduate Courses

Core Courses (ODFO)		Year	Credit Hrs.
Craniofacial Biology and Imaging			
ODFO 301	Craniofacial Growth and Development	1	3 cr.
ODFO 301A	Craniofacial Development		
ODFO 301B	Somatic Growth		
ODFO 301C	Development of the Dentition		
ODFO 301D	Facial Musculature in Orthodontics		
ODFO 302	Craniofacial Imaging		
ODFO 302A	Craniofacial Imaging I: Basics of Radiographic Imaging	1	0.5 cr.
ODFO 302B	Craniofacial Imaging II: Cephalometrics	1	1.9 cr.
ODFO 302C	Applications of 3D Imaging in Orthodontics	1	0.6 cr.
ODFO 303A	Biology of Tooth Movement		
ODFO 303B	Mechanics of Tooth Movement		
ODFO 303C	Properties of Wires		

General and Maxillofacial Medicine			
ODFO 305	General and Maxillofacial Medicine – Issues in Dentistry and Medicine	1/2/3	
ODFO 305A	Comparative mammal anatomy (2), nose anatomy and physiology (2), pediatric Otorhinolaryngology (2), overview of head and neck anatomy pathology and treatment (4), speech pathology (2), sleep apnea (4)		1 cr.
ODFO 305B	Genetics principles, counseling and prenatal diagnosis (2); practical concepts on general anesthesia (3), pharmacology (3), pain management (4), overview of adolescent medicine (2), jurisprudence and patient privacy (2)		1 cr.
Scientific Methods and Reviews			
ODFO 304	Research Science: Method, Design and Conduct Scientific Method and Research Design	1	2 cr.
ODFO 306	Journal Club	2/1	1 cr.
Craniofacial Anomalies			
ODFO 307	Craniofacial Seminar	1/2/3	1 cr.
Elective Courses			
Credits in the existing AUB FM/FHS/other faculties graduate programs, if deemed relevant to the field of individual research and upon recommendation by the research adviser.			2 to 6 cr.
ODFO 399	Thesis	3	9 cr.

Department of Dermatology

Chairperson:	Kibbi, Abdul-Ghani
Professors:	Abbas, Ossama; Kibbi, Abdul-Ghani; Kurban, Mazen; Rubeiz, Nelly; Zaynoun, Shukrallah (Clinical)
Assistant Professors:	Abou Rahal, Jihane; Saade, Dana
Clinical Associates:	Abd-el-Baki, Jasmin; El-Saad-Debahy, Nada; Muallem, Maya; Salman, Salah

The Department of Dermatology offers a course, "The Skin" (IDTH 229) to Medicine I students. Elective and selective clerkships are also available for Medicine IV students, interns and house staff, as well as for foreign medical students and graduates. A three-year residency training program in dermatology, accredited by the Arab Board of Health Specializations and its Scientific Council of Dermatology and Venereology, is offered to MD graduates following a one-year internship. The goal of the training program is to produce fully competent dermatologists capable of providing a broad spectrum of quality care to patients. Residents in training are involved in daily general and specialty clinics, including phototherapy, dermatologic surgery, skin oncology, hair and nail and connective tissue clinics.

An equivalent tuition fee-based residency training program is also open to foreign medical graduates. For more information regarding qualifying examination and prerequisite criteria, please follow the link to the "Admission to GME Programs" page at http://website.aub.edu.lb/fm/gme/adm_info/Pages/Adm_info.aspx

IDTH 229 The Skin

This course introduces first year medical students to basic skin physiology and pathology and is designed in accordance with the Impact Curriculum. Basic concepts are presented in which students are expected to learn the scientific basis of the normal physiology and pathology of the skin and its appendages, including hair and nails as well as mucosal surfaces. Mechanisms of disease causation are illustrated with clinically relevant examples.

DERM 267 Elective in Dermatology 9.90-180.

Students participate in the morning clinics (general dermatology) and afternoon clinics (including hair and nail and Genodermatoses clinics), as well as seminars, conferences, journal club and assignments of audio-visual teaching material. Students can participate in on-going clinical research programs. At the end of the four-week rotation, a final examination is offered to students. This course is offered to AUB and Non-AUB students. Four weeks.

DERM 277 Selective in Dermatology 9.90-180.

Dermatology is the study of skin in health and disease. The goal of this selective is to share with fourth year medical students our enthusiasm for the subject of dermatology and to administer a well-organized, informative and focused course. During this rotation, the essentials of morphology, diagnosis and management will be underscored. By the end of the course, students are expected to acquire basic clinical dermatology and to work up and manage patients with skin, hair, nail and mucous membrane disorders. A final exam is offered at the end of the year for all students. This course is offered only to fourth year medical students enrolled in AUB. Four weeks.

DERM 287 House Staff 9.131-262.
Same as DERM 267; offered to straight and rotating interns and residents of other departments on an elective basis. One month.

Weekly Conferences

Journal club, journal club for electives, grand rounds/case discussion, basic science seminar, clinical slides/differential diagnosis, genodermatoses lecture series, dermatopathology conferences, Bolognia book review, dermoscopy seminar, laser lecture series and dermatologic surgery conference.

Monthly Conferences

Consultation review, attending staff lecture, research meeting, and basic science journal club. For further details, visit the Department of Dermatology website at
https://www.aub.edu.lb/fm/Dermatology/Pages/default.aspx

Department of Diagnostic Radiology

Interim Chairperson:	Berjawi, Ghina
Professors:	Haddad, Maurice; Hourany-Rizk, Roula; Hourani, Mukbil; Berjawi, Ghina; Khoury, Nabil
Associate Professor:	Haidar, Mohamad
Assistant Professors:	Abi Ghanem, Alain; Moukaddam, Hicham; Mourany, Bassem; Muallem Nadim; Nassar, Lara
Instructors:	Khouzami, Riad; Natout, Mustafa; Tamer, Christel
Adjunct:	Al-Kutoubi, Aghiad; Bou Ayache, Jad; Lutfi, Shukri; Salah, Fatima; Sawan, Peter
Clinical Associates:	Abi Fakher-Saab, Faysal; Chebli, Hala; Hobeika, Carla; Geara, Aline; Mehanna, Mayssoun; Nader, Reine; Ngheiui, Ziad

The Department of Diagnostic Radiology offers elective clerkships to medical students, electives to interns and residents, and a five-year residency training program.

DGRG 268 Elective in Diagnostic Radiology 0.180
Open to fourth year medical students within and outside AUB who would like to consolidate their knowledge in radiology. This elective involves attending lectures specifically designed for medical students, read-out sessions with residents & faculty and scientific activities in the department. 4 weeks.

DGRG 287 Student Internship 0.262-1048
Open to all interns and residents. This internship involves attending tutorial and read out sessions and scientific activities in the department. Duration 1-2 months. 1 month (Non-radiology interns & residents). 2 months (AUB future radiology residents).

Weekly Conferences

The Department of Diagnostic Radiology organizes teaching activities divided into 13 organ-based blocks: General Radiology, Emergency Radiology, Ultrasound, Breast, Gastrointestinal Radiology, Genitourinary Radiology, Neuro Radiology, Vascular Intervention Radiology, Musculoskeletal Radiology, Pediatric Radiology, Nuclear Medicine, Cardiothoracic Radiology and Cardiac Imaging.

Department of Emergency Medicine

Chairperson:	Hitti, Eveline
Professors:	Kazzi, Amin; Hitti, Eveline; El Sayed, Mazen
Associate Professors:	Abou Dagher, Gilbert; Mufarrij, Afif; Bou Chebl, Ralph
Adjunct Associate Professors:	Kazzi, Ziad; Hamam, Mohamad; Harmouche, Elie; Sawaya, Rasha Dorothy
Assistant Professor:	El Zahran, Tharwat
Instructors:	Faris, Nagham (Clinical); El Helou, Rachelle (Clinical); Skoury, Assaad (Clinical)
Clinical Associates:	Alameddine, Kawsar; Anka, Mariam; Chalhoub, Sana; El Mais, Amro; Ghanem, Mario; Ghalayini, Nisrine; Farah, Karim; Fares, Sobhi; Hoballah, Hassan; Hakim, Michel; Helbawi, Ali; Ismail, Ali; Itani, Ziad; Kanso, Mohamad; Kreidieh, Ibrahim; Laham, Sami; Maatouk, Ali; Ozoor, Khodor; Rammal, Abdallah; Romani, Diala; Tabaja, Ali; Traboulsy, Sarah; Lakkis, Farah; Moukhaiber, Jihane; Abdul Nabi, Sarah; Bou Assi, Joseph; Samoity, Lidia; Abou Daher, Ghadi; Saab, Aed

The Department of Emergency Medicine (EM) at AUBMC is one of the busiest Emergency Departments (ED) in Lebanon seeing 5-year-average annual volume of 54000 patient visits. ED physicians, nurses and ancillary staff are highly experienced and trained in emergency medical care and provide timely, high-quality care to patients with acute illnesses or injuries. The ED has full-time, round-the-clock, attending level physician coverage by physicians trained in the treatment of all acute care illnesses from medical and surgical cases to pediatric and obstetrics acute care.

Educational Programs

In June 2012, the Department of Emergency Medicine established its first properly supervised EM training program in Lebanon. The program is a four-year curriculum with five categorical positions. All core faculty are emergency medicine trained physicians. Trainees are exposed to the spectrum of acute care illnesses in adult and pediatric patients and have structured, didactic sessions and hands-on workshops. In addition to a robust clinical experience, the program offers integrated research and administrative rotations that are meant to develop skills required to become leaders in the field. In the fall of 2015, the program earned its ACGME-I accreditation, and thus became the first Emergency Medicine Graduate Education Program in the country and one of a few in the region to receive this prestigious certification.

EMMD 262 Clinical Clerkship in Emergency Medicine
A clinical clerkship in which fourth year medical students will learn and work in the AUBMC

Emergency Department (ED). Students will play an active role in the ongoing care of the ED patient and will be responsible for the initial evaluation of assigned patients. They will obtain a thorough history and perform a focused physical exam, formulate a differential diagnosis, suggest diagnostic workup and treatment plan, and determine a disposition for each of their assigned patients under the direction of senior residents and faculty. They will be required to complete a total of five weeks of clinical rotation during which they are expected to be present for up to 17 shifts and to attend and contribute to the educational sessions taking place in the department. Students will acquire important procedural skills by being exposed to and encouraged to participate in the supervised performance of a wide variety of procedures in the ED. The weekly clerkship conference series runs over four weeks and includes a wide variety of topics and workshops that are pertinent to EM practice. Students will sit for the NBME examination for Emergency Medicine at the end of their fourth medical year.

Department of Experimental Pathology, Immunology and Microbiology

Chairperson:	Matar, Ghassan
Professors:	Khoury, Samia; Matar, Ghassan; Sayegh, Mohamed
Associate Professors:	El Hajj, Hiba; Rahal, Elias; Shirinian, Margret; Zaraket, Hassan
Assistant Professors:	Abou Fayad, Antoine; Al-Awar, Ghassan; Massaad, Michel; Bilen, Melhem; Esber, Saba

The Department of Experimental Pathology, Immunology and Microbiology offers courses to medical laboratory sciences (MLSP) students as well as to nursing, medical and graduate students. It offers a graduate program (discipline of Microbiology and Immunology) leading to a master's degree (MS) or doctoral degree (PhD) in Biomedical Sciences.
The requirements for admission to the graduate program are stated on page 29 of this catalogue.

IDTH 203 The Immune System in Health and Disease 37.28; 3 cr.
See Interdepartmental Courses.

IDTH 205 Microbiology and Infectious Diseases 37.28; 5 cr.
See Interdepartmental Courses.

MBIM 223 Parasitology for MLSP Students 39.39; 4 cr.
A course of diagnostic parasitology. Second term.

MBIM 237 Microbiology and Immunology for Nursing Degree Students 32.64; 3 cr.
A course on the fundamental aspects of medical microbiology and immunology for nursing students. Second term.

MBIM 260 Elective in Infectious Diseases for Medicine III and IV 0.180
A course on basic evaluation, diagnosis and management of infectious diseases. One month.

MBIM 261 Elective in Immunology for Medicine III and IV 0.180
A course that is an introduction to immunological research and its application to clinical practice. One month.

MBIM 310 Basic and Medical Immunology 32.32; 1 cr.
A course on innate and adaptive immune mechanisms, infection and immunity, vaccination, immune mechanisms in diseases and tissue injury and therapeutic immunology. Second term.

MBIM 311 Basic and Medical Bacteriology 32.32; 3 cr.
A course on the characteristics and classification of medically important bacteria, diseases caused by bacteria, anti-bacterial agents, susceptibility testing, prophylaxis and therapy. Second term.

MBIM 312 Basic and Medical Parasitology-Mycology 16.32; 2 cr.
A course on the characteristics of medically important parasites and fungi, diseases caused by parasites and fungi, anti-parasitic and anti-fungal agents, prophylaxis and therapy. Second term.

MBIM 313 Basic and Medical Virology 16.32; 2 cr.
A course on the characteristics and classification of medically important viruses, diseases caused by viruses, anti-viral agents, prophylaxis and therapy. Second term.

MBIM 314 Tutorial in Immunology 32.0; 2 cr.
Tutorial in Immunology.

MBIM 315 Tutorial in Bacteriology 32.0; 2 cr.
Tutorial in Bacteriology.

MBIM 316 Tutorial in Virology 32.0; 2 cr.
Tutorial in Virology.

MBIM 317 Tutorial in Parasitology-Mycology 32.0; 2 cr.
Tutorial in Parasitology-Mycology.

MBIM 318 Fruit Flies: Experimental Model Organism 1 cr.
A course designed to introduce graduate students to a variety of topics and techniques including the latest approaches for studying human diseases using Drosophila melanogaster as a model system. The course also includes hands-on laboratory sessions.

MBIM 319 Natural Products as Anti-Infective Agents 1 cr.
The course will cover screening methods, biosynthesis, and mode of action of novel anti-infective, in addition to early pharmacokinetics and pharmacodynamics properties. Second term. Prerequisite course: BIOC322.

MBIM 320 Microbiology and Immunology 3 cr.
A course on the fundamental aspects of basic and medical microbiology and immunology offered to non-Microbiology & Immunology graduate students at the MS and PhD levels. First term.

MBIM 326 Applied and Advanced Basic and Medical Immunology 32.64; 1 cr.
A treatise on advances in immunological diseases, their molecular mechanisms and their laboratory diagnosis. Second term. Alternate years.

MBIM 327 Advanced Basic, molecular and Medical Bacteriology 32.64; 1 cr.
A treatise on advances in the epidemiology, pathogenesis, immune response, diagnosis and prevention of bacterial infections, with particular emphasis on bacterial genetics and antimicrobial resistance. Second term. Alternate years.

MBIM 328 Applied and Advanced Basic, molecular and Medical Parasitology 32.64; 1 cr
A treatise on advances in the epidemiology, pathogenesis, immune response, diagnosis and prevention of parasitic infections. Second term. Alternate years.

MBIM 329 Applied and Advanced Basic, molecular and Medical Virology 32.64; 1 cr.
A treatise on advances in the epidemiology, pathogenesis, immune response, diagnosis and prevention of viral infections. Second term. Alternate years.

MBIM 330 Molecular Microbiology 32.64; 3 cr.
A course on molecular applications on the identification of infectious agents. Second term. Alternate years.

MBIM 331 Infection Control 16.0; 1 cr.
A treatise on the prevention of infections in the laboratory. Second term.

MBIM 390 Seminar 0.32; 1 cr.
Annually

MBIM 394 Journal Club 0 cr.
Annually

MBIM 395A/B Comprehensive Exam 0 cr.
Prerequisite: Consent of advisor.

MBIM 399 A/B/C/D/E MS Thesis 9 cr.
MS Thesis

Department of Family Medicine

Interim Chair:	Musharrafieh, Umayya
Professors:	Antoun, Jumana; Musharrafieh, Umayya; Saab, Bassem; Usta, Jinan
Associate Professors:	Mufarrij, Afif; Romani, Maya; Sakr, Carine
Assistant Professors:	Assaf, Georges; Khater, Beatrice; Rahme-Ballan, Diana; Osman, Mona; Shararah, Nabil; Zahran, Tharwat
Instructors:	Khaddaj, Wajdi; Khattar, Joe; Lakissian, Zavi; Makarem, Nisrine; Moukheiber, Sami; Razzouk, Jibrayil
Clinical Associates:	Alayan, Nour; Badr, Samia; Chalhoub, Wissam; El Ashkar, Khalil; Ghanem, Mario; Hleis, Sani; Lakkis, Najla; Maalouf, Grace; Makhlouf-Akel, Madeleine; Malek, Elie; Rahimi, Rose Maria; Sarkis Habib Ishak, Hala; Zeidan, Randa

The Department of Family Medicine offers a clinical clerkship and specialty electives to fourth year medical students. It also offers a postgraduate training program to physicians at the end of which they are eligible to sit for the Arab Board of Family Medicine.

Residency Program

The Department of Family Medicine offers a three-year training program. Residents who like to sit for the Arab Board will have an extra year. The goal of training is to produce competent, community-oriented family physicians capable of providing high-quality care to their patients. The program consists of rotations in the different clinical departments of the Faculty of Medicine, as well as ambulatory primary health care experience in the Family Medicine Clinics, emergency services at AUBMC, and satellite centers. All residents are required to sit for the In-training Examination of the American Board of Family Medicine during the first three years.

FMMD 262 Clinical Clerkship 0.180.
The purpose of this clerkship is to expose medical students to the principles and practice of family medicine, caring for people of all ages in their communities through a patient-centered and team-based approach emphasizing the bio-psychosocial model. It upgrades the medical students' knowledge of common problems and their skills in the application of preventive medicine in a community oriented primary care setting. Students see patients under supervision in the Family Medicine Clinics and other satellite clinics in the community. They also conduct site visits to community-based health programs to gain exposure to the various resources available in the community. Offered to fourth year students. They attend special lectures and workshops tailored to their needs, including MSK lectures, topics related to integrative medicine and will get a certificate in Lifestyle Medicine Coaching. One block; 4 weeks.

FMMD 267 Elective 0.180.
An elective in family medicine which can be tailored to the needs of the resident/ student and their program requirements including introduction to integrative health and wellness.

Teaching Activities

The department holds topic conferences, core content lectures, journal clubs, morning reports, research forums, patients from our practice, practice management, guest lectures, and workshops.

Family Medicine Added Qualifications Fellowships

The Department of Family Medicine has established three new fellowships. “The Primary Care Sports Medicine Fellowship”, “The Occupational and Environmental Medicine Fellowship”, and “Geriatric Medicine fellowship”.

- The Primary Care Sports Medicine Fellowship offers a 1-year integrated academic and clinical program. It prepares the primary care physician to deliver evidence based, safe and quality musculoskeletal care. Applicants should have completed a residency training in Family Medicine, Internal Medicine, Pediatrics or Emergency Medicine.
- The Occupational and Environmental Medicine Fellowship offers a 2-year integrated academic and clinical program. It trains the physicians to be proficient in all aspects of the practice of Occupational and Environmental Medicine. Completion of the program leads to certification in Occupational and Environmental Medicine and a master’s degree in public health. Applicants should have completed a residency training in Family Medicine or Internal Medicine.
- The Geriatric Medicine fellowship offers a 2-year integrated academic and clinical program. Training occurs in different settings, in hospital, clinics, and nursing home. Fellows also receive training in palliative care. Applicants should have completed a residency training in Family Medicine or Internal Medicine.

University Health Services (UHS)

The Department of Family Medicine is responsible for providing comprehensive primary care services to the AUB community including students, faculty, staff and their dependents at the Family Medicine Clinics and Advancing Research Enabling Communities Center AREC (Bekaa) rural clinic.

Employee Health

The Department offers Employee Health services to the University including the Medical Center.

Faculty Development

The Department provides faculty development courses to primary care physicians from Lebanon and the region. Subjects covered include Integrative Health, Evidence Based Practice, Health Information Systems, Communication Skills, Primary Care Centers Practice Management, Employee Health and Travel Medicine.

Satellite Clinics

The Department of Family Medicine assists various Non-Governmental Organizations (NGOs), governmental and private organizations in managing their primary care clinics. It is currently sending residents to different community-based NGO clinics.

Department of Internal Medicine

Interim Chair:	Abu-Alfa, Ali
Professor Emeritus:	Cortas, Nadim (Dean Emeritus); Berbari, Adel (Professor Emeritus)
Professors:	Abu-Alfa, Ali; Akl, Elie; Alam, Samir; Arnaout, Samir; Badr, Kamal; Barada, Kassem; Bazarbachi, Ali; Bou Khalil, Pierre; Dakik, Habib; El-Hajj Fuleihan, Ghada; El-Saghir, Naji; Ghazzal, Ziyad; Husari, Ahmad; Kanj-Sharara, Souha; Khuri, Fadlo; Mallat, Samir; Mourad, Fadi; Nasrallah, Mona; Refaat, Marwan; Salti, Ibrahim; Sawaya, Jaber (Clinical); Shaib, Yasser; Shamseddine, Ali; Sharara, Ala'; Soweid, Assaad; Taher, Ali; Tamim, Hani; Tfayli, Arafat; Uthman, Imad; Ziyadeh, Fuad
Associate Professors:	Abi-Saleh, Bernard; Arabi, Asma; Assi, Hazem; Bassil, Nazem; Bouakl, Imad; Daniel, Fady; Daouk, Majida; El Cheikh, Jean; Hajjar, Ramzi; Kanafani, Zeina; Khoury, Maurice; Medawar, Walid; Rebeiz, Abdallah; Salem, Ziad; Sawaya, Fadi; Tabbarah, Zuhayr (Clinical); Temraz, Sally; Zeineldine, Salah
Assistant Professors:	Abou Dalle, Iman; Al-Awar, Ghassan; Chakhtoura, Marlene; Choucair, Mahmoud; El Bejjani, Martine; Gharzuddine, Walid; Kanj, Nadim; Masri, Abdul-Fattah (Clinical); Merashli, Mira; Rizk, Nesrine; Tanios, Bassem; Zakhem, Aline
Instructors:	Bou Fakhreddine, Hisham; El Asmar, Noel; Farah, Pamela; Kreidieh, Firas; Moukadem, Hiba; Moukalled, Nour
Adjunct Faculty members:	Mohty, Mohamad (Adjunct Professor); Sayegh, Mohamed Hassan (Adjunct Professor); Mukherji, Deborah (Adjunct Clinical Associate Professor); Bizri, Abdul Rahman (Adjunct Clinical Assistant Professor); Ghusn, Husam (Adjunct Clinical Assistant Professor); Karam; Sabine (Adjunct Clinical Assistant Professor)
Clinical Associates:	Abboud, Diana; Alkawam, Lamees; Allaw, Fatima; Amhaz, Ghid; Baydoun, Omaya; El-Imad, Zuhayr; Farah, Karim; Farran, Abbas; Harb, Wissam; Hilal, Nadeen; Issa, Zeinab; Mohamad, Rayan; Othman, Mahmoud; Rayshouni, Hamza; Rhayem, Caline; Saleh, Munzer; Sukkariyeh, Ismail

The Department of Internal Medicine offers courses, clinical clerkships and specialty electives to medical students. It also offers clinical post-graduate training to MD graduates including residency and subspecialty fellowships. The Residency Program offers two tracks, which are a 1-year training (Preliminary Track) and a 3-year training (Categorical Track).

The Fellowship training following the residency period is offered in these subspecialties: cardiology, endocrinology, gastroenterology, hematology-oncology. Nephrology and hypertension, infectious diseases, pulmonary, critical care and sleep medicine, and rheumatology.

INMD 246 Clinical Clerkship in Internal Medicine 120.540
A clinical clerkship during which third year medical students spend two months on the ward and one month in the outpatient department (OPD). On the ward, students work up and follow patients under the supervision of senior residents and faculty. They are responsible for taking the history, performing the physical examination, following laboratory work and writing supervised notes in the charts on assigned hospital patients. Throughout their rotations students are required to attend clinical conferences, and to prepare and participate in clinical discussions.

INMD 254 Infection Control 6.34; 1 cr.
A course given to Med III students to increase their awareness and expertise in infection control as it relates to the protection of patients as well as the health-care worker from iatrogenic infection. The course aims to ensure that students understand their responsibility in infection control and apply scientifically acceptable infection control principles. This course is given as an online presentation followed by a series of questions. Students should also pass a written examination.

INMD 262 Clinical Clerkship in Internal Medicine 0.540
A clinical clerkship in which fourth year medical students work in their capacity as junior interns (sub-internship) on the medical floors of the hospital. They are responsible for admission work-up of patients, and their follow-up under the supervision of the attending physician and team resident. They are also required to attend clinical conferences, present at the student report activity, and prepare and participate in clinical discussions.

INMD 267 Elective in Internal Medicine Subspecialties 0.180-360.
An elective is offered to fourth year medical students in one or more of the subspecialties of internal medicine, including cardiology, endocrinology, gastroenterology, general medicine and geriatrics, hematology-oncology, nephrology and hypertension, infectious diseases, pulmonary medicine and critical care, and rheumatology.

Department of Neurology

Chairperson:	Atweh, Samir
Professors:	Atweh, Samir; Beydoun, Ahmad; Khoury, Samia; Sawaya, Raja
Associate Professor:	Nasreddine, Wassim
Assistant Professors:	El Ayoubi, Nabil; El Halabi, Tarek
Clinical Instructor:	Doumiati, Hassan
Clinical Associate:	Makki, Ashraf
Adjunct Associate Professor:	Chemali, Zeina; Salameh, Johnny

The Department of Neurology, established in July 2011, offers clinical clerkships and electives to MED IV students. The department also participates in teaching preclinical students the Basic Neuroscience course. The department offers a 4-year post-graduate residency training program in Clinical Neurology as well as post-residency fellowships in Epilepsy, Neuromuscular Diseases and Multiple Sclerosis. Residents sit for the RITE examination offered by the American Academy of Neurology.

NEUR 262 MED IV Clinical Clerkship in Neurology 90.90
MED IV students rotate for 2 weeks on the inpatient neurological service and the neurological intensive care, and 2 weeks on the Neurology consult service and the Emergency room. They have daily attending teaching rounds and lectures, as well as attending daily neurology clinics and neurology grand rounds.

NEUR 267 Elective in Neurology 0.180
Elective rotations are offered to MED IV medical students and house staff where they rotate for 4 weeks on the consult service and outpatient clinics. They attend daily rounds, lectures and weekly grand rounds.

IDTH 230 Brain and Cognition Course 80.80
This course is intended to provide preclinical medical students with an integrated approach to the structure and function of the nervous system. Basic principles of neuroanatomy, neurocytology, neuroembryology, neuroradiology, neurophysiology and neurology will be related to the function of the normal and diseased human nervous system, and the action of drugs. Concepts in social and preventive medicine, epidemiology and medical ethics are explored in relation to diseases of the nervous system.

Weekly Conferences

The Department of Neurology organizes general neurology conferences including Neurology Grand Round, Mortality and Morbidity conferences, Core Curriculum Lectures, Neuroscience Reading Club, Journal Club, as well as a weekly Multiple Sclerosis (MS) conference.

Department of Obstetrics and Gynecology

Chairperson:	Nassar, Anwar
Professors:	Bazi, Toni; Ghazeeri, Ghina; Hannoun, Antoine; Karam, Karam: Khalil, Ali (Clinical); Nassar, Anwar; Usta, Ihab
Associate Professor:	Chamsy, Dina
Assistant Professors:	Abdallah, Reem; Adra, Abdallah; Aswad, Naji (Clinical); El Khoury, Nabil; Hobeika, Elie
Clinical Associates:	Atallah, Sandrine; El Kak, Faysal; Malas, Salah; Yared; Georges

The Department of Obstetrics and Gynecology offers clinical clerkships and specialty electives to medical students. It also offers clinical postgraduate training to MD graduates. The residency program is a four-year specialty training in obstetrics and gynecology. A minimum of four categorical postgraduate year 1 (PGY1) students are accepted yearly. All residents sit for a yearly examination of the Council for Resident Education in Obstetrics and Gynecology administered by the American College of Obstetrics and Gynecology. The Program is ACGME-I accredited and is recognized by the Arab Board of Medical Specialties. The Department of Obstetrics and Gynecology has initiated a 2-year fellowship program in Reproductive Endocrinology and Infertility as of June 2014. One fellow is accepted every year.

OBGY 247 Clinical Clerkship 47-360.
A clerkship is offered to third year medical students consisting of seminars in normal and abnormal obstetrics and gynecology, weekly grand rounds, monthly special grand rounds, and a clinical clerkship divided into delivery suite, gynecological service and outpatient clinics. Other activities include specialty clinics in reproductive endocrinology and infertility, family planning, gynecologic oncology, maternal fetal medicine and urogynecology. Eight weeks.

OBGY 248 Elective in Obstetrics and Gynecology 0.180-360.
Exposure to selected general obstetrics and gynecology or subspecialties in the field, offered to third- and fourth-year medical students. Two to four weeks.

Educational Activities

- **Daily:** Morning Reports with the attending of the week
- **Weekly:** Case Discussion with attending of the week, Chart Review Conference, Grand Round, Chairman's Round, Resident Education Conference, Core Curriculum Lecture, and Journal Club.
- **Monthly:** Joint Perinatal Neonatal Conference, Joint Radiology OB/GYN Conference. Special Grand Round with International speakers, and Ultrasound Course Lecture.

Department of Otorhinolaryngology and Head and Neck Surgery

Interim Chairperson:	Zaytoun, George
Professors:	Fuleihan, Nabil (Adjunct Clinical); Hadi, Usamah (Clinical); Hamdan, Abdul Latif; Zaytoun, George
Assistant Professors:	Alam, Elie; Barazi, Randa; Korban, Zeina; Mourad, Marc; Natout, Mohammad Ali (Clinical)
Clinical Associate:	Kasty, Maher

The Department of Otorhinolaryngology—Head and Neck Surgery offers clinical postgraduate resident training to MD graduates. It also offers clinical clerkships to medical students and specialty electives to interns and residents.

The residency program consists of five years with a gradual escalation in the clinical and surgical responsibilities of each resident. During the internship year, residents spend nine months rotating in relevant general surgical specialties, radiology, and emergency medicine and three months in the Otorhinolaryngology service. The acquired general surgical skills during this year act as a foundation for their future development as surgeons in Otorhinolaryngology—Head and Neck Surgery.

During the next four years of training, residents are exposed to all subspecialties in Otorhinolaryngology—Head and Neck Surgery, namely Otology, Rhinology, Laryngology, Head and Neck Surgery, Pediatric Otorhinolaryngology, and Facial Plastic and Reconstructive Surgery. In each subspecialty, residents learn the clinical and surgical principles required for the diagnosis and medical and surgical management of various diseases. The corresponding faculty members give a series of courses covering the updates of each subspecialty. A temporal bone surgical dissection course is also given yearly. For interdisciplinary exposure, faculties from other departments and services are often invited as speakers. Residents also contribute and learn from the monthly activities of the department, which include the Grand Rounds, Tumor Board, Mortality and Morbidity, Pathology conferences, Radiology conferences, and Journal Clubs. To ensure a busy clinical load, residents rotate in affiliated hospitals with diverse exposure to different areas of the country. These include Clemenceau Medical Center and Bikhazi Hospital. Residents sit for an In-service examination on a yearly basis to assess their written fund of knowledge and clinical competencies. The written in-service exam is acknowledged by the American Board of Otorhinolaryngology and is the same test administered to all US resident trainees.

The PGY4 training program includes at least two months of electives spent in an approved program in the United States of America. The rationale behind this elective is to broaden the medical perspective and provide a wider exposure for residents before graduating. Residents are also encouraged to present research projects at international meetings and are often sent for courses in Europe, the US, and other countries. The PGY4 year also includes three months of protected research time, during which residents are expected to design and complete a research project.

Course Descriptions

ORLG 267 Clinical Clerkship 11.120.
Mornings in the Outpatient Department (OPD), two to three mornings in the operating rooms and the rest of the time in the hospital. Three weeks in the department.

ORLG 268 Elective in Otorhinolaryngology 0.180.
Exposure to Otorhinolaryngology and its allied fields. One month.

ORLG 287 Internship 0.262.
Work divided between Outpatient Department (OPD), operating rooms and hospital. Elective. One month.

Research is also an integral part of the resident training program. All residents contribute to multiple research projects either in terms of literature review, study design or data collection, analysis, and manuscript writing. As a requirement for graduation, each resident is expected to design, execute, and publish a full original research project.
Administrative responsibilities are also allocated to residents throughout their training as part of their development. The aim is to provide physicians, who might assume future managerial tasks and positions, with added value to their clinical practice.
For more information, please contact our Residency Program Coordinator, Ms. Ruba Abed El Karim (email: ra305@aub.edu.lb)

Following are the monthly activities of the department:

- **First Monday**: Journal Club and Mortality Morbidity
- **Second Monday**: Grand Round
- **Third Monday**: Interesting Cases
- **Fourth Monday**: Grand Round

Department of Ophthalmology

Chairperson:	Noureddin, Baha'
Professors:	Awwad, Shady; Bashshur, Ziad; Mansour, Ahmad (Clinical); Noureddin, Baha'; Salti, Haytham
Associate Professors:	Haddad, Christiane; Hamam, Rola; Jabbur, Nada (Adjunct); Ma'luf, Riad (Clinical)
Assistant Professors:	Alameddine, Ramzi; Bou Ghannam, Alaa; Farah, Nadim (Clinical); Haddad, Randa; Jurdi Kheir, Wajiha; Saade, Joanna
Clinical Associates:	Allam, Souha; Massoud, Vicky; Shahin, Hasan; Younis, Mohammad

The Department of Ophthalmology offers clinical clerkships/selectives and specialty electives to medical students. It also offers clinical postgraduate training to MD graduates, including internship, residency and fellowship programs. The internship program is a one or two month rotation offered to categorical interns in other disciplines or to family medicine residents. The residency program is an ACGME-I accredited three-year specialty training in ophthalmology, including rotations in cornea, glaucoma, oculoplastics, pediatrics, neuro-ophthalmology, vitreo-retinal, intra-ocular / refractive surgery, and ocular oncology/ pathology. The residency training in ophthalmology is recognized by the International Council of Ophthalmology (ICO). The primary part of the Royal College of Ophthalmologists examination can be taken at the beginning of the second year of residency, while the final part can be taken any time after that. The same recognition is also granted by the Arab Board of Ophthalmology under similar terms. Two fellowships are offered: a one-year medical retina fellowship, which is a 12-month training with clinical exposure to pathologies of the posterior segment from diabetic retinopathy to age-related macular degeneration, also comprising all posterior uveitic conditions. The second one is a cornea/refractive fellowship with exposure to all the classic and most recent cornea and refractive lasers, procedures, and pathologies.

Finally, the department offers a Pre-Residency Research Fellowship. Twelve months are spent in actively contributing to and running the ongoing clinical research projects in the department.

OPHT 267 Clinical Clerkship Offered as a Selective 0.120.
Clinical training and seminars. Students are clinically required to master the use of the direct ophthalmoscope and identify optic nerve abnormalities through the pupillary light reflex, identifying problems which need referral for ophthalmic assessment. Offered to fourth year medical students. Four weeks.

OPHT 268 Elective in Ophthalmology 0.180.
Exposure to Ophthalmology. (Same as OPHT 267). Students and interns are required to get acquainted with use of the different diagnostic ophthalmic tests. Open to interns and fourth year medical students. One month.

OPHT 287 Internship 0.262-524.
An elective in the Outpatient Department (OPD), hospital wards and seminars. Same as OPHT 268. One to two months.

Department of Pathology and Laboratory Medicine

Chairperson:	Zaatari, Ghazi
Professors:	Araj, George; Daher-Karam, Rose; Kfoury-Kassouf, Hala; Mahfouz, Rami (Tenure); Salem-Shabb, Nina; Tawil, Ayman; Zaatari, Ghazi (Tenure)
Associate Professors:	Kfoury-Baz, Elizabeth; Chakhachiro, Zaher; El-Khoury, Riyad
Assistant Professors:	Fakhreddin, Najla; Assaf, Nada
Instructors:	Jurdi, Nawaf; Aoun, Jessica; Sinno, Sara
Clinical Associate:	Abadjian, Gerard

The Department of Pathology and Laboratory Medicine offers courses to medical students and undergraduate courses to students in the Medical Laboratory Sciences program (Faculty of Health Sciences). The department also offers four-year residency training programs in Pathology and Laboratory Medicine.

Clinico-Pathology Conferences

Med III, IV, and staff in collaboration with the departments of Surgery, Internal Medicine, Pediatrics, Obstetrics and Gynecology, Diagnostic Radiology, and Otolaryngology-Head and Neck Surgery.

Courses Offered for Medical Laboratory Sciences Students

IDTH 204 Basic Pathological Mechanisms 29.14; 2 cr.
This course covers the basic and general pathological mechanisms of disease processes at the clinical, gross, cellular, and molecular levels. The course includes the topics of cellular adaptation to injury, cell death, acute and chronic inflammation, anti- inflammatory drugs, healing/repair and fibrosis, hemodynamic disorders, neoplasia, hereditary and clinical genetics, cancer chemotherapy and radiotherapy, and toxicology. The material covered in this course provides the foundations for the comprehensive organ system-based modules that are covered throughout the first two years of medical school (IDTH 203, 205, 211, 212, 225, 226, 227, 228, 229 and 230). These modules integrate clinical and pathologic aspects of multiple disease entities and are taught collaboratively between pathologists and colleagues from clinical departments.

IDTH 221/222 Introduction to Medicine
See Department of Internal Medicine.

PATH 260 Elective in Pathology 0.180.
This one-month elective is open to Med IV students. The purpose of this elective is to

expose students to the general principles of surgical pathology and cytopathology. During this rotation, the student will participate in the daily teaching activities of the department, learn basic dissection skills at the grossing bench, and learn histologic features of common pathologic processes during multi-headed microscope sign-out sessions. Additionally, the student is required to make a presentation on a topic of interest and is encouraged to participate in an investigative research project with a faculty member.

LABM 262 Elective in Laboratory Medicine 0.180-360.
A clerkship offered to Med IV students. This clerkship consists of daily practical training, supplemented by lectures and seminars to cover the disciplines of clinical chemistry, clinical microbiology and immunology, clinical hematology, blood banking and transfusion medicine, molecular diagnostics and cytogenetics. This elective is available in these various disciplines of laboratory medicine and may be adjusted according to the interest of the candidate. During the rotation, the student is required to make a presentation on a topic of interest and is encouraged to participate in an investigative research project with a faculty member. One to two months.

LABM 287 Internship 0.180-360.
Same as LABM 262. Offered to rotating interns. One to two months.

LABM 201/202 Clinical Chemistry I and II 2.0; 3 cr.
Clinical Chemistry courses I and II are designed to acquaint students with fundamentals of clinical chemistry, including basic physiological and biochemical processes, instrumentation, principles of analytical procedures, and methods used for reliable determination of clinical analytes. Correlation of laboratory results with clinical manifestation is also an integral part of these courses. These courses cover all aspects of routine clinical chemistry such as carbohydrates, electrolytes, acid-base balance, blood gases, nitrogen metabolites, proteins, enzymes, lipids and lipoproteins, calcium metabolism and liver function. LABM 202 also covers some advanced clinical chemistry topics like hormones, therapeutic drug monitoring, toxicology; and specialized techniques like chromatography (HPLC, GC/MS and so on).

LABM 210 Cytology and Histological Techniques 24.16; 2 cr.
A course that includes a series of lectures, demonstrations and hands-on training on cell biology, a review of normal histology of various human organs, examples of pathological changes, lectures and hands-on training on techniques of tissue handling, preparation, staining and studying of sections and smears for cytological material. Department of Anatomy, Cell Biology and Physiological Sciences.

LABM 220 Clinical Chemistry and Endocrinology 0.128; 4 cr.
Practical experience in Clinical Chemistry that includes two parts. The applied manual procedures give students a thorough understanding of test principles and basic laboratory preparations and measurements. The clinical laboratory rotation covers all areas from specimen handling to an overview of automated clinical chemistry analyzers and other specialized areas like electrophoresis and amino acid analysis as well as patient test management. Six weeks.

LABM 230 Clinical Hematology and Phlebotomy 0.128; 4 cr.
Practical experience in clinical hematology and phlebotomy. This course covers technical aspects of diagnosis of hematological disorders including peripheral blood smears and bone marrow aspirates examination. In addition, laboratory testing for coagulopathies work-up is exposed in a variety of tests monitoring that take hemostatic characteristics of a case in consideration. Six weeks.

LABM 231 Clinical Laboratory Quality Systems 1 cr.
This course is intended to give Medical Laboratory Sciences students a thorough understanding of the quality systems used for implementation of total quality management in the clinical laboratories. The course covers all the basic elements and tools required to implement the quality system essentials across all phases of the laboratory workflow: preanalytical, analytical, postanalytical. In addition, it will include focused lectures related to quality and safety standards required in specialized areas such as blood bank, clinical microbiology and molecular diagnostics. Practical examples from the laboratory setting will be part and parcel of the lectures to help students relate theory to practice.

LABM 233 Genetics and Molecular Biology 2.0; 2 cr.
This course is an introduction to human genetics, comprising the structure and function of DNA and the classification of genetic disorders, as well as the application of laboratory genetic testing in the clinical differential diagnosis of a variety of disorders. Diagnostic techniques in human genetics (cytogenetics, biochemical and molecular) will be covered and their applications in pathology, oncology, immunology and microbiology will be reviewed. In addition, there will be learning of performing polymerase chain reaction (PCR) technique, real-time PCR, Sanger sequencing, and Next Generation Sequencing.

LABM 235 Medical Mycology 1.0; 1 cr.
A course that covers the different types of fungi, yeasts (e.g. Candida, Cryptococcus) and molds (e.g. dermatophytes, saprophytes, dimorphic). This course discusses their disease spectrum, mode of infection, growth requirements, and culture and non-culture methods of identification and diagnosis as well as antifungal drugs and susceptibility testing.

LABM 240 Clinical Microbiology 0.128; 4 cr.
Practical experience in clinical microbiology- conventional, automated, and non-culture rapid testing. The diagnostic methods encompass aerobic and anaerobic bacteria, mycobacteria, fungi, media preparation, quality control, specimen management, microbial identification, antimicrobial susceptibility testing and interpretation of findings. Six weeks.

LABM 250 Clinical Parasitology and Urinalysis 0.64; 2 cr.
Practical experience covering conventional and automated approaches in clinical microscopy pertaining to parasitology, urinalysis, spermogram, occult blood, calprotectin lactoferrin, Sudan III fat in stool, RBC morphology, and use of different types of microscopic methods for diagnosing particulate material in synovial fluid and other body fluids. Prerequisite: MBIM 223. Three weeks.

LABM 260 Serology 0.64; 2 cr.
Practical experience in clinical immunology and various automated and manual serodiagnostic techniques used for the diagnosis of infectious and non-infectious diseases. Three weeks.

LABM 270 Blood Banking 0.64; 2 cr.
This course introduces students to the various aspects of modern Blood Banking and Transfusion Medicine. Students will learn the theoretical and practical laboratory aspects of Blood Banking including: ABO, Rh and other blood group systems; handling donor and patient samples; infectious screening; and collection/preparation of blood/ blood components for transfusion administration. The course also covers adverse transfusion reactions, hemolytic disease of the newborn and fetus, as well as advanced Blood Bank procedures and quality management. Prerequisite: MLS 207. Three weeks.

LABM 280 Cytogenetics, Molecular Diagnostics and Histotechniques 0.64; 2 cr.
Practical experience in cytogenetics, molecular diagnostics and histotechniques. Prerequisite: LABM 210. Three weeks.

Department of Pediatrics and Adolescent Medicine

Chairperson:	Abboud, Miguel
Professors:	Abboud, Miguel; Badr, Lina (Adjunct); Bitar, Fadi; Boustany, Rose-Mary; Dbaibo, Ghassan; El Solh, Hassan; Mikati, Mohamad (Adjunct); Mroueh, Salman; Muwakkit, Samar; Nabulsi-Khalil, Mona; Yunis, Khalid
Associate Professors:	Arabi, Mariam (Clinical); Bulbul, Ziad; Charafeddine, Lama; Hanna-Wakim, Rima; Karam, Pascale; Majdalani, Marianne; Musallam, Salim (Clinical); Sinno, Durriyah; Tfayli, Hala; Yazbeck, Nadine
Assistant Professors:	Aoun, Bilal; Maalouf Faouzi; Munla, Nabil (Clinical); Obeid, Makram
Instructors:	Bechara, Elie; Borghol, Rafah; El Taoum, Katia; Haddad, Laith; Hneine; Mona; Ismail, Ali; Moukheiber; Jihane; Noun, Dolly
Clinical Associates:	Abdelnabi, Reem; Abi Nassif, Tania; Alamin, Farah; Al Ali, Razan; Al Araj, Alia; Charafeddine, Fatme; Habanjar, Dima; Khalifeh, Simone; Khafaja, Sarah; Nasrallah, Mona; Sanjad, Sami; Shamseddine, Fadi; Tannoury, Theresia; Yazbek, Soha; Youssef, Nour

The Department of Pediatrics and Adolescent Medicine offers clerkships to medical students. The clerkships concentrate on those aspects of children and adolescent healthcare that are important to any physician, including the management of healthy and sick children; peculiarities of disease in infancy, childhood and adolescence; and nutrition growth and development. These clerkships also concentrate on the importance of combining preventive with curative medicine. Graduate training is offered to physicians leading to specialization (residency) in pediatrics over a three-year period.

PEDT 246 Clinical Clerkship 35.360.
Daily assignments in the Outpatient Department (OPD) (general Pediatrics and subspecialty clinic) for 6 weeks and a 2-week inpatient rotation in the normal nursery and Neonatal Intensive Care Unit. Offered to third year students. Two months.

PEDT 267 Clinical Clerkship 0.360.
A clerkship consisting of daily assignments in the inpatient general Pediatric ward for 2 weeks and in the Children Cancer Center for 2 weeks. Offered to fourth year students. One month.

PEDT 268 Elective in Pediatrics 0.180-360.
Clinical electives are open to fourth year medical students. Laboratory research electives are open to students at all levels. Exposure of students to laboratory research in neurogenetics, molecular biology, infectious diseases, and basic cardiology; or to a special area of clinical pediatrics of the student's choice, including pediatric cardiology, neurology,

hematology-oncology, infectious diseases, pediatric critical care and neonatal intensive care. One to two months.

PEDT 287 Internship 0.786.
A two- to three-month rotation each in the hospital wards, ambulatory services or newborn nursery.

PEDT 288 Straight Internship 0.2882.
Interns spend 11 months in the Department of Pediatrics and Adolescent Medicine at the hospital (PL-1) and in affiliated hospitals.

Weekly Conferences

Ward rounds (daily), radiology conferences, journal clubs, pediatric grand rounds, morbidity and mortality conferences, core curriculum lectures and specialty conferences (adolescent medicine morbidity review, hematology/oncology, neonatology, infectious diseases, critical care and pediatric cardiology).

Department of Pharmacology and Toxicology

Chairperson:	Sabra, Ramzi
Professors:	Sabra, Ramzi; Khoueiry Zgheib, Nathalie
Professor Emeritus:	Cortas, Nadim; Simaan, Joseph
Associate Professosr:	El-Najjar, Nahed; Zouein, Fouad
Associate:	Puzanian, Houry

The field of pharmacology embraces knowledge of the history, sources, physical and chemical properties, compounding, biochemical and physiological effects, mechanisms of action, absorption, distribution, biotransformation, excretion, and therapeutic and other uses of drugs. The Department of Pharmacology and Toxicology offers mainly graduate courses for students in the medical, biomedical and nursing fields. Only one undergraduate course is available, specifically designed for students pursuing a BS in Nursing.

Graduate courses include those offered to medical students, graduate students in the biomedical sciences pursuing either a MS or PhD, degree, and graduate students in the MS in Nursing program. With the complete integration of the preclinical years in the medical program, pharmacology teaching occurs throughout the first two years of medical training within integrated, mostly organ-system based, courses. In addition, sessions in clinical pharmacology are offered during the third year of medical school as a separate 1-credit course.

The MS graduate program in the department (in the discipline of Pharmacology and Therapeutics) consists of a minimum of two years of didactic and research training leading to the degree of Master of Science. Students who wish to enroll must have a BS and must have taken undergraduate courses in biology, chemistry (including organic chemistry) and physics. Required courses within the program include courses within the disciplines of biochemistry, physiology and cell biology, and the PHRM 300 course (see below) for a total of 21 credits, followed by a thesis (PHRM 399).

The PhD in Pharmacology and Toxicology is offered within the PhD program in biomedical sciences (refer to Faculty of Medicine and Medical Center – PhD Program in this catalogue).

PHRM 240 Pharmacology and Therapeutics 48.0; 3 cr.
A presentation of the chemistry, pharmacological effects, and therapeutic usefulness and toxicity of drugs. Designed to meet the requirements of the BS in nursing.

PHRM 300 Pharmacology and Toxicology 7 cr.
A general course dealing with the chemistry, general properties, pharmacological effects on the various systems, therapeutic usefulness and toxicity of drugs. A separate section deals with toxicology. Offered to graduate students.

PHRM 307/308 Tutorial in Pharmacology 0.96; 3 cr. (each)
An introduction to research.

PHRM 309/310 Pharmacology Seminar 0.32; 1 cr. (each)
Pharmacology Seminar

PHRM 314 Advanced Pharmacology and Therapeutics 48.0; 3 cr.
The course covers the basic pharmacology of various drug classes and emphasizes clinical practice perspectives. Designed to meet the requirements of the MS degree in nursing. Prerequisites: PHRM 240 (or its equivalent) and NURS 504.

PHRM 260 Elective in Pharmacology 0.180-360
An introduction to biochemical and physiological methods in use in pharmacology, offered to 4th year medical students as an elective clerkship. One to two months.

PHRM 315 Principles of Pharmacology 19.21; 2 cr.
A course that covers the basic principles of drug action including pharmacokinetics, pharmacodynamics, pharmacogenetics, drug resistance, tolerance and toxicity, and pharmacovigilance; it explores mechanisms of action of major drug classes.

PHRM 333 Clinical Pharmacology 16; 1 cr.
This course is offered to third year medical students. It covers rational prescribing and prescription writing in outpatients and special populations. The goal is to prepare medical students for the practice of safe and effective pharmacotherapy.

PHRM 395 A/B Comprehensive Exam 0 cr.
Prerequisite: Consent of advisor.

PHRM 399 A/B/C/D/E MS Thesis 9 cr.
MS Thesis

Department of Psychiatry

Chairperson:	Maalouf, Fadi
Professors:	Khoury, Brigitte; Maalouf, Fadi
Associate Professors:	Akoury Dirani, Leyla; Talih, Farid
Assistant Professors:	Barakat, Marc; Baroud, Evelyne; Bizri, Maya; El Hayek, Samer (Adjunct); Ghossoub, Elias; Khoury, Rita; Shamseddeen, Wael
Instructors:	Ayna, Dinah; Dandan, Nadia Tina
Clinical Associates:	Bazzi, Zeinab; Farhoud, Leila; Haddad, Ramzi; Ismail, Ghina

The Department of Psychiatry offers a course to Med II students and a clinical clerkship to Med III students, a post-graduate residency training program in Psychiatry as well as clinical electives to interns and residents.

PSYT 227 Human Development and Psychopathology 32.36; 3 cr.
This course covers psychopathology through a lifespan approach. It specifically covers social, emotional and cognitive aspects of human development in addition to the psychopathology of major psychiatric disorders (neurodevelopmental, mood, anxiety, psychosis and substance use disorders, etc.). It also introduces pharmacological and non-pharmacological approaches to the management of patients. A variety of teaching/learning techniques are implemented including didactics and team-based learning.

PSYT 252 Clinical Clerkship in Psychiatry 0.180.
A clinical clerkship in which third year medical students spend one month working on psychiatric patients and attending morning rounds on an inpatient psychiatric service where they are supervised by an attending psychiatrist. Students also attend psychiatry clinics in the outpatient department where they see new and old cases. The rotation also includes seminars dealing with psychopathology, case presentations and discussions, interview techniques and basic psychotherapy, as well as psychopharmacology. One month.

Clinical Psychology Training Program

The AUBMC Department of Psychiatry offers a Clinical Psychology Training Program leading to a certificate of training in clinical psychology. Students are admitted only if they intend to complete the two academic year program.

During the first year, students follow adult and child and adolescent training. They are expected to master the diagnosis and treatment plan process. They are also initiated into individual and group psychotherapies. Note that the first year could be considered as practicum courses within the master's degree program.

The second year can be offered at a post-MA training level. Students choose one of two tracks which include an adult or a child and adolescent track. At the end of the second year, they are expected to develop the expertise to carry out comprehensive clinical diagnoses and treatment plans and to conduct psychotherapy.

Application Process

Second year master's level Clinical Psychology students enrolled in Lebanese universities or abroad are eligible to apply provided they have taken the prerequisite courses at the graduate level. Students in doctorate programs may also apply for the training. Other requirements are a GPA of 3.3 or above and a proficiency in Arabic and English languages.

Applications should be submitted to the Department of Psychiatry and addressed to Mrs. Nibal Safah at ns54@aub.edu.lb. After an initial screening and verification of credentials, selected applicants will be interviewed. The first-year course requirements for students with a master's degree or a doctorate degree in Psychology may be waived if supported by available transcripts.

Application Material

The following are required to be submitted when applying:

- An updated CV
- Copies of transcripts of grades for undergraduate and graduate courses
- A statement of purpose indicating your interest in the program, past achievements and experiences, your goals from the programs and your future career plans. Other relevant issues can also be included
- One photo
- Copy of passport or Lebanese ID

Application: From January 6, 2025, till April 30, 2025

Prerequisite Courses

- Graduate course in Psychopathology
- Graduate course in Psychotherapy Theories
- Graduate course in Developmental Psychology (for those who are interested in the child track)
- Graduate course in Psychological Testing and Assessment

English Requirement

Applicants to the graduate program, other than AUB graduates and graduates of colleges or universities recognized and located in North America, Great Britain, Australia and New Zealand, must meet the Readiness for University Studies in English (RUSE). For more information, refer to page 38.

The program consists of 4 courses (one per term) taken in sequence.

The courses are as follows:

1st year:

PSYT 300 Clinical Psychology Practicum I: 4.0 cr.
Immersion and Observation
The clinical training in this course includes observation of patient interviews, and participation in clinical interviews conducted in a group format, assessment, and treatment of patients from different age groups (adult, adolescents, and children) and backgrounds

and with a variety of presenting problems. Trainees will also be able to practice clinical interviewing and diagnoses with patients they will see. Clinical training will be under the direct supervision of qualified clinical academic faculty.

PSYT 301 Clinical Psychology Practicum II: 4.0 cr.
Diagnosis and Treatment Plan
The second course of the clinical training will involve direct patient contact for trainees who will be assigned a certain load of patients. They will formulate a diagnosis and establish a treatment plan based on the patient's needs. They will learn to practice in a bio-psychosocial model of treatment. Advanced clinical training will be under the direct supervision of qualified clinical academic faculty.

2nd year:

PSYT 302 Clinical Psychology Practicum III: 6.0 cr.
Psychotherapy I
During this course, trainees will carry their own load of individual patients, which they will follow in weekly psychotherapy sessions. They will be trained in Cognitive Behavioral therapy and Psychodynamic therapy. They will also be introduced to in-patient care. Introduction and training in group therapy is possible at this level with psychology interns being co-moderators within groups. Advanced clinical training will be under the direct supervision of qualified clinical academic faculty.

PSYT 303 Clinical Psychology Practicum IV: 6.0 cr.
Psychotherapy II
During this course, trainees will carry their own load of individual adult or child patients, which they will follow in weekly psychotherapy sessions. They will also be participating in in-patient care of patients admitted to the Psychiatry unit as well as conducting psychological assessment and testing whenever needed. Advanced clinical training will be under the direct supervision of qualified clinical academic faculty.

Department of Radiation Oncology

Interim Chairperson:	Eid, Toufic
Professor:	Issa, Philip (Emeritus)
Associate Professor:	Youssef, Bassem
Assistant Professors:	Ayoub, Zeina; Bodgi, Larry; Eid, Toufic; Hilal, Lara; Jalbout, Wassim; Shahine, Bilal

RADO 260 Introduction to Radiation Oncology 0.180
An elective clerkship that introduces the student to the basic principles, techniques and application of radiation oncology. One month.

RADO 287 Internship 0.262-1.048
An elective in radiotherapy. Open to interns. One to four months.

RADO 288 Residency Training in Radiation Oncology
Open to interns after graduation and one year internship in any clinical specialty. The program extends over four years with short elective rotations in pathology, medical oncology, radiology, pediatric oncology and research.

RADO 290 Clinical Training in Medical Physics
Short intensive course open to medical physicists who need to acquire skills in modern radiotherapy physics and clinical training on modern equipment.

RADO 291 Medical Physics to Medical Residents
Medical physics courses open to Medical Radiation Oncology residents to prepare them for their Radiation Oncology exam/certification.

RADO 292 Medical Physics Residency Training in Radiation Oncology (Program under construction)
Open to Medical Physics program graduates. The program extends over two years and includes didactic as well as clinical training.

Department of Surgery

Chairperson:	Hoballah, Jamal
Professors Emeriti:	Khalil, Ismail
Professors:	Al-Halees, Zohair (Adjunct Clinical); Abi Saad, Georges; Atiyeh, Beshara (Clinical); Bulbul, Mohamad (Clinical); Haddad, Fady; Haidar, Rachid; Hoballah, Jamal; Khalifeh, Mohammad; Khauli, Raja; Khoury, Ghattas (Clinical); Najjar, Marwan; Obeid, Mounir; Saghieh, Said; Sawaya, Raymond; Skaf, Ghassan (Adjunct)
Associate Professors:	Abbas, Jaber (Clinical); Akel, Samir (Clinical); Bakhach, Josephzz Deeba, Samer (Clinical); El Hajj, Albert; Haddad, Raja (Clinical); Ibrahim, Amir; Nasr, Rami; Sagherian, Bernard; Sfeir, Pierre; Sfeir, Roger (Clinical)
Assistant Professors:	Bachir, Bassel; Baddoura, Omar (Clinical); Darwish, Hussein; Doughan, Samer (Clinical); El Lakis, Mustapha; Hussein, Maher (Clinical); Kreidieh, Ibrahim (Clinical); Lakkis, Suheil (Clinical); Sbaity, Iman; Sidani, Mustafa (Clinical); Sunna', Tarek (Adjunct); Tayim, Ahmad; Wazzan, Wassim (Clinical); Zaghal, Ahmad
Instructors:	Abiad, Firass (Adjunct); Amine, Ali; Nasser Eddine, Mohamad, Nassereldine, Rakan
Clinical Associates:	Abdelnoor, John; Attieh, Christian; Bazi, Tony; Bitar, Elias; Chahine, Fadl; Daher, Ronald; Harakeh, Ayman; Hushaymi, Ibrahim; Jassar, Yehya; Msheik, Mayyas; Murr, Chadi; Rahhal, Salim, Sakr, Ghazi; Sayyed, Khaled

The Department of Surgery offers courses, graduate clerkships, and specialty electives to medical students. It also offers post-graduate training to MD graduates including residency and subspecialty fellowships.

Post-Graduate Training

The Department of Surgery offers two tracks of residency training which include a one-year of internship in preliminary track required for any further specialization and a categorical track for residency training in General Surgery, Neurosurgery, Orthopedic Surgery, Plastic Surgery and Urology. Trainees are selected during or after their last year of medical school.

The training programs in the categorical track consist of a five-year training program in general surgery, a seven-year training program in neurosurgery, including two prerequisite years of general surgery, a six-year training program in orthopedic surgery, and urology, including prerequisite one year in general surgery and a second year of other surgical and non-surgical rotations, and a seven-year training program in plastic surgery including three prerequisite years in general surgery.

All residency programs are structured to conform to the requirements of the Lebanese Order of Physicians, Arab Board of Surgery, and the Accreditation Council for Graduate Medical Education-International (ACGME-I).

All the surgical residents in the General Surgery training and rotations participate in the didactic curriculum established by the Surgical Council on Resident Education (SCORE).

All junior surgical residents are enrolled in the ACS Fundamentals of Surgery Curriculum. In addition, an elaborate skills lab curriculum including basic and advanced open and laparoscopic skills is provided.

All first year categorical residents are required to join the institutional Fellowship and Residency Research Program (FRRP) and to carry out one research project throughout their residency or fellowship period.

All residents are required to take and maintain their BLS and ACLS certification offered at AUBMC. They are also required to take the Advanced Trauma Life Support (ATLS) course, which is currently offered by AUB and the American College of Surgeons-Lebanon Chapter. All senior general surgery and urology residents are required to get FLS certification offered at the AUBMC-Department of Surgery that is an approved international FLS test center.

All surgical residents shall have memberships in societies or associations pertinent to their specialty of training which are the Resident and Associate Society of the American College of Surgeons (RAS-ACS) for all General Surgery, Neurosurgery and Plastic Surgery, the American Academy of Orthopedic Surgeons (AAOS) for Orthopedic Surgery, the American Society of Plastic Surgery (ASPS) Education Network (EdNet) for Plastic Surgery residents, and the American Urological Association (AUA) for Urology residents.

Starting February 2011, the General Surgical residents were allowed to sit for the annual International American Board of Surgery In-training Exam (I-ABSITE). The General Surgery Residency program was accredited by the Royal College of Surgeons in Ireland (RCSI), and general surgery residents will be eligible to sit for the RCSI after they fulfill the needed requirements. All our residency programs (General Surgery, Neurosurgery, Orthopedic Surgery, Plastic Surgery and Urology) are accredited by the ACGME-I.

As of 2013, General Surgery graduates became eligible to sit for the European Board of General Surgery Certification exam.

The Department of Surgery also offers the following fellowships: a two-year fellowship training program in Trauma and Surgical Critical Care, a one-year fellowship training program in Surgical Critical Care, a two-year fellowship training program in Vascular Surgery, and a two-year Complex general surgery oncology fellowship training program.

SURG 246 Clinical Clerkship 44.540.

The third year surgery clerkship at AUBMC is an 8-week rotation consisting of 6 weeks on a core general surgical service (2 weeks on each General Surgery team, Team A, Team B, and Team C), and 2 weeks on subspecialty surgical services (orthopedic surgery, neurosurgery, urologic surgery, or plastic surgery). The goal of the surgery clerkship is to introduce the student to the principles of caring for the surgical patient. This goal is accomplished by allowing the student to participate in the care of patients at the various stages of evaluation and treatment by the surgical faculty and their teams. These stages include, but are not limited to, the preoperative office or clinic visit, inpatient admission, operative procedures, and inpatient and outpatient recovery.

The clerkship is structured on the principle that learning is an active process, which can be accomplished only by the student. The role of the faculty and House staff is to provide

guidance, motivation, and stimulate their interest in surgical pathology. The third year clerkship educational experience is supplemented by a core curriculum set of lectures/ clinical case discussions covering all the basic topics in general surgery and the surgical specialties, as well as multiple problem-based learning sessions designed by various faculty members. In addition, students participate in weekly teaching rounds with the Attending on-call in the pertinent rotation, as well as a weekly clinical case discussion with the Chairman. Students are required to attend all educational activities held in the department.

SURG 268 Elective in Surgery 0.180-360.
AUB fourth year students may elect to rotate through one or more of the following disciplines: general and pediatric surgery, neurosurgery, orthopedic surgery, plastic surgery, and urology. Non-AUB third and fourth year medical students may elect to rotate through one or more of the following disciplines: general (including pediatric surgery, cardiovascular surgery), neurosurgery, orthopedic surgery, plastic surgery and urology, depending on availability of spots. Non-AUB students act as observers only, for a period of one to two months. Knowledge of English is necessary. No elective will be offered in the months of July and August.

SURG 269 Selective in Surgery 0.180-360.
This selective is offered to fourth year AUB medical students only in General and Plastic Surgery. The program can accommodate up to two selective candidates at any point in time. Students rotating as selective will be evaluated on their efforts and participation during ward rounds and in the operating room. Students are expected to demonstrate appropriate bedside clinical presentations, diagnostic evaluation and the ability to develop and implement a management plan. Students are also expected to demonstrate ability in basic surgical skills such as suturing and knot tying. The faculty and the chief resident of the service will evaluate the individual student and will summarize the overall performance. In addition, students are offered a written MCQ exam at the end of the rotation. No selective will be offered in the months of July and August.

SURG 288 Straight Internship 0.2882.
The surgical interns are post-graduate first year trainees, selected by the Department of Surgery during or after their last year of medical school: previous academic performance, research experience, personal motivation, career goals and potential to achieve a successful academic and clinical career in surgery are evaluated during the selection process. The interns function as an integral part of the resident staff. Workup and general care of patients are the major responsibilities of the interns. They perform surgical procedures under supervision and actively participate in the various bedside rounds and educational conferences of the department. The interns rotate in General Surgery specialty teams and through other subspecialty services as per training requirements.

Conferences

A Departmental Grand Round is held once a month. Each division has its own weekly conference and teaching activities. Bedside teaching rounds are held at least once or twice a week. The trend is more toward bedside teaching rather than didactic teaching. A quality improvement conference is held biweekly in most divisions. Didactic teaching conferences are held each Tuesday and Thursday at 6:45 am to cover the surgical curriculum, pathology and journal club reviews.

Pathology and Journal Club Reviews

Special lectures are delivered as the occasions arise, especially with visiting professorship lectures. Journal clubs are held monthly in all specialties.

Affiliations

Currently there are several affiliations with the Department of Surgery based on agreements of cooperation:

- Makassed Hospital (since March 4, 1982)
- Rafic Hariri University Hospital (since June 9, 2005 for urology, since July 2017 for Plastic Surgery)
- Mount Lebanon Hospital (since August 2010)
- Najjar Hospital (since February 2010)
- Bikhazi Hospital (2015)
- King's College Hospital England (since 2014 for Transplant Rotation)
- General Hospital of Athens "G. GENNIMATAS" (since 2016; for Plastic Surgery)

Additional affiliations are being explored.

Introduction to Radiobiology: Introducing short course to Radiation Oncology residents, addressing biological principles of radiation oncology. Over a period of two months.

Weekly Conferences

Multidisciplinary Tumor Board: GU MDT, GI MDT, Breast MDT, Thoracic MDT, Head and Neck MDT, GYN MDT, Malignant Hematology/BMT, Rare tumors MDT. In addition to the Multidisciplinary radiation oncology case reviews and Journal Clubs. The department participates in the teaching activities of the oncology section of the Department of the Internal Medicine.

Joint Programs

Scholars in Health Research Program (SHARP)

Director:	El Hajj Fuleihan, Ghada
Diploma Director:	Tamim, Hani
Executive Committee:	Tamim, Hani; Nabulsi, Mona; Huda; Sibai, Abla; Zeina Kanafani

Background

The Scholars in HeAlth Research Program is a joint FM and FHS graduate program that consists of a 12-credit summer diploma, a 12-credit two-semester diploma, as well as a 35-credit master's degree. The summer diploma, two-semester diploma, and the MS degree are open to graduates of health fields. Social scientists and humanities graduates interested in Non-Communicable Diseases (NCD) can also enroll in the program, provided they fulfill admission and selection criteria and have the necessary background to follow the course curriculum. Credits earned for the SHARP summer diploma and two-semester diploma can be credited towards the Master of Science in Health Research requirements. These credits can also be credited in full or partly towards other post-graduate degrees at FM, FHS, FAFS, or HSON and possibly at other institutions.

SHARP provides graduates with the required foundation to pursue a career in clinical and translational research. Although focused on NCD, a major cause of mortality and morbidity in the region, the garnered skills are applicable to other areas of clinical research. The Program helps create and sustain a cadre of highly trained researchers who conduct patient-oriented and population-oriented studies on NCD. It also equips trainees with management and leadership skills needed to become "change agents" and lead research groups, academic departments or other health care settings. Management and leadership courses are offered in collaboration with faculty at the Olayan School of Business.

Mission

The Mission of the Scholars in HeAlth Research Program (SHARP) at the American University of Beirut (AUB) is "To provide superior didactic education complemented with state-of-the-art interactive and practical training in health research, with a focus on Non-Communicable Diseases research. It is intended for physicians and other health care professionals, to improve and advance the health care agenda for Non-Communicable Diseases in Lebanon and the region."

SHARP Diploma Curriculum

The SHARP diploma is a 12-credit module that provides the essential foundations in quantitative methods and fundamental skills to conduct research. The core disciplines covered include epidemiology, biostatistics, research ethics and library sciences/informatics. These are complemented with a practical hands-on training course in the analysis and reporting of large health-related datasets in NCD. The SHARP diploma is offered as an intensive summer program and as a two-semester online program.

SHARP Master of Science in Health Research

Admission to the Program

The application deadline for the summer diploma is in March, and the acceptance is in April of each academic year calendar. The application deadline for the two-semester diploma is in March, and the acceptance is in May of each academic year calendar. The application deadline for the MS degree in Health Research is in June, and the deadline for acceptance is in July of each academic year calendar. The SHARP diploma (either summer or two-semester) is a prerequisite for the SHARP MS program, and the performance in the diploma is evaluated to ensure the candidate is suitable for continuing on the MS path. Students should apply to the MS program by early June and are accepted upon successful completion of the diploma program (minimum GPA 3.3). While the 2-year program is approved for all, the 1-year program is approved by the Lebanese Ministry of Education for medical doctors only. For more details, please refer to the Admissions section of the AUB graduate catalogue, page 29.

Criteria for Admission

All applicants to the SHARP summer diploma and two-semester diploma and the Master of Science in Health Research must satisfy the criteria established at AUB for enrollment into a master's degree program, namely the Readiness for University Studies in English (RUSE) (see page 38 of this catalogue) and a minimum degree of BS with a minimum GPA of 3.3 or its equivalent.

In addition, applicants should express/demonstrate commitment to a career in NCD research in the statement of purpose submitted along with their application.

Applications for the summer program are reviewed by the SHARP executive committee.

Applications for the MS program are reviewed by the joint FM/FHS Graduate Studies Committee.

The Application Process

An applicant is considered for admission to the SHARP summer diploma and two-semester diploma and the MS program if s/he meets the following minimum admission requirements:

- an undergraduate cumulative GPA of at least 3.3 (or standardized equivalent from other institutions of higher learning) leading to a bachelor's degree or its equivalent from recognized institutions of higher learning
- at least two letters of recommendation
- a statement of purpose (500-word limit) indicating the purpose for applying to the program and specifying the applicant's research interests and/or practical experience

Applicants to any graduate program, other than AUB graduates and graduates of recognized colleges or universities in North America, Great Britain, Australia and New Zealand must demonstrate proficiency in the English language. See Admissions section in this catalogue, page 29.

Graduation Requirements

See General University Academic Information in this catalogue, page 95.

Incompletes

See General University Academic Information in this catalogue, page 78.

Probation

See General University Academic Information in this catalogue, page 80.

Program Outline

The 35-credit master's degree requirements can be completed over one full-time year (available to Doctor of Medicine graduates only) or two part-time years. The total number of allowed credits per term is 16 unless otherwise approved by the joint FM/FHS Graduate Studies Committee. The degree consists of the 12-credit diploma in addition to 15 credits in required courses, 2 credits of electives and 6 credits for the thesis. The thesis is a mentored research project culminating in the completion of a project revolving around Non-Communicable Diseases. In compliance with AUB requirements, scholars must also sit for a 0-credit comprehensive exam (Pass/Fail) during their last term.

Program Delivery

The 35-credit program is divided as indicated below:

- **Summer diploma and two-semester diploma:** The 12-credit diploma, taken as either an intensive diploma in the summer, or an online two-semester diploma, consists of five courses: Biostatistics (4 cr.), Principles of Epidemiology (4 cr.), Introduction to Research Ethics and Responsible Conduct of Research (1.5 cr.), Analysis and Reporting of Large Clinical Datasets (2 cr.) and Library Science/Informatics (0.5 cr.). These courses consist of didactic lectures, faculty-facilitated discussion groups, laboratory sessions and group projects. The courses in epidemiology and biostatistics are held in conjunction with the Faculty of Health Sciences (FHS), while the Introduction to Research Ethics and Responsible Conduct of Research is held in conjunction with the Salim El-Hoss Bioethics and Professionalism Program (SHBPP).
- **Courses:** Students are required to take a total of 15 credits in required courses, 2 credits of elective courses.
- **Thesis:** Each student is required to select a clinical research project and identify advisor(s) from among the Faculty of Medicine (FM) and Faculty of Health & Science (FHS) engaged in clinical research. Mentors and projects are approved by the joint FM/FHS Graduate Studies Committee (GSC). For those pursuing the 2-year track, the research project typically begins in the Spring term of the student's first year and culminates in a thesis document and oral thesis defense delivered before the end of the second academic year. For those choosing the 1-year track, the process begins early in the Fall term and ends in the Spring term of the same academic year. All projects are supervised by a thesis committee.

Comprehensive Examination

Each student is expected to pass a 0-credit comprehensive examination course after completion of all required courses. If a student does not pass the comprehensive exam, s/he is allowed to take it a second time in the following term as per AUB regulations. The Comprehensive Examination has a Pass (P) or Fail (F) format, and timing of the examination is set by the program.

Tracks

Master of Science: 1-Year Program

12 credit diploma	Course Title	Faculty	Credits
Principles of Epidemiology/Design and Analysis of Epidemiological Studies	SHRP 300/320	SHARP	4 credits
Basic Biostatistics	SHRP 310	SHARP	4 credits
Introduction to Research Ethics and Responsible Conduct of Research	SHRP 315	SHARP	1.5 credits
Analysis and Reporting of Large Clinical Datasets	SHRP 330	SHARP	2 credits
Library Science / Informatics	SHRP 325	SHARP	0.5 credits
Fall – 13 credits	**Course Title**	**Faculty**	**Credits**
Design and Analysis of Clinical Trials	EPHD 321	FHS	2 credits
Clinical Trial Protocol	SHRP 321A	SHARP	2 credits
Leadership and Behavior in Organizations	MNGT 306	OSB	3 credits
Thesis	SHRP 400	SHARP	6 credits
Spring – 10 credits	**Course Title**	**Faculty**	**Credits**
Systematic Review and Meta-Analysis	EPHD 328	FHS	3 credits
Public Health Policy and Advocacy	PBHL 304	FHS	3 credits
Comprehensive Examination	SHRP 395A	-	0 credits
Elective	-	-	2 credits
Advances in NCD Research	SHRP 340	SHARP	2 credits
Thesis	SHRP 400A	SHARP	0 credits

Master of Science: 2-Year Program

12 credit diploma	Course Title	Faculty	Credits
Principles of Epidemiology/Design and Analysis of Epidemiological Studies	SHRP 300/320	SHARP	4 credits
Basic Biostatistics	SHRP 310	SHARP	4 credits
Introduction to Research Ethics and Responsible Conduct of Research	SHRP 315	SHARP	1.5 credits
Analysis and Reporting of Large Clinical Datasets	SHRP 330	SHARP	2 credits
Library Science / Informatics	SHRP 325	SHARP	0.5 credits
Fall I – 4 credits	**Course Title**	**Faculty**	**Credits**
Design and Analysis of Clinical Trials	EPHD 321	FHS	2 credits
Clinical Trial Protocol	SHRP 321A	SHARP	2 credits
Spring I – 9 credits	**Course Title**	**Faculty**	**Credits**
Systematic Review and Meta-Analysis	EPHD 328	FHS	3 credits
Thesis	SHRP 400	SHARP	6 credits

Fall II – 5 credits	**Course Title**	**Faculty**	**Credits**
Leadership and Behavior in Organizations	MNGT 306	OSB	3 credits
Thesis	SHRP 400A	SHARP	0 credits
Elective	-	-	2 credits
Spring II – 5 credits	**Course Title**	**Faculty**	**Credits**
Public Health Policy and Advocacy	PBHL 304	FHS	3 credits
Advances in NCD Research	SHRP 340	SHARP	2 credits
Thesis	SHRP 400B	SHARP	0 credits
Comprehensive Examination	SHRP 395A/B	-	0 credits

Course Descriptions

Required Courses

SHRP 300 Principles of Epidemiology 2 cr.
A course in principles, concepts and application of epidemiology tools relevant to public health and clinical practice. The course covers basic principles of epidemiology related to disease occurrence, distribution and determinants. Topics include rubrics of epidemiology, morbidity and mortality measures, sources of data, epidemiologic study (cross-sectional, case-control, cohort studies and clinical trials), casual inference and causation in epidemiology. The course consists of lectures, assigned readings and complementary practical sessions. Equivalent to EPHD 300.

SHRP 320 Design and Analysis of Epidemiological Studies 2 cr.
The course covers in detail methodological issues related to study design and conduct, data analysis, interpretation of results and inference in epidemiological research. Problems of exposure and disease definitions, information and selection biases, confounding and effect modification are considered. Students are required to critique and discuss epidemiological studies and to lead in the write-up of a research study protocol for design and conduct of an epidemiologic study. Equivalent to EPHD 320. Equivalence to be discussed with FHS on a case-by-case basis and as needed.

SHRP 310 Basic Biostatistics 4 cr.
This course is an introduction to basic statistical techniques applied to health sciences and related fields. The objectives are twofold: descriptive statistics, which encompass techniques for organizing and summarizing data, and inferential statistics, from estimation to confidence interval and testing of hypotheses. Applications include probability distribution, comparing population means (t-tests) or proportions (X2 squares) for data obtained from paired or independent samples, significance testing, sample size calculation and power, stratified and matched analyses, and one-way ANOVA. Also, it introduces simple linear regression, correlations, logistic regression and nonparametric methods for data analysis. Focus will be on problems that are commonly encountered in health services and biomedical research. Equivalent to EPHD 310.

SHRP 315 Introduction to Research Ethics and RCR 1.5 cr.
This course introduces students to the fundamentals of responsible conduct of research, emphasizing the ethical practice of human and animal research. The course recaps the history of ethical principles and the development of research codes of conduct and ethical practices, familiarizes investigators and faculty members with the different kinds of ethical

issues that they might come across throughout their careers, and allows scholars to reflect critically about what it means to be an ethical and responsible researcher. In RE & RCR, students will attend lectures, participate in discussions, analyze actual case studies and watch Audio-visual material. Most importantly, they will know how to conduct and assess research from an ethical standpoint.

SHRP 325 Library Science/Informatics 0.5 cr.
This introductory course spans five 1.5 hours sessions, and focuses on effective and efficient searching skills of the various medical and health-related resources. It also includes an introduction to the evidence-based practice concept and where and how to locate such documents, in addition on how to design a high sensitive search strategy for systematic reviews. Delivery of this course is through a mixture of live demonstration, hands-on exercises, and solving clinical scenarios. Offered only in Summer.

SHRP 330 Analysis and Reporting of Large Clinical Datasets I 2 cr.
This course will put into practice the statistical analysis and other computing skills introduced to scholars in EPHD 300/SHARP 300, EPHD 310/SHARP 310 and SHARP 325. The training format is a mixture of demonstrations, hands-on exercises and clinical scenarios. The course will simulate previously executed/published analyses on previously collected de-identified health research datasets. Scholars will go through the entire process experience of data handling, hypothesis-driven analysis design and culminate in the execution of statistical analysis (modeling) and presentation of results. In addition, this course will use existing datasets to familiarize scholars with commonly used health data analysis methods including survival analysis methodology and Cox regression multivariate modeling of survival data, and finally introduce propensity score approaches for risk-adjustment.

SHRP 340 Advances in Non-Communicable Diseases Research 2 cr.
The course examines a number of selected non-communicable diseases (NCD) given their morbidity and mortality burden at the local and regional level. Expert guest speakers are invited to discuss the public health importance of the topic; its burden; epidemiology (prevalence, patterns, determinants); theoretical and practical methodological challenges and opportunities in the conduct of epidemiologic studies; most recent findings in NCD research conducted in Lebanon and the region; and strategies for the prevention and control of NCDs. The course is an opportunity for students to be acquainted with researchers in Lebanon active in the field and to appreciate the scope and findings of the NCD studies conducted in Lebanon and the region. Students are expected to lead on a scoping review of a selected research question. Offered in Spring every 2 years.

EPHD 321 Design and Analysis of Clinical Trials 2 cr.
A course that focuses on issues in the design and organization of randomized controlled clinical trials: ethical and legal issues, patient selection, recruitment, masking and randomization, endpoint definition, protocol development and statistical analysis.

SHRP 321A Clinical Trial Protocol 2 cr.
This is a 2-credit course designed to complement EPHD 321 (Design and Analysis of Clinical Trials). It is structured around the development of a clinical trial protocol based on principles/concepts covered in parallel in EHPD 321. The course systematically covers all standard key items needed to describe a clinical trial protocol using the 33 items checklist of the 2013 SPIRIT (Standard Protocol Items: Recommendations for Intervention Trials) document. These items include detailed content description for: administrative information, protocol registration, participants, interventions, outcomes, assignment of interventions, data collection, data management, data analysis, monitoring, data sharing,

ethics and dissemination. Weekly assignments are designed to guide students in the production of a clinical trial protocol, covering sequential items of the SPIRIT checklist. The final paper consists of a fully developed protocol to implement a clinical trial that is suitable for submission for competitive funding and for publication in a peer- reviewed journal. Students will also give a PowerPoint presentation at the end of the course describing the protocol developed prior to submission of their final paper.

EPHD 328 Systematic Review and Meta-Analysis 3 cr.
The course is structured around the steps of executing a systematic review of trials of interventions: specifying the PICO question, searching for potentially relevant articles, selecting eligible studies, abstracting data, assessing risk of bias, conducting a meta-analysis, grading the quality of evidence and interpreting results. Weekly assignments are designed to guide students in the production of a systematic review. The final paper consists of a report of the systematic review suitable for publishing in a peer-reviewed journal. The course examines advances in Non-Communicable Disease (NCD) research and risk factors with special focus on methodological challenges and opportunities.

MNGT 306 Leadership and Behavior in Organizations 3 cr.
This course sets the base for proper understanding and micro-level analysis of the role of individual and group behavior in organizations. It is designed as two independent modules. Module I concerns organizational behavior while Module II concerns leadership. The course will serve as an introduction to behavioral aspects of the modern workplace, including such processes as leadership, communication, motivation, conflict resolution and team building, and the influence that the environment has on such behavioral patterns. The course will help students assimilate the different roles people play in an organization irrespective of their departmental positions or functional affiliations, and recognize the interactions inherent among people, structures and environments. Particular attention is accorded to leadership as a focal point of group processes and a critical ingredient in successful organizational endeavors and transformations. Through this course students will analyze, evaluate and apply management and organizational behavior concepts, approaches and tools to both novel business problems and situations and to managerial decision-making situations.

PBHL 304 Public Health Policy and Advocacy 3 cr.
This course introduces students to the relevant concepts and approaches in public health policy and advocacy. It will provide students with a basic understanding of the public health policymaking process as well as the basic elements of advocacy. The aim is to make MPH students informed of the complex nature about public health policy development, be critical consumers of health policy research and evidence, and analytical of the influence of various actors on the policy. Students will learn the stages of the policy process (i.e., agenda setting, policy development, policy implementation and policy evaluation). The field draws upon numerous disciplines. As such, course readings will be drawn from political science, sociology, biomedical sciences and policy studies. Students will also cover the basic elements of an advocacy process, including defining the issue, understanding the audiences and crafting advocacy strategies. Case studies, class discussions, and guest speakers will provide tangible examples of public health policy and advocacy processes at the national, regional and international levels. Ethics and equity considerations will be included in discussions related to concepts and application.

SHRP 395A Comprehensive Examination 0 cr.
Each student is expected to pass a comprehensive examination after completion of all required courses. Examinations may be written, oral or both. Timing of the examination is set by the program.

SHRP 400 Research Thesis 6 cr.
This is a 6-credit master's research course generally completed over two-three terms or more, after the SHARP required summer certificate program. The thesis research track for the SHARP MS degree program will be flexible provided its primary focus is related to NCD. The focus would be clinical trial based, or pertaining to NCD related outcomes or clinical epidemiology, or to the formulation of a health policy related to NCD. A meta-analysis is allowed as a thesis topic pending approval of the joint FM/FHS GSC. A passing grade on the comprehensive exam is also required and it will be followed by a thesis defense and document submission as required by AUB academic guidelines.

Electives

SHARP MS students are allowed a total of 2 credits of electives that can be taken either as established offered courses at any of the following faculties: FM, FHS, OSB, FAFS and HSON (including those listed below), or as tutorials (credits) and seminars (1 credit), provided they are post-graduate courses and are approved by the SHARP Director.

EPHD 324 Special Topics in Biostatistics 1-3 cr.
A course that covers selected topics in biostatistics of special interest to researchers and trainees in epidemiology and population health. Prerequisite: EPHD 310 or consent of instructor.

EPHD 312 Analysis of Continuous Data 3 cr.
A course that deals with concepts and methods for the analysis of continuous outcomes. The main focus is on multiple linear regression. Analytical means to control for confounding and effect modification while maximizing precision is explored. The methods of regression diagnostics are explained. Basic theory is considered; however, the emphasis is on application. Applications of the statistical techniques are carried out using the statistical package SPSS. Prerequisite: EPHD 310 or consent of instructor.

EPHD 313 Analysis of Categorical Data 3 cr.
A course that covers univariate and multivariate statistical techniques for categorical data. Topics include distributions; measures of association and inference for categorical data; log-linear models for multi-contingency tables; and logistic regression for binary, polytomous and ordinal responses. In addition, the concept of maximum likelihood estimation is introduced. Applications of the statistical techniques are carried out using the statistical package STATA. Prerequisite: EPHD 310 or consent of instructor.

HPCH 334 Qualitative Health Research 3 cr.
A course in which students advance their qualitative social research methodology and methods for public health research. Students revisit the underlying paradigms and use of qualitative methodology. Throughout this course, students refine their interviewing skills, train on how to manage qualitative data, apply systematic data analysis and produce a rigorous account of qualitative research findings through practical applications in Arabic and English. Prerequisite: PBHL 310 and PBHL 312 or (PHNU 300 & NFSC 307 & NFSC 301).

HMPD 300 Health Care Systems 3 cr.
This course deals with all the main components, resources and functions of health care systems. It is designed for graduate students to identify organizational and health system problems and apply systems thinking in resolving them. The course also introduces graduate students to the policy making and analysis of health system issues with particular focus on Lebanon and the Middle East region.

PBHL 310 Research Design 3 cr.
This course discusses principles of research design and the methods used in both quantitative and qualitative social research methodologies. Topics include formulation of research questions, literature review, sampling issues, methods of data collection and analysis. Practical ethical issues are also discussed.

HMPD 314 Project Management 2 cr.
A course that exposes students to current project management trends, best practices, and strategies that can aid in better management of projects and programs in health care settings.

SHRP 333 Longitudinal correlated measures 1 cr.
This course builds on the basic biostatistics course by developing regression models to analyze studies that involve correlated outcome data. Correlated outcomes occur in many study designs ranging from classic longitudinal follow-up studies to hierarchical designs where patient level outcomes are influenced by their physician and their health clinic. The correlation may adversely or beneficially affect the power of the study, leading to the need to estimate and adjust for the degree of correlation during analysis, as well as to adjust sample size calculations during the design of the study. Thirteen lectures will cover relevant topics including the concept of correlation, its impact on study design, the specific forms a correlation matrix can assume, and a detailed investigation of modeling longitudinal outcome data. Alternative methods for fitting correlated data including generalized estimating equations, random effects models, and fixed effects models, will be covered.

BIOM 375 Principles of Learning and Assessment 2 cr.
This course provides students with the theoretical background and approaches to teaching science at the university level with emphasis on the nature of science and learner cognition. In addition, students are expected to apply principles and techniques of teaching and assessment of science in a teaching context. Course offered to PhD students in Biomedical Sciences.

SHRP 345 Survival Analysis 1 cr.
This course provides students with the theoretical background and approaches to teaching science at the university level with emphasis on the nature of science and learner cognition. In addition, students are expected to apply principles and techniques of teaching and assessment of science in a teaching context. Course offered to PhD students in Biomedical Sciences.

SHRP 329A Guideline Development and Adaptation 1 cr.
This course provides students with the theoretical background and approaches to teaching science at the university level with emphasis on the nature of science and learner cognition. In addition, students are expected to apply principles and techniques of teaching and assessment of science in a teaching context. Course offered to PhD students in Biomedical Sciences.

SHRP 332 Applied Survival Analysis 1 cr.
This course introduces students to many of the basic principles of human behavior that effective managers apply when managing individuals and groups in organizations. These include individual differences in abilities and attitudes, perception, attribution and bias, motivation, group dynamics including teams and communication, power and politics, organizational culture, and organizational structure and design. Particular attention is given

to the psychological aspects of the employment relationship. Leadership is also highlighted as a crucial underpinning of group processes and as a decisive factor in organizational success, with the tone of leadership having important implications for HRM success.

SHRP 360 Introduction to Data Science 2 cr.
This introductory course will initiate trainees to the main concepts of the Data Science lifecycle, and to machine learning (ML) tools, their algorithms, to mine big data. During the 20 lectures students will learn: To develop an understanding of the data that one will use and how it was collected through significant exploration (exploration and understanding); To munge, wrangle, and manipulate data in order to get an informative, manageable data set; To explore the statistical relationships between the variables in the data, and generate hypotheses and intuition about the data prediction based on statistical learning tools such as regression, machine learning tools including classification and clustering, as well as deep learning techniques; To give the data back in a compelling form and structure, through visualization, stories, and interpretable summaries. The course will therefore allow students to understand the basics behind ML, their potential, as well as their limitations, and to learn data-driven protocols for assessing the quality of data sets. Students will use ML tools to develop and validate predictive models, in order to predict, diagnose, and design interventions to improve pre-defined outcomes. This will include health outcomes in population or cohort settings in general, and as they relate to NCDs in particular. Students will use trustworthy pre- selected large public data sets of relevance to NCDs including data sets on pollution, cancer and cardiovascular diseases, and learn how to pose and answer predictive questions around those data sets. The Data Science tools acquired by the trainees will culminate in a course project where they will apply knowledge and skills acquired on large (big) data sets on air pollution as well as on NCDs with a focus on cardiovascular diseases and cancer.

MS in Public Health Nutrition

The Master of Science in Public Health Nutrition is a new graduate program offered jointly by the Faculty of Agricultural and Food Sciences (FAFS) and the Faculty of Health Sciences (FHS) at AUB. Students may pursue the Master of Science in Public Health Nutrition in either a thesis or a non-thesis track. The successful completion of the degree will require 40 credit hours for both tracks. Credits must be earned within the Faculty of Agricultural and Food Sciences and the Faculty of Health Sciences.

For the non-thesis track, 38 credits out of the required 40 credits should be earned as core program courses, including a culminating experience and a practicum. Two credits must be acquired as one or two elective courses either earned within or at both faculties.

For the thesis track, students must complete a total of 34 credits as core courses and must work on a 6-credit thesis under the supervision of a thesis advisor and thesis committee and defend their thesis as per AUB graduate program policies.

The credit requirements for both the thesis and non-thesis track options are tabulated below.

Credit requirements for both the thesis and non-thesis options for the Master of Science in Public Health Nutrition

		Non-Thesis Track Credits	Thesis Track Credits
Year 1			
NFSC 301	Statistical Methods for Nutrition and Food Sciences	3	3
NFSC 306A	Community Nutrition	2	2
NFSC 307	Nutritional Epidemiology	3	3
PHNU 300	Fundamentals of Public Health Nutrition	3	3
PBHL 303	Design and Evaluation of Public Health Programs	3	3
PBHL 304	Public Health Policy and Advocacy	3	3
PBHL 306A	Workshop Series: Library and Literature Search Skills	0	0
PBHL 306B	Workshop Series: Proposal Writing and Literature Synthesis for Public Health Research and Practice	0	0
PHNU 304	Nutrition in Emergencies	2	2
HPCH 331	Theories in Health Promotion	2	2
HPCH 334	Qualitative Research in Health Promotion	3	3
Total year credits		**24**	**24**
Year 2			
HPCH 333	Social Marketing in Health Promotion	2	2
FSEC 310	Food and Nutrition Security	3	3
PHNU 301	Nutrition in the Life Cycle	3	3
PHNU 302	Nutrition-related Chronic Disease	3	3
PHNU 390	Practicum	2	0
PHNU 391	Integrative Learning Experience	3	0
	Elective	1	0
PHNU 396	Comprehensive Exam	0	0
PHNU 399	Thesis	0	6
Total year credits		**17**	**17**
Total credits		**41**	**41**

Core Courses (Thesis)

NFSC 301 Statistical Methods for Nutrition and Food Science 2.3; 3 cr.
This is an intermediate level course of statistics. Topics include introduction to designs in Nutrition and Food Science research; critical appraisal of literature; methods of describing data; statistical inference for means and proportions; linear and logistic regression, and an introduction to multiple regression. Prerequisites: STAT 210 or EDUC 227 and CMPS 209 or equivalent undergraduate course in statistics. Offered Fall and Spring.

NFSC 306A Community Nutrition 2.0; 2 cr.
In this course, students will be trained on the role of nutrition in improving the health and wellbeing of communities and will be equipped with skills required to conduct community-based assessment, as well as plan, implement, and evaluate community nutrition programs

and policies. The course combines theory and practice where students will discuss, analyze, and experiment with the theories of behavioral change and will apply the principles of nutrition education when tackling specific nutritional problems. Students will be provided with experiential learning opportunities to assess the health and nutrition needs of specific population groups. In addition, this course will give students the opportunity to plan, implement, and evaluate small-scale nutrition interventions to improve the health and well-being of individuals within select communities. Offered Spring.

NFSC 307 Nutritional Epidemiology 3.0; 3 cr.
This course deals with the design, conduct, analysis, and interpretation of epidemiologic studies related to nutrition, particularly the relationship between nutritional status, diet and disease. Prerequisites: STAT 210 or EDUC 227 and CMPS 209 or equivalent undergraduate course in statistics. Offered Fall.

PHNU 300 Fundamentals of Public Health Nutrition 3 cr.
This course introduces students to the field of public health nutrition, covering the fundamental pillars of the field; nutrition status and needs, assessments and planning, monitoring, and evaluating nutrition interventions. Students will be exposed to the theories and conceptual frameworks behind addressing nutrition-related health issues at a population level. Offered Fall.

HPCH 331 Theories in Health Promotion 2.0; 2 cr.
This course focuses on theories utilized to understand health determinants and outcomes and to promote individual and population health. Students will critically examine perspectives from health promotion and other social science disciplines through theoretical readings and empirical case studies. They will also discuss the merits and challenges of using theory to analyze health and to intervene at multiple levels from the individual to the structural levels. Prerequisite: PBHL 312 or (PHNU 300 and NFSC 307). Offered Spring.

HPCH 334 Qualitative Health Research 2 cr.
A course in which students advance their qualitative social research methodology and methods for public health research. Students revisit the underlying paradigms and use of qualitative methodology. Throughout this course, students refine their interviewing skills, train on how to manage qualitative data, apply systematic data analysis and produce a rigorous account of qualitative research findings through practical applications in Arabic and English. Prerequisites: PBHL 310 and PBHL 312 or (PHNU 300 & NFSC 307 & NFSC 301).

PHNU 301 Nutrition in the Life Cycle 3.0; 3 cr.
This course covers the nutritional needs of individuals in different stages of the life cycle, with a focus on maternal and child nutrition and nutrition in the elderly. Offered Fall.

PHNU 302 Nutrition-related Chronic Disease 3.0; 3 cr.
This course covers the epidemiology, etiology, and the medical and nutritional management of chronic diseases whose etiologies are nutrition-related. Offered Fall.

HPCH 333 Social Marketing in Health Promotion 2.0; 2 cr.
In this course, students will learn the theoretical underpinnings of social marketing, a framework used to develop strategies aimed to address social and public health issues and to design effective, sustainable, and ethically sound public health campaigns. As a service-learning course, students apply concepts acquired into the development of a social marketing plan for a local community partner organization, responding to selected public health issues. This course is offered in blended learning format and is based on a combination of different modes of delivery (online and face-to-face) and diverse models

of teaching and learning styles, providing students with an interactive and meaningful learning environment. Prerequisites: HPCH 331 and PBHL 303. Offered Fall.

FSEC 310 Nutrition Security: Assessment and Intervention Strategies 3.0; 3 cr.
This course introduces students to basic principles of nutrition security, community nutrition, and nutritional ecology; and highlights the role that nutrition plays in improving the health and wellbeing of communities. The course aims to equip students with the knowledge and skills required to conduct population-based nutrition research, assess the nutrition needs of a population, to plan, implement and evaluate community nutrition programs and policies based on evidence-based practice and taking into consideration cultural, social, and contextual dimensions. Offered Spring.

PHNU 304 Nutrition in Emergencies 2.0; 2 cr.
This course covers evidence-based community nutrition interventions in emergency situations that place vulnerable populations at risk of food insecurity and consequent malnutrition. Offered Summer.

PBHL 303 Design and Evaluation of Public Health Programs 2.2; 3 cr.
This course introduces students to the concepts and methods of public health program design and evaluation. Students will develop skills for assessing population needs for the development of health programs. The course then covers public health program design, including developing measurable objectives, identifying evidence-based intervention strategies, and planning for program implementation. Students will learn to select appropriate methods for impact and process evaluation of health programs. Prerequisites: PBHL 310 (waived for PHNU students) and PBHL 312 or (PHNU 300 & NFSC 307 & NFSC 301 & HPCH 334 (concurrently)). Offered Spring.

PBHL 304 Public Health Policy and Advocacy 3.0; 3 cr.
This course introduces students to the relevant concepts and approaches in public health policy and advocacy. It will provide students with a basic understanding of the public health policymaking process as well as the basic elements of advocacy. The aim is to make MPH students informed of the complex nature about public health policy development, be critical consumers of health policy research and evidence, and analytical of the influence of various actors on the policy process. Students will learn the stages of the policy process (i.e., agenda setting, policy development, policy implementation and policy evaluation). The field draws upon numerous disciplines. As such, course readings will be drawn from political science, sociology, biomedical sciences and policy studies. Students will also cover the basic elements of an advocacy process, including defining the issue, understanding the audiences and crafting advocacy strategies. Case studies, class discussions, and guest speakers will provide tangible examples of public health policy and advocacy processes at the national, regional and international levels. Ethics and equity considerations will be included in discussions related to concepts and application. Offered Spring.

PHNU 396 Comprehensive Exam 0 cr.
Comprehensive Exam

PHNU 399 MS Thesis 6 cr.
MS Thesis

Core Courses (Non-Thesis)

NFSC 301 Statistical Methods for Nutrition and Food Sciences 2.3; 3 cr.
This is an intermediate level course of statistics. Topics include introduction to designs in

Nutrition and Food Science research; critical appraisal of literature; methods of describing data; statistical inference for means and proportions; linear and logistic regression, and an introduction to multiple regression. Prerequisites: STAT 210 or EDUC 227 and CMPS 209 or equivalent undergraduate course in statistics. Offered Fall and Spring.

NFSC 306A Community Nutrition 2.0; 2 cr.
In this course, students will be trained on the role of nutrition in improving the health and wellbeing of communities and will be equipped with skills required to conduct community-based assessment, as well as plan, implement, and evaluate community nutrition programs and policies. The course combines theory and practice where students will discuss, analyze, and experiment with the theories of behavioral change and will apply the principles of nutrition education when tackling specific nutritional problems. Students will be provided with experiential learning opportunities to assess the health and nutrition needs of specific population groups. In addition, this course will give students the opportunity to plan, implement, and evaluate small-scale nutrition interventions to improve the health and well-being of individuals within select communities. Offered Spring.

NFSC 307 Nutritional Epidemiology 3.0; 3 cr.
This course deals with the design, conduct, analysis, and interpretation of epidemiologic studies related to nutrition, particularly the relationship between nutritional status, diet and disease. Prerequisites: STAT 210 or EDUC 227 and CMPS 209 or equivalent undergraduate course in statistics. Offered Fall.

PHNU 300 Fundamentals of Public Health Nutrition 3 cr.
This course introduces students to the field of public health nutrition, covering the fundamental pillars of the field; nutrition status and needs assessments and planning, monitoring, and evaluating nutrition interventions. Students will be exposed to the theories and conceptual frameworks behind addressing nutrition-related health issues at a population level. Offered Fall.

HPCH 331 Theories in Health Promotion 2.0; 2 cr.
This course focuses on theories utilized to understand health determinants and outcomes and to promote individual and population health. Students will critically examine perspectives from health promotion and other social science disciplines through theoretical readings and empirical case studies. They will also discuss the merits and challenges of using theory to analyze health and to intervene at multiple levels from the individual to the structural levels. Prerequisites: PBHL 312 or (PHNU 300 and NFSC 307). Offered Spring.

HPCH 334 Qualitative Health Research 3 cr.
A course in which students advance their qualitative social research methodology and methods for public health research. Students revisit the underlying paradigms and use of qualitative methodology. Throughout this course, students refine their interviewing skills, train on how to manage qualitative data, apply systematic data analysis and produce a rigorous account of qualitative research findings through practical applications in Arabic and English. Prerequisites: PBHL 310 and PBHL 312 or (PHNU 300 & NFSC 307 & NFSC 301).

PHNU 301 Nutrition in the Life Cycle 3.0; 3 cr.
This course covers the nutritional needs of individuals in different stages of the life cycle, with a focus on maternal and child nutrition and nutrition in the elderly. Offered Fall.

PHNU 302 Nutrition-related Chronic Disease 3.0; 3 cr.
This course covers the epidemiology, etiology, and the medical and nutritional management of chronic diseases whose etiologies are nutrition-related. Offered Fall.

HPCH 333 Social Marketing in Health Promotion 2.0; 2 cr.
In this course, students will learn the theoretical underpinnings of social marketing, a framework used to develop strategies aimed to address social and public health issues and to design effective, sustainable, and ethically sound public health campaigns. As a service-learning course, students apply concepts acquired into the development of a social marketing plan for a local community partner organization, responding to selected public health issues. This course is offered in blended learning format and is based on a combination of different modes of delivery (online and face-to-face) and diverse models of teaching and learning styles, providing students with an interactive and meaningful learning environment. Prerequisites: HPCH 331 and PBHL 303. Offered Fall.

FSEC 310 Nutrition Security: Assessment and Intervention Strategies 3.0; 3 cr.
This course introduces students to basic principles of nutrition security, community nutrition, and nutritional ecology; and highlights the role that nutrition plays in improving the health and wellbeing of communities. The course aims to equip students with the knowledge and skills required to conduct population-based nutrition research, assess the nutrition needs of a population, to plan, implement and evaluate community nutrition programs and policies based on evidence-based practice and taking into consideration cultural, social, and contextual dimensions. Offered Spring.

PHNU 304 Nutrition in Emergencies 2.0; 2 cr.
This course covers evidence-based community nutrition interventions in emergency situations that place vulnerable populations at risk of food insecurity and consequent malnutrition. Offered Summer.

PBHL 303 Design and Evaluation of Public Health Programs 2.2; 3 cr.
This course introduces students to the concepts and methods of public health program design and evaluation. Students will develop skills for assessing population needs for the development of health programs. The course then covers public health program design, including developing measurable objectives, identifying evidence-based intervention strategies, and planning for program implementation. Students will learn to select appropriate methods for impact and process evaluation of health programs. Prerequisites: PBHL 310 (waived for PHNU students) and PBHL 312 or (PHNU 300 & NFSC 307 & NFSC 301 & HPCH 334 (concurrently)) Offered Spring.

PBHL 304 Public Health Policy and Advocacy 3.0; 3 cr.
This course introduces students to the relevant concepts and approaches in public health policy and advocacy. It will provide students with a basic understanding of the public health policymaking process as well as the basic elements of advocacy. The aim is to make MPH student informed of the complex nature of public health policy development, be critical consumers of health policy research and evidence, and analytical of the influence of various actors on the policy process. Students will learn the stages of the policy process (i.e., agenda setting, policy development, policy implementation and policy evaluation). The field draws upon numerous disciplines. As such, course readings will be drawn from political science, sociology, biomedical sciences and policy studies. Students will also cover the basic elements of an advocacy process, including defining the issue, understanding the audiences and crafting advocacy strategies. Case studies, class discussions, and guest speakers will provide tangible examples of public health policy and advocacy processes at the national, regional and international levels. Offered Spring.

PHNU 390 Practicum 2.0; 2 cr.
The practicum is considered an essential part of the curriculum of students. Students gain practical experience working with organizations engaged in developing, implementing and /or evaluating community-based public health nutrition programs. This experience may be purely research-based for students aiming for more academic careers. Offered Spring.

PHNU 391 Integrative Learning Experience 3.0; 3 cr.
This course will allow students to apply knowledge and skills acquired throughout their graduate courses. Through this course, students will develop an understanding of how to conduct a community-based project or a research project beginning with the conception of ideas and concluding with depicting written results and discussing them, along with proper citations and procedures. Part I offered Fall and Part II offered spring.

PHNU 396 Comprehensive Exam 0 cr.
Comprehensive Exam.

List of Elective Courses

HPCH 301 Health Communication 2.0; 2 cr.
Health communication is an area of study that examines how human and mediated communication can influence the outcomes of health-care and health promotion efforts. This core MPH course introduces the students to the basic concepts of health communication and its scholarship, including the focal areas of health literacy and patient-provider communication, social marketing, health campaigns, risk communication, crisis communication, and health advocacy. In the course, students will discuss the ways communicating about health is influenced by individual, social, and societal factors. The course will provide students with tools to critically evaluate existing health campaigns and to outline strategies to effectively communicate with different audiences about health-related topics. They will also design culturally appropriate, evidence-based health messages, designed for specific publics. Through this course, students will also learn how to effectively communicate scientific information with different audiences (e.g., general population, experts, the media), appropriately choosing oral and written materials and communication channels.

NFSC 395 Graduate Seminar in Nutrition and Food Science 1.0; 1 cr.
Offered Fall and Spring.

Rafic Hariri School of Nursing (HSON)

Graduate Program

Officers of the School

Fadlo R. Khuri	President of the University
Zaher Dawy	Provost
Samar Noureddine	Dean of the Rafic Hariri School of Nursing
Nuhad Yazbik-Dumit	Associate Dean for Academic Affairs
Bradley Jon Tucker	Registrar
Antoine Sabbagh	Director of Admissions
Lokman Meho	University Librarian

Faculty

Convener/Graduate Division:	Honein, Gladys
Coordinator, PhD Program:	Yazbik-Dumit, Nuhad
Chair of the online working group at HSON:	Yazbik-Dumit, Nuhad
Director, blended MSN program in Nursing Administration and Management:	Abi Abdallah Doumit, Myrna
Director, Graduate Online Diploma in Nursing Administration and Management:	Younan Sabbagh, Lina
Director of the professional diploma in nursing education:	Abi Fakhr, Lina
Coordinator, MSN Nursing Administration and Management track:	Yazbik-Dumit, Nuhad
Coordinator, MSN Adult-Gerontology CNS track:	Massouh, Angela
Coordinator, MSN Psychiatry and Mental Health CNS Track:	Farhood, Laila
Coordinator, MSN Community and Public Health Nursing Track:	Honein, Gladys
Convener/Undergraduate Division:	Adra, Marina
Coordinator, Accelerated Programs:	Madi, Dina
Professors:	Farhood, Laila; Noureddine, Samar; Yazbik-Dumit, Nuhad
Associate professors:	Abi Abdallah Doumit, Myrna; Fares, Souha; Honein, Gladys; Sukkarieh, Ola
Clinical Associate Professors:	Abi Fakhr, Lina; Adra, Marina; Madi, Dina; Younan Sabbagh, Lina
Assistant Professors:	Dakessian, Silva; Massouh, Angela, Puzantian, Houry
Clinical instructors:	Abdallah, Nour; Avedissian, Tamar; Damianos, Danielle; Succar, Emilie, Malkedjian, Sarine Rita
Instructor:	Chedid, Rana
Part-time Clinical Instructor:	Daibess, Nadine
Visiting Professor:	Kordahi Badr, Lina

School Administrative Support

Executive and Financial Officer:	Chami, Diana
Student Services and Career Planning Officer:	Abdallah, Mira
Skills and Simulation Lab Coordinator:	Nasr, Joyce
IT Manager, Faculty of Medicine and Hariri School of Nursing:	Itani, Maher
IT Field Support Technician:	Karout, Toufic
Medical Librarian:	El Zein, Ola

Historical Background

The School of Nursing, founded in 1905, was the first nursing school in the Middle East. The five–year Bachelor of Science in Nursing program, established in 1936, was replaced by a four-year program in 1964 leading to the degree of Bachelor of Science in Nursing. Students entering the school as sophomores graduate in three calendar years. The RN-BSN program was reactivated and launched in 2003. The Master of Science in Nursing (MSN) program was launched in 2003. The Bachelor of Science in Nursing program (BSN) and the MSN program are registered by the Department of Education of New York State, HEGIS codes 1203.00 and 1203.10, respectively. The BSN and the MSN programs are accredited by CCNE, the Commission on Collegiate Nursing Education, in the USA. The AUB School of Nursing is the first School of Nursing outside the US territories to be accredited by CCNE. The PhD program, also registered in New York with HEGIS code 1203.12, was launched in the academic year 2018-2019. The Rafic Hariri School of Nursing became the seventh independent Faculty at AUB, on September 1, 2018.

Mission

The mission of the School of Nursing is to promote and maintain the highest educational standards of excellence, integrity and professionalism in nursing, following the American model of nursing education and practice. The school aims to provide learning opportunities that will enable students to grow into competent nurses guided by ethical principles, who respect cultural diversity while coordinating and delivering high quality and compassionate nursing care in Lebanon and the region. The faculty believes education is an interactive process between faculty and students with both taking responsibility for active learning. The baccalaureate program, drawn primarily from the humanities, sciences and caring disciplines focuses on the use of nursing theory and research as a basis for practice. The master's program focuses on preparing nurses for advanced nursing practice roles. It is based on the use and generation of research-based knowledge to guide practice. The PhD program in Nursing Science aims to provide rigorous training for research careers in nursing and healthcare. The program is intended to produce research scientists who will make significant and original contributions to nursing practice, health promotion, health maintenance, population health and healthcare delivery. Nursing students at AUB learn to think critically, develop professional attitudes and leadership skills, and appreciate the value of life-long learning and freedom of speech.

Vision

The Rafic Hariri School of Nursing aspires to become the leading school of nursing in Lebanon and the region, nationally and internationally recognized for excellence in education, research and service.

The school is committed to offering cutting-edge, culturally relevant and internationally recognized graduate and undergraduate education. Such education would foster life-long learning and scholarship, develop leaders in nursing and health care, and attract a competent and culturally diverse student body.

Graduate Programs

Masters of Science in Nursing (MSN) Program

The School of Nursing offers five tracks:

- Adult-Gerontology Clinical Nurse Specialist
- Psychiatric Mental Health Clinical Nurse Specialist
- Community and Public Health Nursing
- Nursing Administration and Management (this program is offered in a blended format, partly face to face and partly online)
- Pediatric Clinical Nurse Specialist

Both thesis and non-thesis options are available for all tracks.

Other graduate programs:

Online academic diploma in nursing administration and management

Online professional diploma in nursing education

Admission

A student is eligible for consideration for admission to the Master of Science in Nursing (MSN) program if s/he fulfills the following AUB admission requirements for graduate studies:

- A bachelor's degree in nursing from AUB or its equivalent from another recognized institution, with a cumulative undergraduate average of at least (GPA: 3.0) and an undergraduate average of at least 3.3 in the major field of study (nursing)

Please see the Admissions section of the Graduate Catalogue for further details regarding the Readiness for University Studies in English (RUSE). In addition, HSON requires the following criteria:

- A license to practice nursing from country of residence
- Evidence of knowledge and competence in physical assessment skills (except for the nursing administration and management track)
- At least one year of work experience in nursing for the clinical tracks, Community and Public Health, and the online diplomas; 2 years' work experience for the MSN in Nursing

Administration and Management

- Interviews maybe be required based on the applicant's background, and based on a recommendation of the graduate studies committee.

The MSN program admits students once per year in the Fall semester, except for the blended MSN in Nursing Administration and Management Track, which accepts applicants in Fall and Spring. Special non-degree seeking students willing to register graduate nursing courses may do so in Fall or Spring semesters. However, they need to be approved by the HSON Graduate Studies Committee. The program admits both full-time and part-time students; they need to complete all program requirements within a maximum period of four years. Extension beyond the maximum allowed period of study requires approval of the Graduate Studies Committee of the school. Candidates who fail to meet any of the admission requirements but who, in the opinion of the faculty, demonstrate potential graduate study, are admitted on probation. For example: students with a cumulative undergraduate average of at least (GPA:3.0) but less than (GPA: 3.3) in the major field (nursing) may be conditionally admitted as graduate students on probation. Students admitted on probation must complete 9 credits of graduate level courses within the first two terms of graduate studies, pass all courses and attain a minimum cumulative average of (GPA: 3.3) to achieve regular status.

For graduate academic diplomas, the student should have an undergraduate bachelor's degree (or its equivalent from AUB or other recognized institutions of higher learning) with an average of at least 75 percent (or standardized equivalent from other institutions of higher learning). An applicant who does not meet the minimum undergraduate average requirement but appears to have reasonable potential for academic success, for example as manifested by relevant practical experience or high scores on relevant standardized exams, may be admitted based on justified recommendation.

For graduate professional diplomas, the same admission requirements apply as for graduate academic diplomas but without a minimum constraint on the undergraduate average.

For both graduate professional and graduate academic diplomas, student admission recommendations require the approval of the Faculty Graduate Studies Committee (FGSC).

Graduation Requirements

All recommendations for graduation are made by a vote of the faculty upon the recommendation of the HSON Graduate Studies Committee. To be eligible for graduation from the MSN program, the student must have:

- passed all required courses with a minimum grade of (C+) per course,
- achieved a cumulative average of at least 3.3,
- completed the total number of credits required in the track of study,
- passed the comprehensive examination,
- and completed the requirements for the thesis or project.

Academic Rules and Regulations

Transfer of Credits

Refer to Transfer of Credits section, under General University Academic Information.

Supervision, Courses and Grades

Every graduate student is assigned an academic advisor to guide and help in planning the student's course of study, as stipulated by the graduate curriculum. Non-nursing courses relevant to the student's area of specialty can be taken as electives with the approval of the advisor. For students working toward a thesis, a thesis advisor who must be a full-time faculty member is assigned. S/he will also serve as chairperson of the thesis committee. The thesis advisor and committee members must be of professorial rank.

Graduate level courses in nursing are numbered 500 and above. In addition, all students in the MSN program are required to take NURS 610, a zero-credit course offered in the Fall of the first year, titled 'Advanced Searching of the Scientific Literature'. The minimum passing grade for a graduate course is (C+). However, students are required to maintain a cumulative average of at least (GPA: 3.3) in all courses taken for graduate credit. Students who are absent without excuse from more than one third of the number of sessions in any course, who fail to sit for scheduled examinations or who fail to fulfill course requirements, will be given a grade of (F) for graduate courses. Results of tutorial courses, NURS 610, residencies, projects or theses will be reported as pass (P) or fail (F).

Students admitted with curriculum deficiencies may need to register for prerequisite undergraduate courses; such courses do not carry any graduate credit. The minimum passing grade for a prerequisite course is (C+).

Probation and Dismissal

Refer to Academic Standing of Student Working for a Master's Degree section under General University Academic Information.

Comprehensive Examination

A student must pass a comprehensive examination after completion of most of the course requirements for the MSN degree. The Graduate Studies Committee of the School of Nursing sets the time of the examination. Students planning to take the comprehensive exam must register the comprehensive exam course NURS-526 (0 credit) in the term during which they are planning to sit for the exam. The purpose of the examination is to ascertain the student's knowledge of her/his field of specialization. A student who does not pass the comprehensive examination may take it a second time in the following term. Students who are unable to pass a program's comprehensive exam twice are dropped from the graduate program. Students who pass the comprehensive exam after one failure will have their initial failure reported on their transcript as "PR" for progress in the first term the course was registered in, and their passing the comprehensive exam reported as "P" in the second term the course was registered in. The comprehensive exam is offered twice per year, once in the fall and once in the spring term.

For more information, refer to Comprehensive Examination section, under General University Academic Information.

Thesis/Project

Those students enrolled in the MSN with the thesis option must submit a thesis based on original, independent research, and in English. An abstract not exceeding 350 words must be submitted to the Graduate Studies Committee for approval of the topic and thesis committee members 4 months before the defense date. Once approved the thesis is

granted, the student must ensure that the thesis conforms to the guidelines outlined in the University Thesis Manual found in the library. It is mandatory to apply the manual style to the thesis; theses not conforming to the manual requirements will not be accepted. The student must submit copies of the thesis to the members of the thesis committee at least two weeks before the thesis defense.

Master's Thesis Committee

The thesis committee should be composed of at least three members approved by the faculty Graduate Studies Committee. The student must submit the thesis proposal to the Master's thesis committee for approval. It is advisable that the thesis committee includes one member from outside the School of Nursing (who can also be from an institution outside AUB). All committee members should hold professorial rank. The thesis committee approves the thesis topic, oversees the research protocol and participates in the thesis defense.

Master's Project Committee

Students, instead, may opt for a 3-credit project. If so, 3 credits of elective coursework in a related area should be taken. Students who choose to do a project are assigned an advisor who serves as the project advisor. The master's project committee should be composed of at least two members recommended by the department/program. It is a must that the first reader of the project committee member holds a professorial rank. The second reader can hold a clinical/administrative position (Non-PhD, such as CNS) or be an academic associate or adjunct faculty with expertise in the area of research. The project's topic abstract and selection of the advisor and project committee members should be approved by the faculty/school Graduate Studies Committee at least four months before the project defense. Pass (P) or Fail (F) is reported for project defense. If Fail (F) is reported, the student may resubmit the project and defend it after a period of at least three months. Failure on the second attempt results in discontinuation of the graduate work.

For more information, refer to Supervision of Master's Thesis or Project section, under General University Academic Information. Refer also to the Graduate Student Handbook of the School of Nursing regarding guidelines for projects and theses.

For more information, refer to Thesis Proposal section, under General University Academic Information.

Thesis/Project Defense

Refer to Thesis Defense and Project Defense section, under General University Academic Information.

Deposit of Thesis/Project in the Library

Refer to Thesis Defense and Project Defense section, under General University Academic Information.

Specific Requirements for the Master's Degree

Refer to the Admissions section in this catalogue.

Masters of Science in Nursing Curriculum

Core Courses*		**Lecture Hrs./ Week**	**Clinical Hrs./ Week**	**Credit Hrs.**
NURS 500	Theories, Concepts and Ethical Frameworks for Advanced Nursing Practice	2	0	2
NURS 501	Advanced Nursing Practice: Scope and Roles	2	0	2
NURS 530	Statistical Reasoning and Application in Nursing Research	1	2	2
NURS 502	Advanced Nursing Research	3	0	3
NURS 527	Systems Approach to the Development and Evaluation of Health Care Services	3	0	3
NURS 610	Advanced Searching of the Scientific Literature	1	0	0
Concentration Courses		**Lecture Hrs./ Week**	**Clinical Hrs./ Week**	**Credit Hrs.**
Adult Gerontology Clinical Nurse Specialist Track				
NURS 503	Advanced Health Assessment	2	3	3
NURS 504	Advanced Pathophysiology	3	0	3
NURS 505A	Advanced Practice in Adult-Gerontology I	2	8	4
NURS 505B	Advanced Practice in Adult-Gerontology II	2	8	4
NURS 506	Advanced Practice in Adult-Gerontology III	0	16	4
PHRM 314	Advanced Pharmacology and Therapeutics	3	0	3
Electives	-	3	0	3
Nursing Administration and Management Track (offered as a blended program)				
NURS 507	Essentials of Nursing Administration Management	2	0	2

NURS 508	Advanced Practice in Nursing Administration	0	16	4
NURS 531	Practical Applications of Budgeting Nursing	1	0	1
NURS 525	Leadership Theories and Application Nurse Managers	3	0	3
NURS 520	Managing Quality with Teams	3	0	3
NURS 533	Advanced Learning & Health Informatics	3	0	3
MNGT 308	Human Resource Development	3	0	3
Electives	-	3	0	3
Psychiatric Mental Health Clinical Nurse Specialist Track				
NURS 503A	Advanced Health Assessment for Mental Health	1	0	1
NURS 504	Advanced Pathophysiology	3	0	3
NURS 512	Advanced Psychiatric and Mental Health Assessment	1	3	2
PHRM 314	Advanced Pharmacology and Therapeutics	3	0	3
NURS 516	Psychopathology and Human Behavior	3	0	3
NURS 517	Models of Treatment-Psychotherapy (Bio-Behavioral Nursing Interventions)	1	6	3
NURS 518	Group and Family Psychotherapy	1	6	3
NURS 519	Clinical Residency in Acute Psychiatric Care	0	16	4
Community and Public Health Nursing Track				
NURS 503	Advanced Health Assessment	2	3	3
NURS 504	Advanced Pathophysiology	3	0	3
PHRM 314	Advanced Pharmacology and Therapeutics	3	0	3
EPHD 300	Principles of Epidemiology	1	1	2
NURS 522	Principles and Practice of Community Health Nursing	2	3	3

NURS 523	Advanced Community Assessment	2	3	3
NURS 524	Clinical Residency in Community Health Care	0	16	4
Electives	-	3	0	3
Pediatric Clinical Nurse Specialist Track				
NURS 504A	Complex Topics in Pathophysiology	3	0	3
PHRM 314	Advanced Pharmacology and Therapeutics	3	0	3
NURS 532A	Nursing care of acute and chronic conditions in Pediatrics	2	0	2
NURS 532B	Pediatrics Practicum	0	8	2
NURS 534A	Updates and innovations in Neonatology and Pediatrics	2	0	2
NURS 534B	Pediatrics and Neonatology practicum	0	8	2
NURS 535	Residency in Pediatric Nursing	0	16	4
Electives	-	3	0	3
Thesis/Project				
NURS 599	Thesis	-	-	6
NURS 598	Project	-	-	3
Elective	Elective	-	-	3
Comprehensive course				
NURS 526	Comprehensive exam	-	-	0

All courses designated with a superscript 1 next to their titles are offered in a blended format to the MSN in Nursing Administration and Management Students.

NURS 610 is a zero-credit course on advanced searching of the scientific literature offered to PhD students. All new MSN students ought to take this course in Fall of their first year.

In case MNGT 332 is not offered, students may register for an equivalent course approved by the coordinator of the Nursing Administration and Management track.

Students may take elective coursework in any major that helps them with their studies.

The School of Nursing also offers special topic courses ranging from 1 to 3 credits that cover nursing issues of interest to students in various tracks. These courses can be counted toward the elective credits. (e.g. NURS 505 C).

Online Graduate Diploma in Nursing Administration and Management

HSON offers a one-year graduate academic online Diploma in Nursing Administration and Management.

The program mainly targets working nurses who desire to enhance their administrative skills to possibly obtain a nursing management position in hospitals or primary health care settings.

This education opportunity will help in gaining a “stand-alone” Graduate Diploma or can serve as a “step up” to a Master of Science in Nursing Administration and Management at HSON.

The program will support the unique needs of working nurses, who wants to advance their career while continuing to work full time.

Admission Requirements

BSN degree or its equivalent from an accredited/recognized institution. GPA of at least 2.7, with an undergraduate GPA of at least 3.2 in nursing major courses. Satisfactory scores on the English Entrance Exam (EEE) or Test of English as a Foreign Language (TOEFL), as per AUB admission requirements for graduate studies. License to practice nursing from country of residence. Two years of work experience in nursing.

Curriculum

The online academic diploma in nursing administration and management requires 13 graduate credits. These credits include five concentration courses (12cr) and a practicum (1cr). Students can register 6 credits per semester and finish in one year. Students should complete the following courses required for the program:

Curriculum and Academic Plan

Term	Course Number	Course Title	Lecture Hrs./ Week	Clinical Hrs./ Week	Credit Hrs.
Fall	NURS 507	Essentials of Nursing Administration and Management	2	0	2
	NURS 531	Practical Applications of Budgeting in Nursing	1	0	1
	NURS 520	Managing Quality with Teams	3	0	3

Spring	NURS 525	Leadership Theories and Applications for Nurse Managers	3	0	3
	NURS 533	Advanced Health and Nursing Informatics	3	0	3
	NURS 508A	Residency in Nursing Administration	0	4	1
Total Credits					**13**

Online Graduate Professional Diploma in Nursing Education

The Online Professional Graduate Diploma in Nursing Education focuses on professional development of competent nurses to teach in various healthcare settings and nursing programs. it is a comprehensive and flexible educational program designed to equip experienced nurses with the necessary knowledge and skills to become effective nurse educators.

The program provides a 12-credit program that focuses on knowledge and skills required for the nurse educator role. The courses are:

- Introduction to Curriculum Design and Clinical Education in Nursing
- Innovative Teaching and Learning: Role of Mentors and Coaches
- Assessing and Evaluating Learning and Competence in Nursing
- Course/Project Design

The program will be offered online, so learners have the flexibility to complete the requirements of each course at their own convenience without disrupting their work and life commitments. The curriculum culminates in an intensive individualized workshop in which the learner collaborates with a senior educator from academia or service to implement the role.

Admission Requirements

BSN degree or its equivalent from an accredited/recognized institution. Satisfactory scores on the English Entrance Exam (EEE) or Test of English as a Foreign Language (TOEFL), as per AUB admission requirements for graduate studies. License to practice nursing from country of residence. One year of work experience in nursing.

Learning Outcomes

Upon completion of the diploma, students will be able to:

1. Develop nursing or health-related courses or continuing education offerings aligned with expectations of the role.
2. Incorporate diverse instructional approaches relevant to learners' needs and context of application.
3. Use various strategies in assessing and evaluating learning in the cognitive, psychomotor, and affective domains.
4. Evaluate the effectiveness of instructional and training strategies in achieving learning outcomes.

Curriculum and Academic Plan

Term	Course Number	Course Title	Lecture Hrs./ Week	Clinical Hrs./ Week	Credit Hrs.
Fall	NURS 536	Introduction to Curriculum Design and Clinical Education in Nursing	6	0	3
	NURS 537	Innovative Teaching and Learning: Role of Mentors and Coaches	6	0	3
Spring	NURS 538	Assessing and Evaluating Learning and Competence in Nursing	6	0	3
	URS 539	Project/Internship: Course/ Program Design	0	0	3
Total Credits					**12**

Doctor of Philosophy (PhD) in Nursing Science

General Information

The PhD in Nursing Science Program provides rigorous training in scholarship and research. Graduates are prepared for careers as university academics, research scientists, educators and leaders of healthcare systems. The program contributes to building the capacity of the health workforce in Lebanon and the region.

The PhD program focuses on the following areas of research and beyond:

- Health care systems research

- Biobehavioral research in health and illness
- Determinants of health and disease in individuals, families and communities
- Stress and coping
- Health promotion and risk reduction research

Program Learning Outcomes

Students are expected to:

- Demonstrate theoretical and empirical expertise in a current area of study in their discipline.
- Produce original and independent research in a priority area of healthcare that contributes to knowledge in their discipline.
- Analyze qualitative and/or quantitative information while conducting research related to their graduate program.
- Apply professionalism and ethical research conduct in their discipline.
- Demonstrate scholarly communication skills to disseminate research findings in scientific oral and written format.
- Employ teaching activities based on student learning related to their discipline.

Admission Requirements

Admission requirements and procedures as outlined in the AUB Graduate Catalogue are followed. The PhD is a 3-4 year program, with a maximum of 5 years permitted for its completion. Admission to the program is on a competitive basis. To be eligible for admission, applicants should have an outstanding academic record, demonstrate a genuine interest in contributing to improving healthcare outcomes, hold a master's degree in Nursing from a recognized institution, with a minimum cumulative GPA 3.7 or its equivalent, and have satisfactory GRE results. Applicants with a Non-Nursing Masters degree will be considered on a case-by-case basis and may be required to take pre-requisite courses prior to enrolling in the PhD program.

The program will not admit students post bachelor's degree in an accelerated stream. Only holders of master's degree will be considered for admission into the program.

Regular PhD Program Requirements

The PhD program requires a minimum of 48 credit hours of coursework beyond the master's degree, including the PhD thesis work. The coursework consists of a minimum of 18 credits of core courses, 6 credits of electives and 24 credits of PhD thesis work.

Candidacy Requirements

All students admitted to the PhD program must register for the Qualifying Exam Part I: Comprehensive Exam and the Qualifying Exam Part II: Defense of Thesis Proposal. Refer to both qualifying exams under the General University Academic Information of the Catalogue.

Admission to Candidacy

Refer to the “Admission to Candidacy” paragraph under the General University Academic Information section of this catalogue.

Thesis Requirements

In partial fulfillment of the requirements for the degree of Doctor of Philosophy, a student must submit a thesis that is expected to make a significant and original contribution to her/his field of research. The research work is to be carried out under the supervision of a full-time faculty member of the Hariri School of Nursing. Faculty members will provide co-mentoring from FHS, FM, and adjunct faculty from partner universities from the US and Europe as needed.

Thesis requirements follow AUB regulations outlined in the graduate catalogue. More information about the PhD Thesis Committee, the Thesis Defense and the Residence Requirements can be found in the General University Academic Information section of this catalogue.

Graduation Requirements

Refer to the General University Academic Information section of this catalogue.

Sample Curriculum Plan

Year	Fall term	Credits	Spring term	Credits
Year 1	NURS 601 Philosophical and Theoretical Perspectives in Nursing Science	3	NURS 604 Measurement in Health Research (equivalent to EPHD 411)	3
	NURS 605 Bivariate Analysis and Linear Regression	3	NURS 602 Quantitative Research Designs	3
	NURS 606 Qualitative Research	2		
	NURS 610 Advanced Searching of the Scientific Literature	0		
Total		8		6
Year 2	NURS 607 Multivariate Analysis, Causal Modeling and Factor Analysis (equivalent to EPHD 410)	3	NURS 608 Scholarship in Nursing	0
	NURS 609 Research Seminar	0	NURS 982 PhD Thesis	3
	Qualifying Exam I Elective	0	Elective	3
	Elective	3	NURS 603 Ethical issues in Health Research	1
Total		6		7
Years 3 & 4	Qualifying Exam II	0	NURS 983 - 987: PhD thesis	21

Course Descriptions

NURS 500 Theories, Concepts and Ethical Frameworks for Advanced Nursing Practice 2.0; 2 cr.
This course introduces students at an advanced level to conceptual resources for advanced nursing practice. The course is organized around four themes: conceptions of science and nursing knowledge; antecedents and applications of theories relevant to nursing practice; healthcare ethics; and nursing and politics. The course focuses on the application of conceptual models to current and future nursing practice.

NURS 501 Advanced Nursing Practice: Scope and Roles 2.0; 2 cr.
This course provides students with knowledge related to advanced practice roles and competencies. Students develop a vision and structure for Advanced Nursing Practice that includes the Consensus Model for Advanced Practice Registered Nurse, regulation, credentialing and emerging professional issues. The course concentrates on the foundations and philosophy of care in different specialties and health care settings.

NURS 502 Advanced Nursing Research 3.0; 3 cr.
This course focuses on research designs and analysis of multiple variables. The philosophy and principles of scientific inquiry, research design, sampling, techniques of data collection,

ethics, and incorporating research into practice are discussed with emphasis for nursing. Critical evaluation of research articles will be covered. Content will be discussed in terms of clinical nursing research problems. The utilization of research findings to promote evidence-based practice will be emphasized. The course culminates with the students' research proposal paper. Pre-requisite: NURS 530.

NURS 503 Advanced Health Assessment 2.3; 3 cr.
This course focuses on the advanced comprehensive assessment of individuals across the life span using a case-based approach. Students are provided with advanced knowledge and skills in clinical interview, focused history taking, psychosocial and physical assessment, and diagnostic reasoning.

NURS 503A Advanced Health Assessment for Mental Health 1.0; 1 cr.
This theory course focuses on the comprehensive health assessment of clients using a bio-psycho-social approach. Mental health students will build on their knowledge and skills in clinical interviewing, focused history taking, and critical analysis of client data to identify actual and potential health problems. The focus will be on the differential diagnosis of various case presentations with organic and psychological etiologies.

NURS 504 Advanced Pathophysiology 3.0; 3 cr.
This is a course in advanced pathophysiology related to acute and chronic illnesses experienced by adults and older adults. Emphasis is placed on pathophysiologic nursing phenomena experienced across diseases, and their manifestations and assessment measures. Case studies are used to illustrate application to advanced nursing practice.

NURS 504A Complex Topics in Pathophysiology 3.0; 3 Cr.
Students will take Pathophysiology (N504) for 2 credits with the students of the other tracks and an additional 1 credit that will address diseases and conditions unique to neonates and children.

NURS 505A Advanced Practice in Adult-Gerontology I 2.8; 4 cr.
This course builds on N504 and N503, and includes a theoretical and clinical component. Emphasis is on further refinement and extension of pathophysiological concepts and assessment skills in the management of adults and older adults with a spectrum of health problems, specifically on chronic health problems. Health promotion and risk reduction strategies are also addressed. Prerequisite: NURS 503. Corequisite: NURS 504.

NURS 505B Advanced Practice in Adult-Gerontology II 2.8; 4 cr.
This course addresses advanced nursing practice in the acute care of adults and older adults and includes a theoretical and clinical component. Emphasis is on further refinement and extension of pathophysiological concepts and assessment skills in the management of adults and older adults with acute and critical care conditions. Prerequisites: NURS 503 and NURS 504.

NURS 505C Advanced Practice in Chronic Illness 2.0; 2 cr.
This theory course is offered as elective for students in the community and public health track. The content addresses the evidence-based management of adults and older adults with chronic health problems covered in NURS 505A. The content builds on knowledge of pathophysiological concepts and assessment in clients with a spectrum of health problems. Prerequisite: NURS 503. Corequisite: NURS 504.

NURS 506 Advanced Practice in Adult-Gerontology III 0.16; 4 cr.
This is a practicum in which students apply content learned in NURS 503, NURS 504, NURS 505A and NURS 505B, and use concepts learned in NURS 501 and PHRM 314 in the

advanced management of adult and older adult clients with various illnesses. Interdisciplinary collaboration, research utilization, educational activities and case management are emphasized in a specialty area of practice. Prerequisites: NURS 505A, NURS 505B and PHRM 314.

NURS 507 Essentials of Nursing Administration and Management 2.0; 2 cr.
This course introduces management concepts and techniques. It focuses on three core topics: roles and responsibilities of managers, leading organizational effectiveness and strategic planning. The focus is on using management models and concepts to work towards improved organizational effectiveness. Case studies of organizational problems provide the basis for group practical work.

NURS 508 Advanced Practice in Nursing Administration 0.16; 4 cr.
This practicum focuses on developing advanced management and administrative nursing skills in hospitals and primary health care settings. Prerequisite: NURS 507.

NURS 508D Nursing Administration Residency 1.0; 1 cr.
This residency course will give the student the chance to explore the nurse administrator's role in contemporary healthcare organizations. As a basis for developing a culture of excellence, quality, and safety, students will develop practical understanding of organizational structure, management functions, professional ethics, and policy within a specialty area related to the role of nurse administrator.

NURS 509 Role Development in Nursing Education 3.0; 3 cr.
This course addresses principles of teaching and learning, instructional methods, test construction and use, as well as curriculum and program development as applied to nursing. The course enables students to apply educational theory and research in various settings, such as schools of nursing and staff development centers. This course is only required of students doing the minor in education.

NURS 512 Advanced Psychiatric and Mental Health Assessment 1.3; 2 cr.
This course focuses on the advanced comprehensive mental health assessment of individuals using a case-based approach. Students are provided with advanced knowledge and skills in clinical interview, focused history taking, mental status examination and diagnostic reasoning. Students perform comprehensive assessment and D.S.M. IV diagnoses on adult populations.

NURS 516 Psychopathology and Human Behavior 3.0; 3 cr.
This theory course examines the effects and/or sequels of alterations in selected bio-behavioral processes in the adult human suffering from illnesses with critical onsets and long-term unstable conditions. It focuses on the study of the brain and behavior and the neurological, physiological and biochemical foundations of cognition, mood and affect. Students will be exposed to advanced assessment skills, selected theories and research to identify complex psychiatric disorders and interventions utilizing case studies.

NURS 517 Models of Treatment-Psychotherapy (Bio-behavioral Nursing Interventions) 1.6; 3 cr.
In this course, students learn the models of treatment of psychiatric and mental health disorders, and become trained on psychotherapeutic interventions in acute settings. Theories on individual psychotherapy, crisis intervention, group and family therapy are covered. This course has a clinical component where students do practicum in a psychiatric care department. Students learn the application of acquired knowledge in the field of practice and start to practice their role.

NURS 518 Group and Family Psychotherapy 1.6; 3 cr.
This course is complementary to the "Models of Treatment" course, and it focuses on group and family psychotherapeutic interventions. Students synthesize knowledge of theories in the provision of care to groups and families with complex psychiatric problems. Family and group intervention strategies are discussed in a variety of settings. Students explore the practice of these interventions in psychiatric care departments.

NURS 519 Clinical Residency in Acute Psychiatric Care 0.16; 4 cr.
The purpose of this clinical practicum course is to provide opportunities for students to apply the content learned from courses. Students will use assessment skills, selected theories and research to identify complex health problems and interventions for diverse populations. The focus is on advanced case management and practice of the role, which is further developed as the student integrates theory and practice skills in acute and chronic or community settings. Students will spend 224 clinical hours under the supervision of a preceptor.

NURS 520 Managing Quality with Teams 3.0; 3 cr.
This course addresses theory and application of quality teams; their composition, purposes, function and decision-making tools. Process improvement team and the use of mapping processes for process improvement are a main focus.

NURS 522 Principles and Practice of Community Health Nursing 2.3; 3 cr.
This course introduces concepts and issues relevant to the advanced practice of public and community health nursing. Areas of focus include health promotion, management of chronic disease and health education. The course will use case studies in class and field work in the community.

NURS 523 Advanced Community Assessment and Interventions 2.3; 3 cr.
This course focuses on nursing assessment of the health of communities using a case-based approach. Students are provided with advanced knowledge and skills in population and individual needs assessment and community-based interventions. Clinical experience will be provided.

NURS 524 Clinical Residency in Public and Community Health Care 0.16; 4 cr.
The purpose of this clinical course is to provide students with opportunities to apply content learned in community courses, with a focus on advanced case management and health promotion. Assessment skills, theories and research will be utilized in identifying health problems and planning community interventions. Prerequisites: NURS 522 and NURS 523.

NURS 525 Leadership Theories and Applications for Nurse Managers 3.0; 3 cr.
The aim of this course is to promote familiarity with critically thinking about and applying evidence-based theories of leadership in nursing settings. The course encourages a reflective and analytical approach to cultivating effective personal leadership behaviors. The course introduces the full spectrum leadership model, examines its transformational leadership components in depth, and explores similarities and differences between transformational leadership and related leadership theories.

NURS 526 Comprehensive Exam 0 cr.
Comprehensive Exam.

NURS 527 Systems Approach to the Development and Evaluation of Health Care Services 3.0; 3 cr.
The purpose of this course is to introduce students to the development and implementation of health service programs/projects intended to improve health care, practice and health

system outcomes. The course addresses assessment of contemporary issues affecting health, such as the epidemiology of diseases, healthcare policies; and sociocultural, geopolitical and economic issues. It focuses on the theory and practice of planning from a system's perspective and introduces conceptual approaches and techniques of program evaluation. Students will prepare a project plan as part of the course.

NURS 530 Statistical Reasoning and Application in Nursing Research 1.2; 2 cr.
This class introduces students to the basic concepts and applications of statistics for nursing research and explains how to carry these applications using SPSS. The primary objective of the course is to provide students with the skills necessary to understand basic statistical analyses and carry out those analyses using SPSS. Descriptive, bivariate and linear multiple regression are covered.

NURS 531 Practical Applications of Budgeting in Nursing 1.0; 1 cr.
This course focuses on practical applications of concepts in budgeting and basic financial management. Participants will learn to develop a budget and evaluate the financial status of a department or operating unit and determine what, if any, corrective actions need to be taken. The course presents various analytical methods for management decision-making, including variance analysis and break-even analysis.

NURS 532A Nursing care of acute and chronic conditions in Pediatrics 2.0; 2 cr.
This course will integrate advanced concepts of growth and development, anticipatory guidance, therapeutic communication, cultural variations in family structure, and health promotion strategies in a practice setting.

NURS 532B Pediatrics Practicum 0.8; 2 cr.
Under the guidance of an Advanced Practice Pediatric or Neonatal Nurse or a Physician, students will develop sophisticated clinical reasoning, advanced ethical practice, and integrate care within complex healthcare delivery systems that serve acutely ill children and their families.

NURS 533 Advanced Health and Nursing Informatics 3.0; 3 cr.
This course will help participants acquire a foundational and practical understanding of the fast-evolving discipline of health informatics. It introduces health informatics concepts and competencies utilized in nursing care and practice. The course examines the use of digital tools to foster engagement of patients, families, and consumers in their health care. Emphasis is also placed on how Electronic Health Records (EHRs) and Personal Health Records (PHRs) can facilitate health information exchange.

NURS 534A Updates and innovations in Neonatology and Pediatrics 2.0; 2 cr.
This seminar course will explore current and emerging issues in neonates. Emphasis will be placed on scholarly inquiry, use of sophisticated informatics, skills and discussion.

NURS 534B Pediatrics & Neonatology Practicum 0.8; 2 cr.
This is a continuation of the pediatrics practicum. Under the guidance of an Advanced Practice Pediatric or Neonatal Nurse or a Physician, students will develop sophisticated clinical reasoning, advanced ethical practice, and integrate care within complex healthcare delivery systems that serve acutely ill neonates, infants, children and their families. Prerequisite: NURS 532B.

NURS 535 Residency in Pediatric/Neonatal Nursing 0.16; 4 cr.
Under the guidance of an Advanced Practice Pediatric or Neonatal Nurse specialist or a Physician, students will develop sophisticated clinical reasoning, advanced ethical practice,

and integrate care within complex healthcare delivery systems that serve acutely ill neonates, children and their families. Students will also get experience in the various roles of the clinical nurse specialist (coaching and education, research, leadership and consultation).

NURS 536: Introduction to Curriculum Design and Clinical Education in Nursing 3 cr.
This course strengthens learners' knowledge and skills in the field of nursing education. It introduces learners to core curriculum concepts and the various forces influencing nursing education. The role of the nurse educator in both classrooms and health care settings is discussed in depth. Clinical education as the means to prepare nurses for the complex professional roles is explored with emphasis on the educator's responsibility to plan and select authentic learning experiences with an interdisciplinary and interprofessional focus.

NURS 537 Innovative Teaching and Learning: Role of Mentors and Coaches 3 cr.
This course is designed to facilitate learners' understanding and implementation of innovative teaching strategies that promote learning in healthcare education. The course focuses on enhancing innovative ways of developing critical thinking and clinical reasoning in applying new knowledge and skills in professional practice. Learners will be introduced to mentoring and coaching that focus on experiential and student-centered learning, building capacity in others, and facilitating intentional and reflective practice. Further, the role and influence of reflection on one's teaching practice is explored.

NURS 538 Assessing and Evaluating Learning and Competence in Nursing 3 cr.
This course introduces the concept of assessment and evaluation of learning, its purposes and strategies for learners interested in developing skills in nursing education and continuing education. The course focuses on methods of assessing student/participant learning outcomes and evaluating educational/training offerings and programs at the pre-service and professional development levels. Included in the course are principles, purposes, and strategies of classroom assessment, clinical instruction, and clinical competence. The course addresses the role and influence of nurse educators in the application, interpretation, and communication of assessment findings. Background information about program evaluation and benefits are described, along with an explanation of processes of conducting various evaluation strategies.

NURS 539 Project: Course/Program Design 3 cr.
These 3 credits concluding course provides learners with opportunities to apply teaching and assessment theories in various settings, such as schools of nursing and nursing staff development/educational centers or institutions. The project solicits the four major components of the nurse educator role: course/curriculum design; classroom and clinical instruction; mentoring and coaching; and assessment and evaluation of learners' competence in nursing, and in course/program. Emerging from an educational needs assessment at the facility of interest, the learner will proceed with developing the project which can take the form of a continuing education course or a program. Integrated in the project will be the syllabus, the implementation process, and the various means of educational assessments and project evaluation.

NURS 598 Project 3 cr.
Special projects directed toward acquiring skills needed in the development of programs relevant to nursing care within the student's area of interest. Projects vary depending on the track of study.

NURS 599 Thesis 6 cr.
Thesis.

NURS 601 Philosophical and Theoretical Perspectives in Nursing Science 3 cr.
This course considers, at an advanced level, fundamental issues in the conception of knowledge in nursing. Patterns of knowing and their philosophical origins are considered as a basis for empirical nursing research. Strategies for identifying, synthesizing and applying theoretical perspectives when designing research studies are examined. Theory and model development will be addressed.

NURS 602 Quantitative Research Designs 3 cr.
In this course students examine the full range of designs from descriptive to experimental for answering various research questions. Design and sampling considerations to enhance rigor, internal and external validity are analyzed. The relationships between design, measures and statistical analyses will be examined. Ethical issues related to the conduct of research are addressed. Critical analysis of published research serves as a forum for applying knowledge.

NURS 603 Ethical Issues in Health Care Research 1 cr.
This course examines selected ethical and scientific integrity issues and the role of scientists in society in the conduct of healthcare research. These issues will be addressed at each stage of the research process; from identifying research questions, designing research studies, recruiting and consenting participants, data collection and analysis to writing research reports and scholarly publications. This course complements Philosophical and Theoretical Perspectives in Nursing Science.

NURS 604 Measurement in Health Research 3 cr.
This course covers theories and principles of measurement paradigms in health research. This involves designing, testing and evaluating instruments for measuring nursing phenomena in a variety of clinical, educational and health services research settings. Measurement theories and frameworks will be used to guide methods used for psychometric testing of instruments used in nursing and health research. May be replaced by EPHD 411 offered in PhD in Epidemiology.

NURS 605 Bivariate Analysis and Linear Regression 3 cr.
This course covers exploratory data analysis for univariate observations with single or multiple covariates, followed by regression methods and diagnostics with a focus on multiple linear and logistic regression. The primary objective of the course is to provide students with the skills necessary to understand regression analyses and carry out those analyses using SPSS.

NURS 606 Qualitative Research 2 cr.
This course explores the development and application of qualitative research designs and methods in nursing science. It considers a broad array of approaches, from exploratory narratives to focused-comparison case studies, for investigating plausible research questions. Mixed methods research is also addressed.

NURS 607 Multivariate Analysis, Causal Modeling, Factor Analysis 3 cr.
This course introduces multivariate techniques currently used in nursing research. Topics include multivariate analysis of variance, causal modeling, cluster analysis and factor analysis. The emphasis will be on the implementation of these techniques using SPSS, including data preparation and checking assumptions, and on interpretation. May be replaced by EPHD 411 offered in PhD in Epidemiology.

NURS 608 Scholarship in Nursing: Grant Writing, Systematic Reviews, Preparing Publications 0 cr.
This seminar provides the foundation for the development of a program of research. Students acquire skills needed for writing grant proposals, synthesizing literature in their area of interest and writing for publication.

NURS 609 Research Seminar 0 cr.
This course examines specific topics in chronic illness and health services research. Faculty and students will present their research in various areas of specialty.

NURS 610 Advanced Searching of the Scientific Literature 0 cr.
This course is offered in a workshop format to provide graduate students with the skills needed to efficiently and effectively search the scientific literature in order to answer specific research questions. The course includes a didactic component and hands-on sessions on literature search. This course is required of all MSN students, to be taken in the Fall semester of the first year.

NURS 980 Qualifying Exam Part I: Comprehensive exam 0 cr.
Qualifying Exam Part I: Comprehensive exam.

NURS 981 Qualifying Exam II: Defense of Thesis proposal 0 cr.
Qualifying Exam II: Defense of Thesis proposal.

NURS 982 PhD Thesis 3 cr.
All doctoral students will complete a research residency to strengthen their research skills. Each individual student, with the help of his or her advisors, will identify the term during which they wish to complete their research residency. During the research residency, students can work on their proposals with a faculty mentor and get involved in writing grants, collecting and analyzing data, and publications. The requirements of this residency are to be achieved as part of NURS 982.

NURS 983 PhD Thesis 6 cr.
The nursing PhD thesis courses are NURS 982 through NURS 987. Students must register the 3-credit NURS 982 (research residency) course, plus any combination from the remaining courses as long as they complete a total of 24 thesis credits.

NURS 983A PhD Thesis 6 cr.
The nursing PhD thesis courses are NURS 982 through NURS 987. Students must register the 3-credit NURS 982 (research residency) course, plus any combination from the remaining courses as long as they complete a total of 24 thesis credits.

NURS 984 PhD Thesis 9 cr.
The nursing PhD thesis courses are NURS 982 through NURS 987. Students must register the 3-credit NURS 982 (research residency) course, plus any combination from the remaining courses as long as they complete a total of 24 thesis credits

NURS 985 PhD Thesis 12 cr.
The nursing PhD thesis courses are NURS 982 through NURS 987. Students must register the 3-credit NURS 982 (research residency) course, plus any combination from the remaining courses as long as they complete a total of 24 thesis credits.

NURS 986 PhD Thesis 0 cr.
The nursing PhD thesis courses are NURS 982 through NURS 987. Students must register the 3-credit NURS 982 (research residency) course, plus any combination from the remaining courses as long as they complete a total of 24 thesis credits.

NURS 987 PhD Thesis Defense 0 cr.
The nursing PhD thesis courses are NURS 982 through NURS 987. Students must register the 3-credit NURS 982 (research residency) course, plus any combination from the remaining courses as long as they complete a total of 24 thesis credits.

Division of University Interdisciplinary (DUIP)

Following a reappraisal of its current practice, the Division of University Interdisciplinary Programs (DUIP) has been frozen in order to develop more efficient ways the unit can serve as a coordinating body for interdisciplinary education across AUB. The MA Program in Public Policy and International Affairs is now housed in FAS while the MS Degree Program in Energy Studies is now housed in MSFEA.

Master Degree Program in Environmental Sciences

Director:	Massoud, May
Professors:	Zaatari, Ghazi (Pathology and Laboratory Medicine); Zurayk, Rami (LDEM); Massoud, May (FHS);
Associate Professors:	Makdisi, Karim (PSPA); Salam, Darine (CEE)

Background

The Interfaculty Graduate Environmental Sciences Program (IGESP) is a multidisciplinary field of study which leads to the Master of Sciences degree in Environmental Sciences with four possible majors: Environmental Technology, Ecosystem Management, Environmental Health, and Environmental Policy Planning.

Together, these majors ensure adequate coverage of all environmental and sustainable development issues prevailing in Lebanon and the Arab World, in their various ecological, economic, political and social dimensions.

The program has been designed to cater to the rising demand for environmental scientists in the Middle East region. The specificity of the region's environment is reflected both in the program's academic and educational perspectives.

Founded in the mid-1990s, the IGESP program, recognizing Lebanon's unique diversity – environmental, societal and cultural – also understands that various environmental problems affect the integrity of the country's ecosystems. Accordingly, IGESP adopts a holistic approach to resolving those problems, and offers a course of study designed to address both the most salient environmental issues as well as more specialized topics.

IGESP draws on the resources of various faculties/departments and provides opportunities for study and research in the field of the environment in its totality. While the program caters mostly to physical and natural sciences students, it is offered to students holding a bachelor's degree in any approved relevant discipline of engineering, natural or social science, or humanities. It provides graduates with the necessary tools to assess diversified and multidisciplinary environmental issues. The program focuses on enhancing students' research, analytical, problem-solving and critical-thinking skills by emphasizing the case study approach to learning and solving environmental problems.

Like all programs at the American University of Beirut, IGESP is registered in the US through the New York State Education Department.

Mission

The mission of the AUB IGESP Program is to contribute to building the environmental capacity in Lebanon and the region through human resources development as well as research and community involvement. The essence of the program lies in its interdisciplinarity. The program is firmly based on a holistic view of the environment that integrates the ecological, technical, health and socioeconomic dimensions. We aim to train creative, flexible and cross-curricular graduates capable of appreciating, building on, and applying cutting-edge knowledge for the management of the environment. Our graduates are empowered with exceptional technical, managerial, critical evaluation, research and reporting skills.

Vision

The IGESP Program aspires to be the leading interdisciplinary program bridging environmental education, research and service through close partnership with academic institutions and civil society actors.

General Information

The degree of Master of Science (MS) in Environmental Sciences is offered with four possible majors:

- Ecosystem Management in the Faculty of Agricultural and Food Sciences (FAFS).
- Environmental Health in the Faculty of Health Sciences (FHS).
- Environmental Technology in the Maroun Semaan Faculty of Engineering and Architecture (MSFEA).
- Environmental Policy Planning in the Faculty of Arts and Sciences (FAS).

The program draws on the resources of various departments of the faculties of Agricultural and Food Sciences (FAFS), Arts and Sciences (FAS), Engineering and Architecture (MSFEA), Health Sciences (FHS) and Medicine (FM), and it provides opportunities for study and research in the general field of environment.

The program provides graduates with the necessary tools for professional practice and/or the pursuit of higher education. It is administered by an interfaculty committee that coordinates with the graduate committees of the faculties concerned.

Criteria for Admission

To be accepted into the program, an applicant must:

- meet general university requirements for admission to graduate study.
- be recommended by the appropriate faculty graduate committee and accepted by the Interfaculty Coordinating Committee of the program.
- provide at least two academic letters of recommendation and one other professional letter if relevant.
- submit a detailed effective statement of purpose (400-500 words) for each major indicating the purpose for pursing graduate study in the particular field at AUB and specifying the applicant's research interests and/or practical experience in the field. Note: The statement should be oriented to the major.
- have a background that is relevant to the major.

Applicants to the program may be admitted under the following categories:

- graduate – if the average in the last 60 credits or the last two years is greater than 3.3.
- graduate on probation – if the average in the last 60 credits or the last two years is less than 3.3 and greater than 3.0.

Adequate preparation to take any graduate course is decided by the academic advisor and the Interfaculty Graduate Environmental Sciences Program Committee (IGESPC).

Degree Requirements

Requirements for the degree of Master of Science in Environmental Sciences (any major), both thesis and non-thesis options, are tabulated below. The master's degree with thesis option will normally require between 20 and 24 months to be completed. In both options, the student is required to complete 30 credits of which 9 credits are core courses.

Course	Group	Thesis Option Credits	Non-Thesis Option Credits
Core	A	9	9
Electives	B	15	18
Thesis		6	
Project			3
Total number of credits required for graduation			**30**

Core courses, as well as basic and broad electives, are listed below. Other relevant electives not listed below may be accepted on a case-by-case basis. These courses are structured to provide students with a diversified and multidisciplinary background in environmental sciences. Students have to register for the core course offered by their faculty of concentration. Students are also required to select two other supplementary courses from the list of core courses approved by the program. Students may not select two core courses from the same faculty. Students can take other elective courses from other faculties after securing the approval of the advisor. Specific faculty/department requirements are defined under each respective faculty/department.

Group A	**Core Courses in Environmental Science**	**Credits**
One course selected from the following ECOM core courses		
ENSC 630/LDEM 630	Natural Resources Management	3
LDEM 301	Urban Greening	3
LDEM 302	Green Infrastructure for Resilient Landscapes and Cities	3
One course selected from the following ENVH core courses		
ENSC 640/ENHL 310	Toxicology and Environmental Health Hazards	3
ENSC 641/ENVH 312	Occupational Health	3

ENSC 642/ENHL 314	Environmental Management Systems	3
One course selected from the following ENVT core courses		
CIVE 550	Water Treatment and Laboratory	3
CIVE 551	Wastewater Treatment and Laboratory	3
CIVE 552	Waste Management and Treatment	3
CIVE 553	Environmental Biotechnology	3
CIVE 555	Air Quality Management	3
CIVE 654	Environmental Bioremediation	3
ENSC 600/CIVE 655	Air Pollution and Control	3
ENVP core course		
ENSC 650/PSPA 316	International Environmental Policy	3
Group B	Examples of Major Electives	Credits
1. Ecosystem Management		
ENSC 631/LDEM 631	Agricultural Pollution and Control	3
LDEM 632/URPL 641	Geographic Information System	3
ENSC 633/LDEM 633	Ecological Landscape Design and Planning	3
ENSC 634/LDEM 634	Sustainable Landscape Planning and Management	3
ENSC 635/LDEM 635/PSPA 3446A	Political Ecology of Water	3
ENSC 622/CIVE 653	Environmental Chemistry and Microbiology	3
ENSC 641/ENHL 312	Occupational Health	3
ENSC 642/ENHL 314	Environmental Management Systems	3

ENSC 652/CIVE 656	Environmental Impact Assessment	3
ENSC 654	Physical and Biological Resources in Terrestrial Ecosystems	3
ENSC 655/AGSC 301	Statistical Methods in Agriculture	3
ECON 333	Energy Economics and Policy	3
ENSC 662/ECON 338	Economics of Natural Resources and the Environment	3
LDEM 300	Directed Study in Ecosystem Management	3
LDEM 301	Urban Greening	3
LDEM 302	Green Infrastructure for Resilient Landscapes and Cities	3
BIOL 362	Advanced Ecology	3
BIOL 363	Population and Community Ecology	3
AGSC 376	Resource and Environmental Economics	3
AGSC 384	Political Economy of Middle East Development	3
CIVE 648	Climate Change and Water Resources	3
CIVE 552	Waste Management and Treatment	3
ENSC 630/LDEM 630/CIVE 633	Natural Resources Management	3
CIVE 654	Environmental Bioremediation	3
ENSC 600/CIVE 655	Air Pollution and Control	3
CIVE 659	Environmental and Water Conflict Management	3
URPL 664	Urban Land Use Planning	3
URPL 665	Development and Planning Policies	3

2. Environmental Health		
CIVE 601	GIS and Geospatial Data Modeling	3
EPHD 300	Principles of Epidemiology	3
PBHL 300	Foundations of Public Health	3
PBHL 310	Research Design	3
EPHD 310	Basic Biostatistics	3
ENSC 600/CIVE 655	Air Pollution and Control	3
ENSC 640/ENHL 310	Toxicology and Environmental Health Hazards	3
ENSC 641/ENHL 312	Occupational Health	3
ENSC 642/ENHL 314	Environmental Management Systems	3
ENHL 301	Environmental Health and Sustainable Development	1
ENHL 307	Food Safety	3
ENHL 308	Tutorial	1-3
ENHL 320	Special Topics in Environmental Risk Analysis	3
ENSC 652/CIVE 656	Environmental Impact Assessment	3
ENSC 658/PSPA 343	Environmental Conflict Resolution	3
ENSC 661/BIOL 363	Population and Community Ecology	3
ENSC 662/ECON 338	Economics of Natural Resources and the Environment	3
CIVE 659	Environmental and Water Conflict Management	3

3. Environmental Technology		
CIVE 550	Water Treatment and Laboratory	3
CIVE 551	Wastewater Treatment and Laboratory	3
CIVE 552	Waste Management and Treatment	3
CIVE 553	Environmental Biotechnology	3
CIVE 555	Air Quality Management	3
CIVE 601	GIS and Geospatial Data Modeling	3
CIVE 602	Experimental Design and Statistical Methods	3
CIVE 650	Water and Sewage Works Design	3
CIVE 651	Processes in Water and Wastewater Treatment	3
CIVE 652	Landfill Engineering Design	3
CIVE 653	Environmental Chemistry and Microbiology	3
CIVE 654	Environmental Bioremediation	3
ENSC 600/CIVE 655	Air Pollution and Control	3
CIVE 656	Environmental Impact Assessment	3
ENSC 651/CIVE 657	Methods of Environmental Sampling and Analysis	3
CIVE 658	Industrial Waste Management	3
CIVE 659	Environment and Water Conflict Management	3
CIVE 685	Environmentally Sustainable Renewable	3
CIVE 751	Wastewater Reclamation and Reuse	3
ENSC 602/CIVE 755	Air Pollution Modeling	3

4. Environmental Policy Planning		
PPIA 301	Public Policy and Practice	3
PPIA 304	Development	3
PPIA 305	Economics for Public Affairs	3
PPIA 306	Political Economy	3
PPIA 307	Politics of Policy-Making	3
PPIA 308	Research Methods	3
PPIA 309	Topics in Public Policy	3
PPIA 310	Topics in Public Policy	3
PPIA 311	Topics in International Affairs	3
PSPA 312	Public International Law	3
PSPA 314	The UN and International Politics	3
PSPA 324	Government and Politics of Lebanon	3
PSPA 343/ENSC 658	Environmental Conflict Resolution	3
PSPA 345	Special Topics in Environmental Policy and Politics	3
PSPA 346	Special Topics in Natural Resource Policy and Politics	3
PSPA 351	New Public Management	3
PSPA 352	Foundations of Public Policy	3
PSPA 360	Public Policy Research and Analysis	3
ENSC 659/PSPA 362	Public Policy and Administration	3
PSPA 373	The Ethics of Public Administration	3

AGSC 376	Resource and Environmental Economics	3
AGSC 384	Rural Social Change, Development the Environment	3
ECON 333	Energy Economics and Policy	3
ECON 338	Economics of Natural Resources and the Environment	3
URPL 664	Urban Land Use Planning	3
URPL 665	Development and Planning Policies	2
CIVE 601	GIS and Geospatial Data Modeling	3

A student can take other elective courses from other faculties after securing the approval of her/his advisor.

Graduation Requirements

See General University Academic Information in this catalogue.

Core Course Descriptions

CIVE 550 Water Treatment and Laboratory 3 cr.
A course that examines the quality and principles of municipal wastewater treatment processes and methods of testing for physical, chemical and biological parameters (Core course).

CIVE 551 Wastewater Treatment and Laboratory 3 cr.
A course that examines the quality and principles of municipal and industrial water treatment processes and methods of testing for physical, chemical and biological parameters (Core course).

CIVE 552 Waste Management and Treatment 3 cr.
A course on engineering principles, practices and techniques for the management of solid wastes: sources, composition, properties, impacts, generation, storage, collection and transport, processing, resource recovery, and disposal (Core course).

CIVE 553 Environmental Biotechnology 3 cr.
A course that examines current and emerging environmental biotechnologies used for environmental quality evaluation, monitoring and remediation of contaminated environments, and provides students with working knowledge of the science that underpins them (Core course).

CIVE 555 Air Quality Management 3 cr.
A course on the principles, practices and techniques for the management of air pollution: types, sources, properties, impacts, standards, control technologies, atmospheric dispersion, emissions and indoor air quality (Core course).

CIVE 654 Environmental Bioremediation 3 cr.
A course that discusses the application of biological treatment for the remediation of contaminated environments, and highlights current engineering methods/design used to enhance biodegradation (Core course).

CIVE 655/ENSC 600 Air Pollution and Control 3 cr.
A course that examines processes and design equipment for the control of particulates and gaseous emissions. Prerequisite: Consent of instructor (Core course).

CIVE 685 Environmentally Sustainable Renewable Energy Sources 3 cr.
A course that covers basic principles, potentials and limitations of various renewable energy sources and technologies, including solar energy, hydroelectricity, wind energy, bio-energy, fuel cells, batteries and supercapacitors. Sustainability and impact of renewable energy sources on the environment will be discussed. Prerequisite: CIVE 251 or CHEM 202.

LDEM 301 Urban Greening 3 cr.
This course allows students to develop an understanding of nature in cities, present the latest research and concepts on urban nature, describe and conceptually apply urban greening approaches, explore urban residents' relation with nature, and discuss opportunities and limitations of urban greening in restrictive environments. Graduate or senior undergraduate standing (Core course).

LDEM 302 Green Infrastructure for Resilient Landscapes and Cities 3 cr.
Green infrastructure is an ecologically based system, naturally occurring or engineered, across urban and rural contexts, that is multi-functional and delivers essential cultural, social, environmental, ecological and economic benefits. It requires a holistic and systems approach to improve ecological function while providing vital ecosystem services for human populations. The course introduces students to the concepts, theories and applications of design, planning and policy of green infrastructure in conjunction with open space planning and design. A particular focus is the relationship and synergy between green infrastructure and climate change adaptation of landscapes and cities. A case study approach is utilized to study green infrastructure across multiple scales, disciplines and applications in the Middle East and North Africa (MENA) region. Green infrastructure is inherently multi-disciplinary and intersects with landscape architecture; urban design and planning; architecture; environmental engineering; public health; urban policy; and environmental policy. Graduate or senior undergraduate standing (Core course).

LDEM 630/ENSC 630 Natural Resources Management 3 cr.
This course introduces students to key concepts in ecosystem-based natural resources management (NRM) and to the management of specific terrestrial resources: soils, water, land and biodiversity with examples drawn from drylands and developing nations. A landscape lens is adopted to examine territory-scale resource management options, such as farming, ecotourism, forestry and rangelands. The course also addresses the physical, socioeconomic, cultural, political and geographic specificity of NRM by reviewing the status of Arab Natural Resources in a changing environment (Core course).

ENSC 640/ENHL 310 Toxicology and Environmental Health Hazards 3 cr.
The course presents toxicology in three sections. In the first section, the fundamental principles and essentials of toxicology are introduced, particularly dose-response, toxicokinetics, and cellular mechanisms of action. In the second section, the course discusses toxicity of main organ systems. Classic toxicants that adversely affect health, emerging hazardous human exposures, and special topics, are discussed in the last section of the course. The course includes lecture style presentations, collective case- studies activities, and student led

discussions. Topics of local and regional relevance are also introduced through hosting guest speakers (Core course).

ENSC 641/ENHL 312 Occupational Health 3 cr.
This course overviews the general principles of occupational health, relating work, the work environment, and workers' health and wellbeing to general principles of social equity and justice. The course surveys research on the social, economic, political, environmental, and health elements of a workplace using multidisciplinary approaches. Students who join the course are able to identify occupational hazards and work-related injuries and illnesses in workplaces and propose monitoring, management and prevention strategies to lessen their impact on workers. With its emphasis on social justice, the course discusses the factors that make some workers' groups more vulnerable than others. Its unique approach emphasizes global perspectives and popular imaginations of workers through academic publications, newspaper journalism, cinema, lectures and class discussions. This course is designed for students of multiple educational and training backgrounds and does not require prerequisite knowledge (Core course).

ENSC 642/ENHL 314 Environmental Management Systems 3 cr.
The implementation of an Environmental Management System (EMS) integrates the precautionary and polluter pays principles into firms' operations and demonstrates commitment to sustainable development. This course provides an overview of the most common international standards for environmental management systems, primarily the International Standards Organization (ISO) harmonized management systems, and its implications for different organizations. It provides students with the skills to formulate and evaluate such management systems. Though the first part of the course is mainly lecture based, student participation in the form of questions and discussion is always welcomed and encouraged. Critical thinking will be promoted throughout the course. Students will be expected to formulate an EMS for an organization and prepare a technical report to communicate project findings to their colleagues through verbal presentation. Emphasis is placed on solving environmental problems using an integrated management approach in order to achieve an optimized environmental performance. Alternate years (Core course).

ENSC 650/PSPA 316 International Environmental Policy 3 cr.
A course that seeks to provide a broad overview of the key concepts, actors and issues related to global environmental policy. This course outlines the evolution of environmental policy in facing global environmental challenges and how such policies have become inherently intertwined with government policy, business practice and international trade. Annually (Core course).

ENSC 695 Comprehensive Exam 0 cr.
Comprehensive Exam.

ENSC 697 Project 3 cr.
The project must be undertaken, in partial fulfillment of the requirements for the degree, upon the completion of at least 27 credits of core and elective courses. A student who is unable to finish the project in one term can register one additional time.

ENSC 699 Thesis 6 cr.
Thesis.

Interfaculty Graduate Neuroscience Program (IGNP)

The Interfaculty Graduate Neuroscience Program leading to the MS degree in neuroscience draws on the resources of the Faculty of Medicine, the Faculty of Engineering and Architecture, and the Faculty of Arts and Sciences, and is administered by graduate committee of the faculty of Medicine.

Neuroscience is the study of the nervous system. It includes an interrelated set of scientific disciplines including basic (neuroanatomy, neurophysiology, neurochemistry, neuropharmacology, neurobehavior) and clinical (neurology, neurosurgery, anesthesiology, neuropathology, ophthalmology, psychiatry) subjects. Since its inception in 1974, the program has been run by faculty in the Department of Anatomy, Cell Biology and Physiological Sciences (DACP; former Physiology and Human Morphology Departments). Although the participating faculty comes primarily from the DACP, contributions are made from faculty members in the Neurosurgery Division and the Neurology and Psychiatry Departments and from other departments in the Faculty of Medicine, the Biology and Psychology Departments in the Faculty of Arts and Sciences, and the Electrical Engineering Department in the Maroun Semaan Faculty of Engineering and Architecture.

The Interfaculty Graduate Neuroscience Program (IGNP) is a member of the Association of Neuroscience Departments and Programs (ANDP) in Bethesda, Maryland (USA), whose aim is to advance education and research in neuroscience.

Admission Requirements

The program is flexible in accepting students from a variety of backgrounds, including MD graduates and holders of the BS degree from various university programs. Applications must be submitted through the AUB website; selected applicants must fulfill the admission criteria for graduate studies at AUB.

Graduation Requirements for the MS in Neuroscience

- Students holding a BS or BA degree are required to take a minimum of 21 graduate credit hours and present a thesis (9 credits) based on independent research in one of the basic neuroscience subjects.
- Holders of the MD degree, or medical students who have completed the first two years towards the MD, are required to take a minimum of 10 non-medical graduate credit hours in addition to a thesis (9 credits).
- Only one course (IDTH 308 - Basic Neuroscience (6 credits)) is required, in addition to a wide choice of electives from various departments and faculties.

Average Length of Time

- Four semesters for holders of BS or BA degrees.
- Two semesters for MD graduates or medical students who have completed the first two years of the medical program.

Course Descriptions

IDTH 308 Basic Neuroscience 62.54; 6 cr.
This course covers the structure and function of the human nervous system. This course can also be taken in two parts: IDTH 308A and IDTH 308B. Annually.

IDTH 308A Neuroanatomy 31.27; 3 cr.
This course is offered to graduate students. The course covers the normal structure of the human nervous system. See HUMR 308 in the Department of Anatomy, Cell Biology and Physiological Sciences.

IDTH 308B Neurophysiology 31.27; 3 cr.
This course is offered to graduate students. The course covers the function of the human nervous system. See PHYL 308 in the Department of Anatomy, Cell Biology and Physiological Sciences.

IDTH 395 A/B Comprehensive Exam 0 cr.
Prerequisite: Consent of advisor.

IDTH 399 A/B/C/D/E MS Thesis 9 cr.
MS Thesis.

HUMR 305 Cell and Tissue Biology 30.33; 3 cr.
Consists of the first half of Basic Histology, HUMR 209, covering cells and tissues. Open to all graduate students.

HUMR 310 Biomedical Research Techniques 28.46; 3 cr.
A guided laboratory course in research methods used in cell biology and physiology. Open to graduate students. The course is made of three modules that can all be selected or selected as one module per specialty as follows:

HUMR 310A Cell Biology Techniques 10.15; 1 cr.
Cell Biology Techniques.

HUMR 310B Genomics and Proteomics 10.15; 1 cr.
Genomics and Proteomics.

HUMR 310C Mouse Models and In Vivo Studies 8.16; 1 cr.
Mouse Models and In Vivo Studies.

IDTH 309 Biology of Nerve and Muscle 48.0; 3 cr.
A multidisciplinary study of anatomy, physiology, biochemistry, pharmacology, and pathology of nerve and muscle. Alternate years.

PHYL 310 General Physiology: Cellular Mechanisms 32.16; 3 cr.
A course on aspects of membrane transport processes across symmetrical and asymmetrical cell membranes, electrophysiology, membrane potentials, action potentials in excitable cells, synaptic transmissions and excitation-contraction coupling in muscles. Open to all graduate students.

PHYL 324 Electrophysiology of Excitable Cells 12.9; 1 cr.
A study of the basic mechanisms of membrane cable property and resting potentials in all cells, action potential initiation and propagation in excitable cells, receptor physiology, central synaptic transmission, neuromuscular transmission and muscular contraction. Annually.

In addition, any elective graduate course from other graduate programs may be taken.

Interfaculty Graduate Nutrition Program (GNP)

The Interfaculty Graduate Nutrition Program (GNP), leading to the MS degree in Nutrition (thesis or non-thesis), draws on the resources of various departments of the Faculties of Agricultural and Food Sciences, Medicine and Health Sciences, and provides opportunities for study and research in the general field of nutrition. The involvement of several faculties in this program provides students with a wide range of choices that enables them to specialize in areas of nutrition, such as basic nutrition, community nutrition, clinical nutrition or nutritional biochemistry. Students can register in this program through any of the participating faculties.

The program is administered by an interfaculty coordinating committee and the graduate committees of the participating faculties.
To be accepted into the program, the student must:

- Meet general university requirements for admission to graduate study
- Be recommended by the department concerned

Degree Requirements

MS Nutrition (Thesis)

Requirements for the MS degree in Nutrition (thesis) are coursework and a thesis. Total number of credits required is 30 including 21 course credits and 9 thesis credits.

Required Core Courses		**Credits**
NFSC 311	Advanced Nutrition: Macro Nutrients	3
NFSC 314	Advanced Nutrition: Minerals	3
NFSC 315	Advanced Nutrition: Vitamins	3
NFSC 395	Graduate Seminar in Nutrition and Food Science	1
NFSC 301	Statistical Methods for Nutrition and Food Science	3
NFSC 399	Thesis	9
Suggested Electives		**Credits**
NFSC 300A	Graduate Tutorial	1
NFSC 300B	Graduate Tutorial	2
NFSC 300C	Graduate Tutorial	3
NFSC 305	Sensory Evaluation of Food	3

NFSC 306	Community Nutrition: Research and Intervention	3
NFSC 307	Nutritional Epidemiology	3
NFSC 308	Advanced Therapeutic Nutrition	3
NFSC 310	Advanced Food Biochemistry	3
NFSC 351	Food Safety: Contaminants and Toxins	3
NFSC 391	Research Techniques	3

Other elective courses must be approved by the Thesis Supervisory Committee and the faculty/school Graduate Studies Committee.

The course program followed by the student as well as the thesis to be undertaken will be selected in consultation with the Thesis Committee, the faculty/school Graduate Studies Committee and the department concerned depending on the student's background and interests.

Graduate students in the Nutrition (thesis) program may take a maximum of 3 credits in graduate tutorial courses.

MS Nutrition (Non-Thesis)

Requirements for the MS degree in Nutrition (non-thesis) consist of coursework and research. Total number of credits required is 33.

Required Core Courses		**Credits**
NFSC 300C	Graduate Tutorial	3
NFSC 311	Advanced Nutrition: Macro Nutrients	3
NFSC 314	Advanced Nutrition: Minerals	3
NFSC 315	Advanced Nutrition: Vitamins	3
NFSC 395	Graduate Seminar in Nutrition and Food Science	1
NFSC 301	Statistical Methods for Nutrition and Food Science	3
Suggested Electives		**Credits**
NFSC 300A	Graduate Tutorial	1
NFSC 300B	Graduate Tutorial	2

NFSC 305	Sensory Evaluation of Foods	3
NFSC 306	Community Nutrition: Research and Intervention	3
NFSC 307	Nutritional Epidemiology	3
NFSC 308	Advanced Therapeutic Nutrition	3
NFSC 310	Advanced Food Biochemistry	3
NFSC 312	Sports Nutrition	3
NFSC 351	Food Safety: Contaminants and Toxins	3
NFSC 391	Research Techniques	3

Other elective courses need to be approved by the student Supervisory Committee faculty/school Graduate Studies Committee.

Graduate students in Nutrition (non-thesis) can take a maximum of 6 credits in graduate tutorial courses.

AUB Nature Conservation Center (NCC)

Director

Daou, Alain, PhD	Associate Professor, Entrepreneurship (OSB)

Executive Committee Members

Daou, Alain, PhD	Associate Professor, Entrepreneurship Business (OSB)
Yazigi, Serge	Architect and Urban Planning, Urban Planning Policy and Design (MSFEA)
Darwiche, Nadine, PhD	Assistant Professor, Biochemistry and Molecular Genetics (FM)
Romani, Maya, MD	Assistant Professor, Family Medicine (FM)
Abunnasr, Yaser, PhD	Associate Professor - Landscape Design and Ecosystem Management (FAFS)
Perdigon, Sylvain Jean Daniel, PhD	Assistant Professor -Sociology, Anthropology and Media Studies (FAS)
Talhouk, Salma, PhD	Professor, Landscape Design and Ecosystem Management Department (FAFS)

Core Team

Kallab, Antoine	Associate Director
Hourani, Anna	Operations Manager
Barakat, Jill	Grants Writer
Rossa Moawad, Leila	Research Assistant
Bou Rjeily, Justine	Environment Academy Project Coordinator

Introduction

The AUB Nature Conservation Center (AUB-NCC) is the leading transdisciplinary academic center addressing nature conservation in the MENA region, which promotes the conservation

and sustainable use of biodiversity and encourages individuals to relate to nature through research, education, community development, and knowledge dissemination. Ultimately, AUB-NCC aims to make people and communities the guardians and beneficiaries of nature.

AUB-NCC is a firm believer in citizen science and the role it can play in addressing issues related to air and water pollution, deforestation threats, and climate change challenges. Being one of the first organizations to adopt a public participatory approach to its projects, the Center takes full advantage of the collaborative framework put in place, which invites the general public into the fold, utilizing better data collection and analysis processes for the good of the cause at hand. This approach allows the Center to understand the needs of the communities and offers up a platform to engage the public and allow them to contribute to the research, study, and science of the subject at hand.

AUB-NCC's interest in promoting eco-innovation, entrepreneurship, and education is woven into all of its programs. It understands the importance of organizing environmental science programs in several fields and disciplines that raise awareness amongst communities of the environmental challenges we face today.

In addition, AUB-NCC's medicinal program ventures into the validation of folk practices, which involve the country's nature plants, flowers, and trees. Plant use is a primary concern in this field as Lebanon's natural wealth is second to none; therefore, a thought given to sustainability in that regard would prove significant in the context of natural medicines and remedies.

AUB-NCC's priority areas are environmental stewardship, community development and biodiversity conservation, with a focus on climate change mitigation.

Membership

Since its establishment in 2001, AUB-NCC has mobilized people and institutions throughout Lebanon to support nature conservation, improved the environment, and inspired countless individuals to appreciate and embrace sustainability. The Center leverages the expertise and experience of AUB's faculties from different fields and involved around 92 faculty members to tackle the region's most pressing environmental challenges.

Throughout its tenure, AUB-NCC has recruited interns, worked with local and international businesses, engaged and impacted Lebanese citizens, engaged students, enrolled volunteers, operated with municipalities, worked alongside NGOs, collaborated with universities, and cooperated with government authorities. All the actors at stake illustrate the Center's multi-disciplinarity, as they aid the Center in achieving its mission.

Center for Advanced Mathematical Sciences (CAMS)

The American University of Beirut has established the Center for Advanced Mathematical Sciences (CAMS), the first such center among the institutions of higher learning in the Arab world. Given the seminal historical role of the Arab Middle East in the development of mathematics and astronomy, it is only natural for the region to have such a center dedicated to advanced teaching and research. The establishment of the Center is also especially timely, in view of the significant scientific talent both within the region and among its Diaspora, as well as the central importance of mathematical inquiry to the region's scientific, technological, and economic development.

Director: Jihad Touma

International Advisory Committee

Sir Michael Atiyah (Chairman)	University of Edinburgh, UK
R. Dijkgraaf	University of Amsterdam, Netherlands
I. Ekeland,	UCB, Canada; PIMS, Canada
P. Griffiths	IAS, Princeton, USA
N. Khuri	Rockefeller University, New York, USA
D. Zagier	MPI Bonn, Germany; College de France, France

In addition to their scientific distinction, members of the International Advisory Committee are highly experienced, scientific leaders and have been involved in the administration of some of the world's top academic institutions in Europe and the USA. The International Advisory Committee's main task is to advise the president of AUB and the director of CAMS on policies, fundraising, appointments of fellows, and scientific programs.

CAMS Objectives

CAMS provides a vehicle for promoting research and graduate studies in the mathematical sciences, and a focal point for collaborative research among scientists and mathematicians in Lebanon and the region at large. Its aims are to:

- conduct research in the sciences and engineering, with special emphasis on their mathematical aspects. In this regard, CAMS acts as a regional research facility in various mathematical sciences such as theoretical physics, pure and applied mathematics, computer science, engineering, and a variety of fields in computational science.
- promote and contribute to the graduate programs in the mathematical sciences and engineering at AUB.
- promote postdoctoral research and education at AUB and at other local universities, and foster a multi-disciplinary environment encompassing various areas of mathematical science.
- assist the university community at large in integrating the use of high-performance computing into the various academic and administrative programs by capitalizing on the expertise developed by the scientific and professional staff of CAMS.
- Identify and pursue promising new fields of science and engineering that might be integrated within CAMS and the university.
- act as a focal point for promoting collaborative research among scientists in the region, partly by accommodating visitors for various intervals of time, and partly by organizing topical meetings, workshops, and conferences in different fields.
- encourage and help promising young students to start academic careers in mathematical sciences, including applied areas crucial to economic growth.

The Issam Fares Institute for Public Policy and International Affairs (IFI)

Director:	Bahout, Joseph
Assistant Director:	Mourad, Yara
Staff:	Abbas, Dania (Finance and Grants Manager); Chamma, Marina (Communications Manager); Solh, Leila (Research Development Manager); Hodroj, Lamis (Administrative Assistant)

Inaugurated in 2006, the Issam Fares Institute for Public Policy and International Affairs (IFI) was established as an independent, research-based and policy-oriented institute with the aim of initiating, developing, and communicating policy-relevant research from and about Lebanon and the Arab world, contributing to the realms of both academia and policymaking.

Forming a bridge between academia and policymaking, the central mission of IFI is threefold:

1. To conduct and disseminate high-quality research on the complex issues, problems, and challenges faced by Lebanon and the Arab world within the world's rapidly shifting global contexts.
2. To generate research and evidence-based policy recommendations to address local and regional challenges.
3. To create a space for interdisciplinary dialogue, engagement, and exchange of ideas among various stakeholders.

Since its establishment, the Institute has made an indelible contribution to research and debates on public policy and international affairs in Lebanon, the region, and internationally. The Institute takes pride in its vast knowledge of and hands-on experience with the political landscape and numerous policy networks in the Middle East and beyond. Treading the sensitive interface between research and "real" politics, IFI navigates the often-arduous process of dialogue between experts and policymakers, integrating the constraints of real-time policy-making and the intricacies of governmental, inter-agency work. More importantly, the Institute has made large and successful contributions to the shaping of research agendas, and has introduced local and international stakeholders to novel and innovative ways of thinking and understanding the world's problems. It has effectively brought together the worlds of ideas, politics, and policy, translating academic research and knowledge and making it both accessible and understandable. The impactful work produced by IFI has enabled various institutions (e.g. governmental, non-governmental, and international), the public, and society to better understand politics and policymaking processes; make data-driven informed decisions on a myriad of socio-economic and political issues; and understand the alternative (or "other") viewpoints on these issues and serve as a platform for debate and engagement.

IFI recognizes its potential to act as a strong think tank given its geographical location and presence in one of the most prominent academic institutions in the region. It has access to a vast pool of scholars, professionals, departments, centers, and research generating groups therefore allowing the Institute to swiftly navigate, coordinate, and lead on novel projects and dialogues that impact and inform public policy.

IFI continuously seeks to spearhead and partake in projects and initiatives that are multidisciplinary, interdisciplinary, and transdisciplinary in focus.

Its three interconnected clusters of focus are the following:

1. Sustainability and Inclusive Development

Climate Change: environment preservation, climate conflict, water and food security
Energy and Technology: power in Lebanon, oil and gas, renewable resources and energy transition
Refugees: socio-economic impacts, political dimensions, protracted displacement, laws and policies
Education and Youth: labor inclusion, educational reform, policymaking, youth
Political Economy: debt recovery, economic inequality, trade, labor markets
Urban and Rural Planning: housing, public transport, social justice
Public Health: health systems, mental health, pandemics

2. Policy, Politics, and Governance

Nation-state Structure: constitutional debates, state/society relations, state structure and organization, decentralization, federalism, Ta'if and beyond
State Reform and Public Administration: decentralization, federalization, clientelism, corruption, e-government, judiciary and justice reform, fiscal and budgetary governance
The Political Landscape: political forces and parties (Lebanon/regional), political cultures (local/national)
Electoral Processes and Debates: laws and systems, voter behavior, electoral databases, polling surveys
Security and Politics: civil/military relations, National Defense strategy, security apparatuses reform and democratic oversight

3. Lebanon in the World: Regional and International Affairs

The Global System: global power equilibriums, rising and contending new powers (BRICS, the "EAST", Global South), humanitarian protection, gender, ethics
Lebanon in the International Order: in the UN/UNSC, Arab League, foreign policy
Lebanon Abroad, the Lebanese Diaspora Project: Lebanese in the world, cooperation with American institutions
Lebanon and its Neighbors: EuroMed, Med and East-Med, Arab Neighborhood (special attention to the Gulf, Turkey, Iran, and involvement in the Levant
Syria Watch: regime transformations, political economy/reconstruction, regional power plays/influences

The above topics within each of the clusters are not exhaustive, and priorities for policy dialogue and policy-based interventions are set according to the current and most pressing local, regional, and international developments. IFI ensures that research and dialogue generated cuts across two or more clusters, and makes essential links between each of the subtopics to offer a comprehensive and rich understanding of the subject being addressed. It also allows to draw in various experts/stakeholders to the table so as to enhance meaningful debates and develop solid, well-grounded policies in line with the current realities and context.

Internship Program

The institute offers internships for local and international students seeking first-hand experience in the fields of public policy, international affairs, and communications. Each year dozens of students have an opportunity to intern with IFI's various tracks and gain research and administrative skills that pave the way for a successful career in their fields of interest.

Affiliate Program

Out of our commitment to expanding and deepening knowledge production and to creating a space for the interdisciplinary exchange of ideas among researchers, civil society actors, and policymakers, our Institute has established an affiliation program divided into two different categories: 'Associate and University Fellows' and 'Affiliated Scholars'.

Associate Fellows constitute the intellectual network of academics, researchers, professionals, and practitioners, that gravitate around the Institute, contributing to its work, knowledge production and activities. Associate Fellows are either resident or non-resident, while maintaining full professional affiliation to their respective institutions. They are invited to be part of our network of experts, based on thematic interest and needs, in line with the Institute›s vision and development strategy, and with the final approval by the Director. Fellows are associated to the Institute on a voluntary basis, the specific conditions of which are decided between the Fellow and the Institute.

Meanwhile, University Fellows are those belonging to various the departments, faculties and units of our university. University Fellows not only contribute in expanding and enriching the Institute›s knowledge production and intellectual life, but highlight the organic link between our Institute and the American University of Beirut.

Affiliated Scholars are post-doctoral scholars or PhD candidates who are finalizing their dissertation and whose current research project is relevant to one of the institute's research programs. The affiliation gives the scholar an institutional home at the university and the ability to access the AUB libraries, as well as other campus resources. Most importantly, this affiliation offers the scholar the opportunity to collaborate with researchers and staff from the institute and share their ongoing research for feedback and support. The duration of this affiliation may vary from a short stay up to one full academic year.

Munib and Angela Masri Institute of Energy and Natural Resources

Director:	Ghaddar, Nesreen R., Professor and Qatar Chair in Energy Studies, Department of Mechanical Engineering
Executive Assistant:	Assaad, Sandrine
Institute Steering Committee	
Abdel Rahman, Abdel Fattah	Professor, Department of Geology
Al Ghoul, Mazen	Professor, Department of Chemistry
Ghaddar, Nesreen	Professor and Qatar Chair in Energy Studies, Department of Mechanical Engineering
Jabr, Rabih	Professor, Department of Electrical and Computer Engineering
Moukalled, Fadl	Professor, Department of Mechanical Engineering
Zeaiter, Joseph	Associate Professor, Baha and Walid Bassatne Department of Chemical Engineering and Advanced Energy
Abdel Rahman, Abdel Fattah	Professor, Department of Geology

Introduction

The Munib and Angela Masri Institute of Energy and Natural Resources at the American University of Beirut (AUB) was established in June 2007 through a generous endowment pledge of $5 million by AUB Trustee Munib Masri of the Munib R. Masri Foundation.

Mission

The Munib and Angela Masri Institute of Energy and Natural Resources provides a vehicle for promoting research and advanced study in the petroleum, water, and energy disciplines, as well as a focal point for collaborative research among scientists, engineers, and professionals in Lebanon and in the region at large. The institute serves as an interfaculty coordinating unit in AUB and a catalyst for advanced research in the sciences and engineering for the management and conservation of natural resources and energy.

Objectives

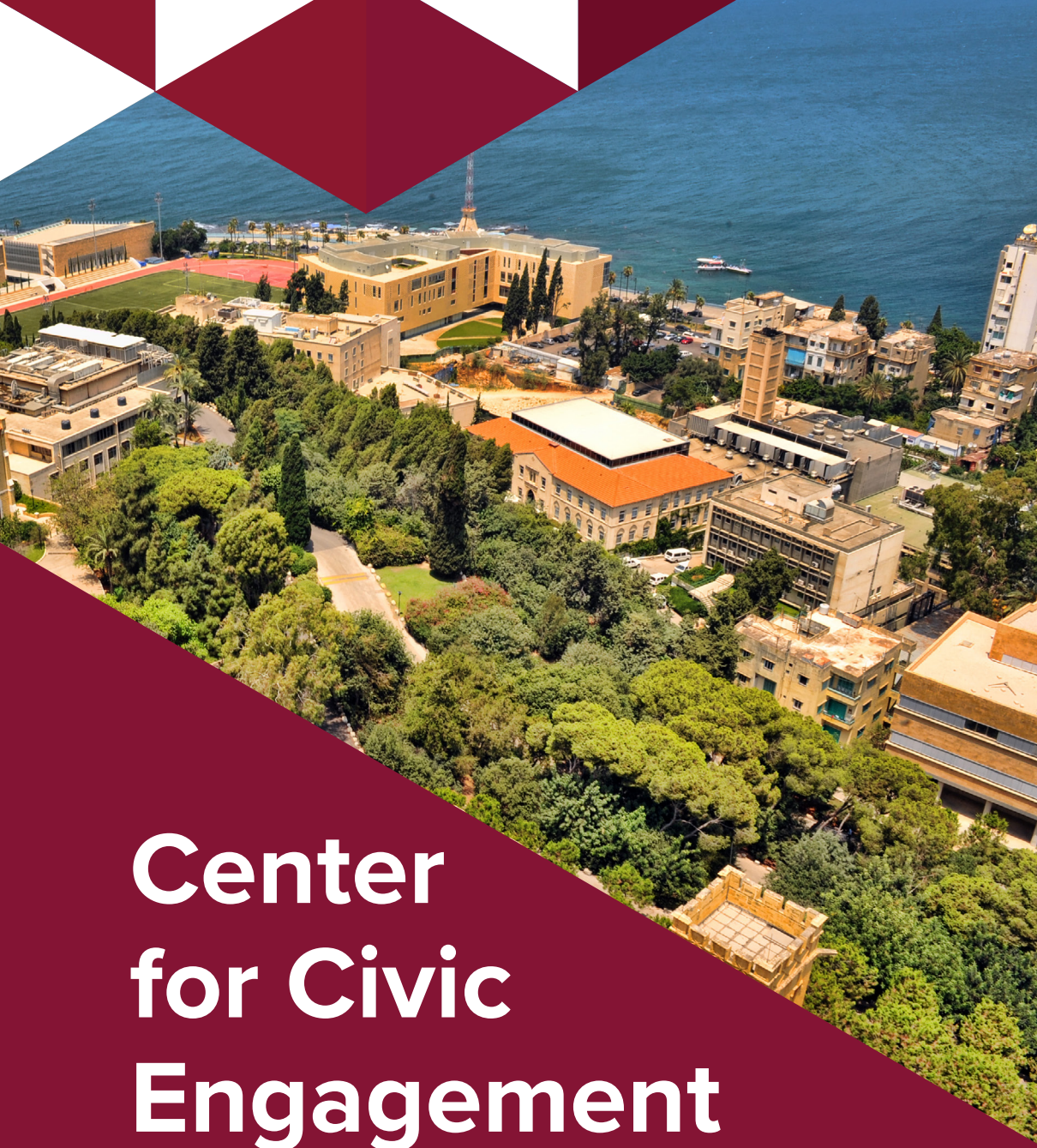
The objectives of The Munib and Angela Masri Institute of Energy and Natural Resources are the following:

- Initiate, guide, and support collaborative and interdisciplinary research in renewable energy and energy efficiency, water and mineral resources, of and management natural resources to protect the environment.
- Support research studies that advance knowledge in areas that promote sustainable development in the region.
- Form research clusters and multi-disciplinary research teams crossing boundaries of disciplines to address complex problems.
- Organize specialized training workshops, academic and public seminars, conferences, lecture series, and similar high scholarly events.

Activities of the Institute

The activities of The Munib and Angela Masri Institute of Energy and Natural Resources are the following:

- Initiate and enhance collaborative and interdisciplinary research that leads to sustainable impact.
- Form research clusters and MOUs with a focus on critical contextual issues.
- Organize academic and public seminars, lecture series and international workshops.
- Enhance collaborative research and dissemination of research results at AUB.
- Support projects and blended learning, increasing graduate (master) students.
- Support outreach contextualized digital hybrid learning.
- Support activities of the interdisciplinary master program in energy studies at MSFEA.



Center for Civic Engagement and Community Services (CCECS)

Director:	Shibli, Rabih
Administrative Assistant:	Bou Fadel, Mireille
Staff and Research Assistants:	Abou Farraj, Lina; Fleihan, Hala; Chahine, Karen; Hajaig, Rabih; Kouzi, Sarah; Bou Matar, Sarah; Dabbous, Lin; Kossaifi, Clara; Massalkhi, Fatima; Ziadeh, Raghda; Al Ajami, Ahmad; El Ali, Qamar; Saleh, Aya

Vision

Positioning AUB as a civic convener and frontline responder to societal conflicts and challenges while realizing the potential of university students as change makers in local and global contexts.

Mission

Leveraging operational research, campus community, and socially responsive partnerships to address societal challenges while equipping students with professional skills for ethical and effective crisis management. This is reflected in three cross-cutting tenets:

1. **Engaged Scholarship Program (ESP):**

   Each year, CCECS guides more than 700 undergraduate and graduate scholarship recipients from Lebanon, the Middle East, Africa, and Afghanistan through a four-track journey beginning with workshops, volunteering rotations, extending to internships, and culminating in the development and implementation of Community Support Projects (CSP). Skills development workshops are sequentially layered according to students' academic standing and in alignment with the ESP milestones. Volunteering rotations allow freshman and sophomore students access to community organizations and direct exposure to services offered to vulnerable communities. Community-based internships provide junior and senior students with specialized opportunities to gain work-like experience over a minimum of 4 weeks. This preparatory experience culminates with a CSP that engages students in a participatory design process with local stakeholders to develop and pilot interventions that respond to pressing challenges facing vulnerable communities.

2. **Fundamental in Civic Engagement (FCE):**

   Under the new General Education Program, the CCECS is developing a three-credit general education course requirement bridging theory with practice, provides students with a five-option pathway to fulfill, namely through, Volunteering Rotations, a Community-Based Internship, Capstone Project, Community Support Project (CSP) and a Service-Learning Course. The common ground of these five options is a one credit online prerequisite course that entails the fundamentals of civic engagement and field reports developed by students; an opportunity to recognize some of the prominent student-led initiatives, that can be used as references to further inspire their peers. Each of these reports starts with a short documentary raising awareness and understanding on a specific societal challenge along with a case study illustrating the global relevance, the national manifestation of its policies and practices, and the local context where a specific site is identified for the pilot project implementation.

3. **Strategic Community Initiatives (SCIs):**

   CCECS plays a leading role in empowering the most vulnerable populations through high impact multi-year interventions, by first identifying themes, setting the roadmap for project development, and establishing strategic partnerships with academia, stakeholders, and funding agencies. Each contextualized SCI is initially a prototype that is meticulously designed to tackle local complexities; it must be flexible, resilient, and positioned in the most appropriate setup for it to thrive. Insights, common practices, and readily available resources within the targeted communities provide invaluable building blocks that increase local buy-in, ownership, and the sustainability of the prototype. Leveraging cutting-edge operational research, SCIs yield tangible solutions that are expandable to cover a wider scope of the same targeted community and are transferable to various locations enduring similar challenges.

AUB's civic engagement through CCECS has earned international recognition. AUB has been designated as the "most civically engaged campus" in the Middle East and North Africa, won the MacJannet Prize for Global Citizenship, the MIT Enterprise Forum 'Innovate for Refugees' Award, as well as the Fritz Redlich Human Rights Award from Harvard University.

Continuing Education Center (CEC)

Background

In line with its mission to serve the region and its commitment to life-long learning, AUB offers a variety of certificate and diploma non-credit programs, non-certificate courses, intensive professional courses, and special programs for all ages as well as students with intellectual disabilities, school-age children, and children of AUB alumni.

All courses pertaining to CEC Certificates involve at least 30 contact hours per course and include at least four courses but can reach up to six courses per certificate. Furthermore, enrolling into a CEC Diploma program requires the completion of the relevant CEC Certificate. Diploma program requirements are usually eight courses (including certificate courses) and can reach up to twelve courses. All CEC courses are designed to include more practical case studies customized for professionals in the specialization area. CEC also offers testing services through its state-of-the-art testing center.

The Continuing Education Center (CEC) at the American University of Beirut promotes AUB's motto "so that they may have life and have it more abundantly" and stands at the heart of AUB's strategic plan in extending the resources of the University into the community by providing high-quality educational opportunities for people of all educational and professional levels.

Mission

The mission of CEC is to meet the lifelong educational and training needs of all learners in the local community in Lebanon, the Middle East and North Africa region and beyond. CEC aims to enhance professional and technical skills of individuals while addressing their needs for personal development and cultural enrichment.

Vision

CEC aspires to become a center of excellence in providing quality education and training in a variety of fields to a diverse population of learners in Lebanon, the Middle East and North Africa region and beyond.

General Criteria for Admission

Students applying to one of the certificate or diploma programs should submit a secondary school or university certificate. Also, a minimum score of 27 in AUB-EN is required for admission. Applicants who are graduates of an English-speaking university are exempted from the English language test. Applicants who sit for the English Language Placement test at the Center and are placed in Level 5 or Level 6 are also allowed to register. An applicant might also be required to report for an interview with the program coordinator.

A student with an AUB-EN score less than 27 will be allowed to take a maximum of two courses in one of the certificate programs provided that s/he sits for the AUB-EN at the end of the first and/or second course and meets the minimum requirements. If the student does not meet the minimum required English score for entry into that program by the end of the second course, s/he will be disqualified from the certificate program and will not be allowed to register for another course in that certificate. The student will have to take more English courses before being allowed to re-register to complete the courses in that certificate program and become eligible for a certificate upon completion of course requirements.

Students applying for enrollment in the English language courses are required to sit for a placement test given at CEC.

Enrollment in all other courses is generally open to all learners from diverse educational backgrounds, unless stated otherwise.

Graduation Requirements for Certificate and Diploma Programs

A certificate or a diploma is offered upon the successful completion of all the required courses and the attainment of a minimum grade of 60 over 100 or (D) in each course along with a minimum cumulative average of 70 over 100 (GPA: 2.2). If the academic requirements change before the student finishes a specified program of study, the student may follow the new requirements upon the approval of the program coordinator.

Testing Center

Mission

The Testing Center plays a vital role in advancing the university's mission statement by offering a high-quality, secure, confidential, and welcoming testing environment to cater to the diverse needs of academics, staff, students, and the general public. Our primary objective is to facilitate access to education and promote academic success by delivering a dependable testing environment that upholds the highest standards of quality and integrity.

Vision

Supporting the University's Mission: The Testing Center actively supports the university's mission statement by enhancing academic excellence through offering high-quality testing services tailored to the needs of students, faculty, and the public.

High-Quality Testing Services: The vision encompasses the continuous enhancement of testing services, committed to providing reliable, accurate, and up-to-date assessments that adhere to the latest testing standards and procedures.

Secure and Confidential Testing Environment: The Testing Center prioritizes the creation of a secure and confidential testing environment to ensure the integrity of test results and safeguard the privacy of test-takers.

Friendly Testing Environment: Envisioning a welcoming and supportive testing environment, reducing test-takers' stress and anxiety to contribute to their overall academic success.

Access to Education and Academic Success: The ultimate vision is to facilitate access to education and promote academic success for all by providing a professional and reliable testing environment, aligning with the university's broader mission.

Services Offered by the Testing Center

The Testing Center offers a diverse range of services, each tailored to address the unique

needs of the academic community and beyond:

Language Proficiency Testing (AUB-EN): Providing language proficiency tests that evaluate English language skills, vital for success in academia and various professional fields. This score offers a general assessment of English language proficiency, specifically designed as the AUB English Entrance exam.

Writing Placement Testing (WT): The center administers writing placement tests designed to help students identify their appropriate academic placement. These tests assess students' ability to read, analyze, and write at the university level. The results guide the selection of the appropriate Communication Skills Program (CSP) writing course, ensuring a strong foundation for academic success.

Language Proficiency Testing for Recruitment (AUB-IET, AUB-EET): Conducting language proficiency tests tailored for recruitment purposes, aiding in selecting candidates with the requisite language skills, crucial for effective communication in professional and academic settings. These assessments are utilized beyond the academic realm, facilitating effective communication and language skills evaluation for various organizational needs.

College-level Skills Testing (ETS® Proficiency Profile): Administering tests that assess essential skills such as critical thinking, reading, writing, and mathematics, with the aim of measuring and enhancing general education student learning outcomes.

Testing for International Organizations (British Council: IELTS, Educational Testing Service: Digital SAT): Facilitating international testing for organizations like IELTS and the Digital SAT, enabling students to meet global standards and opening doors to global educational and professional opportunities.

Proctoring Services for Distance Education (Concordia University, Universitat Pompeu Fabra etc.): Offering proctoring services for students enrolled in distance education courses from other educational institutions, guaranteeing the integrity of examinations.

The Testing Center plays a pivotal role in shaping academic success by ensuring that the assessment process is seamless, secure, and conducive to individual achievement. The Testing Center is committed to maintaining and enhancing these services to meet the ever-evolving needs of the academic community and the broader public.

CEC Rules and Regulations

AUB-EN

Applicants who need to sit for the AUB-EN should register online for the test two days prior to the examination day and pay an exam fee. Test administration is done in Dr. Samer Kamil Al-Rayyes Hall (Nicely Hall Room 500).

Student IDs

CEC students are provided with AUB identification cards, which they should carry while on AUB campus. In case the student loses the ID card that s/he gets upon registration, s/he can get a new one by paying a replacement fee.

Course Offerings

The updated course listing is posted each term on the CEC website. CEC is under no obligation to offer any of the certificate or diploma courses at all times.

Course Cancellations

CEC reserves the right to cancel any course due to insufficient enrolment or other unavoidable circumstances. All registrants will be notified, and a complete refund is made automatically.

Student Withdrawal

For students deciding to withdraw from a course in which they have already registered, fees are refunded according to the CEC refund policy on which the applicant signs. Requests for refunds are not accepted after the third week of classes. Refund checks may take up to four weeks to process.

Attendance

Attendance of all classes is required. CEC instructors will record attendance at the beginning of each session. A student who is absent for more than one fifth of the number of sessions of a course without valid excuse will not be entitled to a final grade for that course. The student will receive a "W" grade. Late arrivals and early departures are tracked by the class instructor, the result of three unexcused late arrivals and/or early departures will be equivalent to a day of absence. Late arrivals and early departures are recorded if the student arrives 15+ minutes late or leaves 15+ minutes before.

Access to University Facilities

- Students enrolled in CEC courses are entitled to use the reading facilities at the university libraries but not to check out books.
- CEC students are not entitled to free access to the Charles Hostler Student Center. Those who wish to join may apply for paid monthly membership.

Examinations

Final Examinations are held within one week of the last class session.

Repeating a Course

A student is not allowed to register for the same course more than two times.

Attestations and Transcripts

Attestations are offered to students who are enrolled in CEC courses. Requests for attestations can be submitted to the CEC office and may take up to three working days to be ready. Transcripts are provided by the Registrar's Office. The student should fill out a

request form and submit it to the Registrar's Office.

Holidays

The CEC follows the AUB calendar with respect to holidays.

AUB Rules and Regulations

All students are expected to abide by the rules and regulations of the University.

Change of Personal Information

Students are encouraged to inform CEC about any changes in their contact information.

Contact CEC

Continuing Education Center, PO Box 11-0236

Riad El Solh 1107 2020 - Beirut, Lebanon

Phone: +961-1-350000 or 374374, ext.3140

+961-1-759675

Email: cec@aub.edu.lb

Website: www.aub.edu.lb/cec

Visit CEC: Nicely, 5th floor

CEC Programs of Study

CEC programs are designed to cater to the personal and professional growth needs of practitioners in a wide variety of areas including business and management, cultural and humanitarian studies, education, fine arts, foreign languages, health care, media and communication, as well as science and technology.

This section elaborates on the courses offered as part of the requirements towards 34 professional CEC Certificates and Diplomas as well as non-certificate courses. Certificate and Diploma programs are categorized according to different specialization areas, listed alphabetically under eight different tracks as shown in the following pages.

Business and Management

Accounting Studies Certificate

Objective

The objective of the accounting studies program is to provide learning opportunities to students who are interested in developing their business career by teaching them

accounting principles, preparing of financial statements for different types of business organizations and enhancing their analytical and technical skills for the purpose of using financial data in decision making. Moreover, the program focuses on the relationship between the company's management and the independent auditors, including the legal responsibilities and liabilities for each party.

Requirements

This program consists of four courses to be completed within two years:

CACT 101	Principles of Accounting I
CACT 201	Principles of Accounting II
CACT 301	Cost Accounting and Control
CACT 302	Auditing

Associate Project Management Certificate

Objective

The Associate Project Management program offers participants the opportunity to define, plan, and execute a project no matter how simple or complex it may be. Participants will acquire the tools and knowledge necessary to deliver successful projects, both on time and within budget, while meeting any performance specifications determined from the onset. Students will examine the key skills of a project manager and learn how to develop and apply those skills for project success. Participants will also learn how to create a project schedule, resource plan and budget, and how to monitor and evaluate a project to manage time, cost, scope, and resources effectively.

Requirements

This program consists of four courses to be completed within two years:

CPRM 102	Emotional Intelligence and Project Leadership
CPRM 103	Project Schedule Management
CPRM 104	Project Stakeholder Engagement and Management
CPRM 216	Project Risk Analysis and Mitigation

Aviation Management Certificate

Objective

The objective of this program is to provide participants with thorough grounding in aviation-related topics which are management, operation, and regulation. The courses are carefully selected to equip the participants with the skills required to pursue a successful career in various sectors of the aviation industry.

Requirements

This program consists of four courses to be completed within two years:

CAVM 101	Air Transport Fundamentals
CAVM 102	Aviation Policy and Regulation
CAVM 103	Aviation Operations Management
CAVM 104	Aviation Safety Management Systems

Essentials of Business Certificate

Objective

The objective of this program is to provide learning opportunities in selected aspects of business with emphasis on modern developments. Some who may consider enrolling in individual courses to continue their professional development will be given attestations of completed courses.

Requirements

The program consists of the following six courses to be completed within three years:

CACT 101	Principles of Accounting I
CMKT 101	Principles of Marketing
CECN 101	Introduction to Economics
CMGT 101	Principles of Management
CECN 301	Money and Banking
CFIN 101	Principles of Finance

Financial Management Certificate

Objective

The objective of this program is to introduce participants to the process of financial decision-making to serve various business objectives in different settings. The program enables participants to deal with financial decisions facing businesses, household savers, and institutional and individual investors. Participants cover the areas of financial management, financial reports, security analysis, and banking activities.

Requirements

The program consists of the following four courses to be completed within two years:

CFIN 101	Principles of Finance
CFIN 301	Financial Statements Analysis
CFIN 302	Investment Analysis
CFIN 303	Commercial Banking

Human Resource Management Certificate

Objective

The objective of this certificate is to offer instruction on practical, current issues in the human resource field for professional development. Increasingly, companies in Lebanon realize that a motivated, appropriately selected, trained, appraised, and compensated workforce is critical to improving company financial performance and success. Human resource professionals facilitate this process through effective management of human resource issues.

Requirements

The Human Resource Certificate requires successful completion of four core courses to be completed within two years:

CHRM 101	Overview of Human Resource Management
CHRM 201	Workforce Planning and Staffing
CHRM 202	Total Compensation and Benefits
CHRM 203	Employee Training and Development

International Commercial Arbitration Certificate

Objective

This program is intended for Lawyers, engineers, contractors, legal directors, corporate counsels from companies involved in international commercial arbitration, professionals and academics aiming for a career or to expand their knowledge in international commercial arbitration. The course will examine arbitration law and practice from a comparative, multi-jurisdictional perspective, and focuses on the theoretical and practical aspects of modern international commercial comparative arbitration.

Requirements

The program is composed of four courses to be completed in two years.

CABT 205	Central Aspects & Agreement to Arbitrate
CABT 206	Arbitral Tribunal, Jurisdiction, Powers, and Process
CABT 207	Applicable Laws of Arbitration
CABT 208	Arbitral Award

Leadership Skills Certificate

Objective

This program aims to introduce participants to the essential skills needed to be successful leaders in the field of social work. Participants will be guided to discover their leadership skills, strengths, and weaknesses. They will also learn how to design their own self-development plans and develop strategies to improve the organizations in which they are working.

Requirements

The program is composed of four courses to be completed within two years:

CLDS 100	Introduction to Leadership Skills
CLDS 202	Emotional Intelligence in Leadership and Management
CLDS 203	Understanding Oneself Understanding Others
CLDS 204	Leading Oneself Leading Others

Marketing Management Certificate

Objective

The objective of this program is to provide participants with an understanding of the marketing-management process. The basic components of marketing, such as consumer behavior, marketing research, product distribution, promotion, and price planning will be emphasized.

Requirements

The program consists of the following four courses to be completed within two years:

CMKT 101	Principles of Marketing
CMKT 202	Marketing Research
CMKT 301	Marketing Communications and Advertising
CMKT 302	Sales Management

Office Management Certificate

Objective

The objective of this program is to develop efficient executive secretaries to facilitate the complex and demanding jobs of today's executives.

Requirements

The program consists of the following four courses to be completed within two years:

CBUS 101	Introduction to Business

CBUS 102	Business English
CBUS 202	Office Procedures and Routines
CBUS 203	Office Automation

Project Management Certificate

Objective

Managing projects has become one of the most important characteristics of modern organizations. This serves to focus responsibility and authority to achieve the organizational goals and retain better control, coordination, communication and customer relations. This certificate program provides participants with the ability to achieve these objectives via effective project management. Participants will master: (i) leadership and communication skills, (ii) project scheduling and cost control principles, (iii) stakeholders categorizing and managing and (iv) risk identification and mitigation.

Requirements

This program consists of the following four courses to be completed within two years:

CPRM 202	Project Leadership and Communication
CPRM 203	Project Management Scheduling and Control Tools
CPRM 204	Project Stakeholder Management
CPRM 316	Project Risk Management

Aviation Management Diploma

Objective

This diploma program equips participants with the skills required to pursue a successful career in various sectors of the air transport industry including airlines, airport companies and authorities, civil aviation departments, and air transport consultancies. The program provides the managerial and practical skills required to assist the participants to become more valuable employees or potential employees to international aviation businesses.

Requirements

The diploma program consists of ten courses divided over two parts which include the Aviation Management Certificate (four courses) plus the diploma focus (six courses). The following are the diploma focus courses to be completed within three years:

CAVM 201	Aviation Strategic Management
CAVM 202	Air Transport Economics
CAVM 203	Aviation Marketing
CAVM 301	Airport Design and Master Planning
CAVM 302	Airline Business Management
CAVM 303	Research Methods and Forecasting in Aviation

Human Resources Management Diploma

Objective

This diploma program provides a comprehensive overview of HRM roles and responsibilities in the workplace from a strategic perspective. It fosters and develops the participants' professional expertise and competencies. This diploma program involves an intensive education program using traditional classroom instruction, hands-on case studies, and executive presentations.

Requirements

This program consists of the following eight courses to be completed within four years:

CHRM 101	Overview of Human Resource Management
CHRM 201	Workforce Planning and Staffing
CHRM 202	Total Compensation and Benefits
CHRM 203	Employee Training and Development
CHRM 301	Managing Human Behavior in Organizations
CHRM 302	Managing the Employment Relationship
CHRM 401	Strategic Management
CHRM 402	Advanced Topics in Human Capital Management

Marketing Management Diploma

Objective

The objective of this diploma is to provide an advanced and comprehensive overview of marketing from basic to strategic. The components of marketing, such as consumer behavior, sales management, marketing communication, marketing research, market segmentation, and strategic marketing planning will be emphasized.

Requirements

The program consists of the following eight courses to be completed within four years:

CMKT 101	Principles of Marketing
CMKT 202	Marketing Research
CMKT 301	Marketing Communications and Advertising
CMKT 302	Sales Management
CMKT 401	Services Marketing
CMKT 402	Public Relations
CMKT 403	Consumer Behavior
CMKT 404	International Marketing

Project Management Diploma

Objective

Upon mastering basic Project Management (PM) skills and techniques in the PM certificate, this diploma offers an advanced and practical project management training in critical areas such as construction planning, financing, and economic feasibility, procurement, supply chain management, and quality assurance.

Requirements

The PM diploma will be granted upon completing the four core courses of the PM certificate (CPRM, 202, 203, 204, and 316) plus five electives from the following list:

CPRM 301	Pre-Project Planning
CPRM 302	Design Project Management
CPRM 303	Construction Project Management
CPRM 304	Construction Contract Administration under the FIDIC Conditions
CPRM 305	Green Project Management and Sustainable Construction
CPRM 311	Technology and Innovation Management
CPRM 312	Program Management
CPRM 313	Project Economic Feasibility
CPRM 314	Managerial Risk and Decision Analysis
CPRM 315	Supply Chain Management

Non-Certificate Business and Management Courses

CNAP 201 Certified Nonprofit Accounting Professional 20 hrs.

Initiated and developed through the National Association of Nonprofit Accountants and Consultants (NPAC), CNAP is the gold standard training for nonprofit financial professionals. CNAP is a turnkey training program that offers professional certification to nonprofit finance office staff. CNAP is now offered in the Middle East by Wegner CPAs, based in the US. The seminar covers practical skills

that can be immediately applied to day-to-day operations, including financial reporting, internal controls, budget development, and governance. The seminar prepares participants to sit for the international exam and acquire the CNAP certification.

CPRM 200 The Certified Associate in Project Management 25 hrs.

This course provides junior project managers with the basic knowledge and preparation required to pass the CAPM certification exam. It follows the outline of the Project Management Body of Knowledge (PMBOK). Each topic is introduced and discussed, with emphasis on the Inputs-Processes-Tools and Techniques-Outputs structure outlined in the PMBOK. This course is approved for credit (25 PDUs) by the Project Management Institute.

CPRM 300 Project Management Professional Course 35 hrs.

This course introduces senior project managers to the science of Project Management and how it applies to their business; and refreshes the knowledge of those who want to sit for the PMP exam. The basic elements of project management will be discussed: PMP logistics, integration management, project scope management, project time management, cost management, quality management, human resource management, communication, risk, procurement, and professional responsibility. Each topic is introduced and discussed with emphasis on the Inputs-Processes-Tools and Techniques-Outputs structure outlined in the PMBOK. This course is approved for credit (35 PDUs) by the Project Management Institute.

CLDS 205 Training of Trainers on Elementary Leadership Skills 30 hrs.

The main objectives of this course are to introduce participants to the essential skills needed for a successful Trainer, and to help them plan implement and evaluate one training course on Elementary Leadership Skills. Main topics include characteristics of a successful training program, research methods for training needs assessment, structure of a training program, managing training problems, characteristics of a successful trainer, and importance of leadership training in development.

CEVP 101 Event Planning 30 hrs.

This course is designed to provide the necessary knowledge and skills an event planner should acquire. It focuses on the fundamentals of event planning, the communication process, and event branding and marketing. The course includes organizing and planning actual events taking place on AUB campus.

CIPE 201 Business Protocol and Etiquette 30 hrs.

This course teaches students how to greet people, converse with them, understand their business and management styles while respecting their cultural attitudes. Topics include: first impressions and networking skills, dressing for success, communication at its best, business lunching and dining etiquette, hosting business potentials, and mastering business meetings.

CLDS 101 Leadership Skills 30 hrs.

The objective of this course is to introduce participants to the essential skills needed to be successful leaders. Participants will be able to determine their leadership qualities and personal responsibilities style. They will also understand their responsibility in developing further as leaders. Participants will learn how to set, evaluate, and follow up on short and long-term objectives. The teacher of this course will use a practical approach emphasizing exercises, discussion, group work, and practical experience. A pre-test will be given at the beginning of the course and a post-test at the end so that participants

will be able to evaluate their leadership skills and plan for improvement.

CLDS 201 Emotional Intelligence 30 hrs.

This course is designed to help participants understand the relationship between emotions and decision-making and their role in developing their own emotional intelligence. The course focuses on the importance of emotional intelligence to our health and leadership qualities. Participants will learn to identify their emotions, express themselves clearly, and understand others. They will also learn how to motivate themselves and others, and how to plan for self-management in order to achieve higher emotional intelligence.

CMKT 501 E-Commerce Management 30 hrs.

In this course and through a hands-on approach, students will learn how to develop, market, and manage an e-commerce business. Students' personal laptops are required.

CSTM 201 Stress and Time Management 25 hrs.

This course is designed to improve the students' productivity and job satisfaction by developing their understanding of the causes and consequences of stress in their work environment. Students will also learn time management strategies such as workload planning and task prioritization. The course includes case studies, real-life examples, and practical sessions.

CCRM 201 Customer Relationship Management 25 hrs.

This course highlights the importance of a customer to the success of any business and discusses the cost of acquiring and/or retaining a customer and the evaluation of the monetary value of a customer. The training also covers the main business challenges that companies face at present, and how CRM helps them address such challenges. This is followed by a detailed discussion of CRM, including implementation strategies, improvement of customer satisfaction / retention, and company profitability.

Cultural and Humanitarian Studies

International Relations and Diplomacy Certificate

Objective

The objective of this program is to provide participants with an in-depth understanding of the theory and practice of international relations within the contemporary interdependent world, while placing a particular emphasis on cultural diplomacy within this framework.

Requirements

This program consists of five courses to be completed within two years:

CCDC 101	International Relations and Diplomacy
CCDC 201	Global Governance and Diplomacy
CCDC 202	Conflict Zone Mediation
CCDC 203	Sustainable Development and the Global Markets
CCDC 204	Cultural Diplomacy by the Arts, Music and Cinema

Humanitarian Certificate

Objective

This certification, in collaboration with DisasterReady, will introduce the Core Humanitarian Principles and Standards as a framework to support local organizations in establishing internal emergency response systems, improving the quality of response, and fostering collaboration. This is a blended certificate; courses are given online and in-person. Face-to-face classes are provided at AUB and the online self-study courses are available free of charge on DisasterReady. For instructions on how to access the online courses, please refer to the DisasterReady Guide.

Requirements

This program consists of four courses to be completed within two years:

CHMN 201	Principles and Standards of Humanitarianism
CHMN 202	Safety, Security and Staff Care
CHMN 203	Humanitarian Programming
CHMN 204	Humanitarian Leadership and Operations

Education

Coaching for School-Based Improvement Certificate

Objective

This program provides training for individuals to become coaches who train school teams on how to lead school-based improvement founded on TAMAM's research-based approach that is customized and grounded in the context of the Arab Region. This program prepares the coaches to acquire the needed skills and competencies to provide continuous guidance and support for the school teams while being coached on TAMAM eleven competencies, skills related to the school improvement journey, and the attitudes required to sustain their commitment to lead school-based improvement. Moreover, this program prepares the coaches with the appropriate approach to monitor the work of the school teams and to provide them with adequate support. The approach also prepares the coaches with the skills to negotiate with the administrators of schools to urge them to provide the teams with supportive conditions that sustain their commitment to engage in TAMAM activities and facilitate their work on leading the school-based improvement even after the gradual withdrawal of the coaches. The Program is based on international literature related to educational leadership and school improvement but is designed to fit the context of the Arab Region and is presented in Arabic Language.

Requirements

The program consists of the following four courses:

CEDU 217	Principles of School Improvement
CEDU 218	Building Capacity to Lead Change

CEDU 219	The School Improvement Journey
CEDU 220	Coaching Roles and Responsibilities

Early Childhood Education Certificate

Objective

The purpose of this certificate is to expose practitioners and prospective teachers in various Early Childhood Education contexts to both theoretical and practical knowledge regarding current trends in early childhood education, child development and teaching, and practices in the field. It also aims to develop the related skills for better performance. New educational programs and approaches are explored in light of findings of new brain research regarding how children learn and develop. The implications for appropriate practices are studied in various areas which include curriculum, methods of instruction, classroom management, parental involvement, and the changing role of the teacher. Special emphasis is placed upon the inquiry method and the development of creative and critical thinking.

Requirements

The program consists of the following four courses to be completed within two years:

CECE 201	Trends in Early Childhood Education
CECE 202	Developmentally Appropriate Practices in the EC Classroom
CECE 203	Curriculum and Planning in Early Childhood Education
CECE 204	Managing the Early Childhood Classroom

Life Centered Education Certificate

Objective

This certificate aims to provide youth and adults with intellectual disabilities with an inclusive university based educational and career guidance program that responds to their needs and prepares them for career attainment. Its courses address subject matters in a variety of life skill courses in addition to computer skills, art and music therapy, and internship hours in selected business platforms.

The certificate's program offers knowledge and skills for students to be effective, independent productive individuals in careers that are best suited to their likes and strengths.

Requirements

The program is composed of the following courses:

CLCE 110	Daily Living Skills I
CLCE 111	Daily Living Skills II
CLCE 112	Self Determination and Interpersonal Skills I

CLCE 113	Self Determination and Interpersonal Skills II
CLCE 114	Functional Math I
CLCE 115	Functional Math II
CLCE 116	Computer Skills I
CLCE 117	Computer Skills II
CLCE 118	Employment Skills I
CLCE 119	Employment Skills II
CLCE 200	Daily Living Skills III
CLCE 201	Daily Living Skills IV
CLCE 202	Self Determination and Interpersonal Skills III
CLCE 203	Self Determination and Interpersonal Skills IV
CLCE 206	Computer and Expressive Arts III
CLCE 207	Computer and Expressive Arts IV
CLCE 208	Functional Math III
CLCE 209	Functional Math IV
CLCE 210	Employment III
CLCE 211	Employment IV
CLCE 300	Daily Living Skills V
CLCE 301	Daily Living Skills VI
CLCE 302	Self Determination and Interpersonal Skills V
CLCE 303	Self Determination and Interpersonal Skills VI
CLCE 306	Computer and Expressive Arts V
CLCE 307	Computer and Expressive Arts VI
CLCE 308	Functional Math V
CLCE 309	Functional Math VI
CLCE 310	Employment Skills V
CLCE 311	Employment Skills VI

Non-Certificate Education Courses

CEDU 200 Leading School-based Improvement 10hrs

This course is an introduction to TAMAM's Capacity-Building Program that aims to prepare educators to lead sustainable school-based improvement. The Program is based on international literature related to educational leadership and school improvement but is designed to fit the context of the Arab Region and is presented in Arabic Language. This course aims at introducing the educational theoretical background for sustainable school-based improvement and the needed principles and strategies to lead improvement. The course describes the characteristics of self-renewing schools, the educator who leads improvement, and the profile of the student we aspire to graduate. The course explains the knowledge, skills, and attitudes that educators need to become agents of change in their educational institutions. It also presents the steps followed to launch an innovative intervention, and the procedure to design, implement and evaluate an improvement project, which are referred to as "TAMAM School Improvement Journey". The course also discusses the challenges that could face the launching of school-based improvement and suggests strategies to overcome these challenges using the leadership competencies and skills for based-improvement. In this course, the participants will engage in interactive activities and reflections that help them understand the nature of the process of leading school-based improvement.

CSAT 201 English for SAT 24 hrs.

This course aims to familiarize students with the English component of the Scholastic Aptitude Test (SAT). It helps them practice their English language skills and vocabulary.

CSAT 202 Math for SAT 24 hrs.

This course aims to familiarize students with the mathematical and reasoning components of the SAT test. It reviews mathematical concepts and helps students practice their basic math and reasoning skills.

Fine Arts

Arabic and Oriental Music Studies (Instrument) Certificate

Objective

Provide a large diverse public (different ages and generations) with no previous musical knowledge, a basic appreciation and practice of Arabic and Oriental Music in its various aspects: theory, history, voice and instruments: wind, string, and percussion.

Requirements

CMUS 106 I	Oriental Music Instrument: Theory and Practice I
CMUS 107 I	Oriental Music Instrument: Theory and Practice II
CMUS 203 I	Oriental Music Instrument: Theory and Practice III
CMUS 204 I	Oriental Music Instrument: Theory and Practice IV

Arabic and Oriental Music Studies (Voice) Certificate

Objective

Provide a large diverse public (different ages and generations) with no previous musical knowledge, a basic appreciation and practice of Arabic and Oriental Music in its various aspects: theory, history, voice and instruments: wind, string, and percussion.

Requirements

CMUS 103 V	Theory and Practice of Voice I
CMUS 104 V	Theory and Practice of Voice II
CMUS 201 V	Voice for Oriental Singing: Theory and Practice I
CMUS 202 V	Voice for Oriental Singing: Theory and Practice II

Interior Design Certificate

Objective

The Interior Design Certificate Program equips students with the methods and skills needed to temper the urgent problems generated by a rapidly growing demography and to create a friendly urban environment. The courses will address the different types of living spaces, the different concepts of interior design, and the different methods for combining aesthetic factors with cost and functional concerns. Graphic illustrations, sketches, case studies, AutoCAD, and real models are used.

Requirements

The program consists of four courses:

CINR 101	Basic Skills for Interior Design
CINR 102	Elements and History of Design Styles
CINR 201	AutoCAD for Interior Designers
CINR 202	Practice of Interior Design

Arabic and Oriental Music Studies Diploma

Objective

This course provides a large diverse public (different ages and generations) with no previous musical knowledge and a basic appreciation and practice of Arabic and Oriental Music in its various aspects: theory, history, voice and instruments: wind, string, and percussion. Holders of the Diploma will be at the level of music performers within an Ensemble.

Requirements

Students should complete one of the certificate music programs and the following courses:

CMUS 301 V	Voice for Oriental Music: Theory and Practice III

CMUS 302 V	Voice for Oriental Music: Theory and Practice IV
CMUS 303 I	Oriental Music Instrument: Theory and Practice V
CMUS 304 I	Oriental Music Instrument: Theory and Practice VI
CMUS 305	Oriental Music Ensemble Practice I
CMUS 306	Oriental Music Ensemble Practice II

Interior Design Diploma

Objective

This diploma program equips students with the methods and skills needed to temper the urgent problems generated by a rapidly growing demography and to create a friendly urban environment. The courses will address the different types of living spaces, the different concepts of interior design, and the different methods for combining aesthetic factors with cost and functional concerns. Graphic illustrations, sketches, case studies, AutoCAD, and real models will be used.

Requirements

This program consists of the following eight courses to be completed within four years:

CINR 101	Basic Skills for Interior Design
CINR 102	Elements and History of Design Styles
CINR 103	Drawing and Rendering for Interior Spaces
CINR 201	AutoCAD for Interior Designers
CINR 202	Practice of Interior Design
CINR 203	Technical Detailing and Executing Drawing
CINR 301	Advanced Interior Architecture Project
CINR 302	Supervised Research Project

Non-Certificate Fine Arts Courses

CINR 303 Digital Rendering for Interior Designers 24 hrs.

This course concentrates on transforming the technical drawings into client friendly, readable and attractive presentations. It teaches students who already know AutoCAD how to transfer CAD drawings into color rendered images using both AutoCAD and Photoshop programs.

CART 101 Introduction to Arts Policy and Management 36 hrs.

This course introduces the main concepts related to arts policy and management, giving an overview of the fundamentals of arts policy as well as essential concepts related to third sector arts and cultural organizations management.

CART 201 History of Arts 36 hrs.

This course is an introduction to the art of the twentieth century. It focuses on the approaches and methodologies used in the Dadaist and the Surrealist movements in visual art and literature. The course covers the sources and influences of the major artists. Styles and movements of this period are closely examined. Emphasis is on discussion of pioneering attitudes, theories, and concepts of the art world with topics ranging from a focus on artists and media, art politics, and various thematic concerns. Seminars, workshops and lectures diversify the course.

CDRW 101 Life Drawing I 36 hrs.

This course concentrates on “seeing” and rendering with pencil and charcoal. Special emphasis is placed on still life taken from nature and landscapes.

CMUS 100 Basic Sight Reading and Solfeggio 15 hrs.

This course is an introduction to basic notation reading skills needed in performance practice. The course could be waived with the recommendation of the instructor of practice courses if the student has prior knowledge of music notation and sight reading.

CMUS 101 History and Appreciation of Oriental Music I (Antiquity - 19th century) 25 hrs.

This course is a survey of the practice and theories of music in West Asia and the Eastern Mediterranean from Antiquity till the late 19th century, with a focus on the Mashriq. Readings and recordings are used to illustrate the important styles, forms, modes, rhythms, and instruments. Music is studied as part of the wider social, political, economic, and cultural context. The course highlights the role of cultural exchange in influencing the development of music practice and theory.

CMUS 102 History and Appreciation of Oriental Music II (19th and 20th century) 25 hrs.

This course is a survey of the practice and theories of music in Egypt and the Mashriq. Readings and recordings are used to illustrate the select case studies. Music is studied as part of the wider social, political, economic, and cultural context, with a particular focus on the concept of heritage and nation building. The course highlights the role of composers and practitioners, and the impact of recordings, radio, television and music festivals.

CMUS 105 Digital Audio Course 25 hrs.

This course shows students how to create music using computers, keyboards, and industry-standard audio software. It deals with notation software such as Sibelius or Finale, and as well as sampling and MIDI recording and arranging software such as Cubase or logic. Besides general topics in music notation, and software use, the course will cover the basics of recording and audio editing.

CSKT 101 Sketching 36 hrs.

In this course, students will learn how to execute a free hand drawing that is not intended as a finished work. They will be introduced to perspective, proportions, scales, and composition.

Foreign Languages

English Language

Courses are offered at all levels from beginners to advanced with emphasis on communication competence. Students who complete Level 7 are often able to pass the AUB-EN. Each student's level is determined by a placement test given to all new applicants before the session begins.

CENG 101	English Language Level 1	42 hrs.
CENG 102	English Language Level 2	42 hrs.
CENG 103	English Language Level 3	42 hrs.
CENG 104	English Language Level 4	42 hrs.
CENG 105	English Language Level 5	42 hrs.
CENG 106	English Language Level 6	42 hrs.
CENG 107	English Language Level 7	42 hrs.

اللغة الإنجليزية

المستوى: الاول حتى السابع.

الـــدوام: الخامسة والنصف حتى الثامنة والنصف مساء.

دورة مكثفة في اللغة الإنجليزية تهدف الى تمكين المشتركين فيها من أصول اللغة في القراءة والكتابة والقواعد والمحادثة، وهي تشمل عدة مستويات يوزع الطالب فيها وفقا لمدى إلمام كل منهم بها.

تحدد مستويات الطالب بناء على نتائجهم في امتحان خاص للتصنيف يجرى قبل إتمامهم عمليات التسجيل للدورة.

English Language

CENG 201 Conversational English 36 hrs.

This course offers students the opportunity to speak in formal and informal situations. Throughout the course, students will participate in discussions, group activities, and simulated role-playing. They will also give and evaluate presentations.

CENG 202 Creative Writing 30 hrs.

This course provides participants with the opportunity to apply and extend their creative writing skills in a workshop setting through a series of directed writing activities and in-class discussions. Genre-specific writing will be addressed allowing participants to pursue specific interests in writing fiction, creative non-fiction, memoir and/or poetry. Developing voice and revision will be important components of this course. Participants will also learn how to prepare a piece of writing for publication and will examine the publishing opportunities available to writers.

CENG 203 Public Speaking 42 hrs.

This course focuses on the fundamentals of oral communication which involves preparation and presentation of conventional forms of public address, such as expository and persuasive speaking. Emphasis is placed on the use of correct and effective language and organizational skills in preparing, delivering and evaluating different types of oral presentations. Prerequisite: CENG 107 or equivalent.

CENG 204 Communication Skills 36 hrs.

This course is designed to teach participants different communication techniques and skills in the areas of time management, note-taking, proofreading, editing and copywriting of business, medical, legal, journalistic and economic texts and writings. Participants will practice their communication skills by listening to lectures and dialogues among professionals. They will also write, edit and proofread various documents, abstracts and short papers, and will learn to present orally using the latest technology. Prerequisite: CENG 106 or equivalent.

CENG 205 Basic English for Law 48 hrs.

This course helps lawyers, law school professors, law school students, contractors, paralegals, business professionals and other legal professionals with an interest in learning the legal English to improve their legal English language skills and master the legal terminologies, phrases, collocations and structures. It intends to teach the participants the language of law while learning about the Lebanese and the American judicial systems.

CENG 206 Business English Communication Skills 72 hrs.

This course will primarily be developing students' communication skills in working life and will be developing their vocabulary and knowledge of an integrated use of tenses and forms in the business world. Students will develop their ability to use questions and answers in real-life situations such as formal and/or informal meetings. They will also develop discussion skills using appropriate tenses and common expressions conveniently, which will enable them to be confident in social encounters. Students will be able to use correct English in authentic business settings, including, but not limited to, written communication, through networking by phone, and in face-to-face situations. Applicants eligible for this course must have a score of 29 on the AUB-EN; otherwise, candidates will sit for a placement test at the CEC.

Arabic Language

CARB 204 Arabic for Foreigners I 42 hrs.

This course offers a departure from traditional Arabic programs in its integration of colloquial Arabic with Modern Standard Arabic (MSA) in a way that reflects the use of the language by native speakers. In everyday situations, Arabs communicate in the colloquial and use MSA for reading, writing, and formal speech. This course begins with spoken Arabic and uses it for ordinary conversation throughout the course and gradually integrates MSA through graded reading selections. Emphasis is on real communication and on developing proficiency in the language by using it in meaningful contexts rather than on the study of grammar.

CARB 205 Arabic for Foreigners II 42 hrs.

This course is a continuation of CARB 204 through the extensive use of graded materials on a wide variety of topics. Special attention is given to developing native-like pronunciation and to grammatical accuracy. The focus will be on encouraging fluency and facility in understanding the language and communicating ideas in it. In addition to building on the linguistic foundation, the course continues the practice of introducing students to the Arab society, history, and culture using folk tales, songs, poems, and short stories depicting different aspects of Arab life and culture.

Other Languages

CFRN 101 French I 36 hrs.

This course provides students with the chance to use the language in familiar contexts both orally and in writing. In Level One, the emphasis is on conversations using basic structures.

CFRN 102 French II 36 hrs.

This course provides students with the chance to use the language in familiar contexts both orally and in writing. In Level Two, the student will be able to read and write simple texts.

CGER 101 German I 36 hrs.

In this course, students will learn basic vocabulary and sentence formation that will enable them to participate in simple conversations.

CGER 102 German II 36 hrs.

In this course, students will learn the basics for writing and conversing in a more professional way. Prerequisite: German I.

CHNS 101 Chinese I 36 hrs.

This course provides students with basic working knowledge of Chinese (Mandarin). The course exposes beginners to Chinese Pinyin (spelling with one tone), Chinese characters, Chinese grammar, commonly-used sentence structures, and simple situational dialogues.

CHNS 102 Chinese II 36 hrs.

This course is a continuation of Chinese I. Students will learn more characters, grammar, sentence structures, and dialogues; and they will practice simple applied writing. Prerequisite: Chinese I.

CITL 101 Italian 36 hrs.

This course provides students with a basic knowledge of Italian and foundation for speaking, reading, and writing the language.

CSPN 101 Spanish I 36 hrs.

This course is designed to provide students with a basic knowledge of Spanish, both of its conversational form and of the elementary grammatical structure. By the end of the course, student will be able to engage in simple conversation, read short articles, and write letters and simple compositions.

CSPN 102 Spanish II 36 hrs.

This course aims to enhance students' skills of speaking, listening, reading, and writing. Students who complete this course should be able to communicate in a more professional way. Prerequisite: Spanish I.

Health Care

Community Health Nursing Certificate

Objective

The post-basic certificate program in community health nursing is designed to provide students with theories of nursing and principles underlying current community health nursing practice. The focus of care is on clients who may be represented as individuals, families, and small groups or larger aggregates and community. The nursing role is developed with emphasis on health maintenance, health promotion, and disease prevention as facilitated by health teaching and appropriate use of community resources. Critical inquiry using nursing research and epidemiological processes is fostered by didactic and clinical learning experiences. Clinical experiences are designed to enhance collaborating effectively with interdisciplinary team members in health care settings.

Concepts and theory are learned through various combinations of classroom discussions, lectures, and seminars, case studies, independent study, and guided application in practice. The faculty will carry responsibility in the area of clinical practice through consulting services and participating in demonstrations. Emphasis is placed on the use of community sites, including ambulatory care centers, homes, and schools, collaborative activities with Community Institutions and group teaching. The program includes 90 theory contact-hours and 180 clinical contact-hours.

Requirements

The post-basic Community Health Nursing Certificate program consists of four courses:

CNRS 311	Introduction to Community Health Nursing
CNRS 312	Practicum I: Application of Theories and Concepts
CNRS 313	Advanced Concepts and Issues Relevant to Community/Public Health Nursing
CNRS 314	Practicum II: Planning and Evaluation of Community Based Interventions

Critical Care Nursing Certificate

Objective

The program is designed to build on the knowledge and clinical experience of nurses. It consists of 90 theory contact-hours and 90 clinical contact-hours. The theory part tackles concepts and issues related to assessment, care, and evaluation of critically ill adults. The practicum part includes application of critical care concepts in assessing and managing evidence-based care to critically ill clients. Areas of emphasis include nursing assessment, interventions, and evaluation in critical illness, ventilatory assistance, hemodynamic monitoring, dysrhythmias, and EKG interpretation.

The program is based on the nursing process as a framework for building theoretical knowledge and applying nursing care. Concepts such as critical care environment, relationship with patient and family, end-of-life care, infection control and safety, communication, documentation, and critical thinking will be integrated in this course. Reading and understanding nursing research, doing library search and using information technology to enhance learning will be incorporated.

Requirements

The post basic Critical Care Nursing Certificate program consists of six courses:

CNRS 315	Fundamental of Critical Care Nursing
CNRS 316	Nursing Care Management of the Critically Ill Adult
CNRS 317	Nursing Management of Acute Medical Surgical Emergencies
CNRS 318	Practicum I: Critical Care Nursing: Assessment and Evaluation
CNRS 319	Practicum II: Critical Care Nursing: Management
CNRS 320	Practicum III: Code Management

Leadership and Management in Nursing Certificate

Objective

This program helps build the managerial capacity of nurse managers or nurses in charge of leading and managing skills to ensure success in today's dynamic healthcare environment. It emphasizes the use of creativity in problem solving and decision-making, thus promoting critical thinking, an essential element in the nursing process. It introduces nurses to the change process and control measures which contribute to the improvement of nursing practice. This program allows the nurses to examine their role as leaders in today's rapidly changing healthcare environment.

Requirements

The program consists of five courses:

CNRS 301	Foundations of Leadership and Management in Nursing
CNRS 302	Leading Towards Effective Patient Care Management
CNRS 303	Managing Quality Improvement
CNRS 304	Advanced Management Practice
CNRS 305	Practicum

Nursing Informatics Certificate

Objective

The post basic certificate in Nursing Informatics is designed to provide students with the knowledge and skills necessary to take a leadership role in the selection and implementation of health care information management systems and in applying the knowledge gained from the information generated from these systems. This program entails five courses which focus on concepts and issues surrounding technology and information management in today's rapidly changing health care environment.

Requirements

The post basic NI program consists of five courses:

CNRS 306	Data, Information and Knowledge
CNRS 307	Informatics and the Health Care Delivery System
CNRS 308	System Lifecycle
CNRS 309	Issues in Health Care Informatics
CNRS 310	Data Standards, Terminologies and Implications for Practice

Media and Communication

Journalism Certificate

Objective

This certificate offers a comprehensive insight into the theories and practices of journalism in the digital era. Its courses address a variety of areas, including media law, ethics of reporting, digital storytelling, visual media production, investigative journalism, mobile reporting, cyber activism, in addition to other relevant fields in modern journalism. The certificate's program aims to advance the participants' skills and capabilities when reporting on multimedia platforms.

Requirements

The program is composed of four courses in journalism.

CJRN 201	Media Law and Ethics
CJRN 202	Investigative Journalism
CJRN 203	Mobile Reporting
CJRN 204	Multimedia Journalism

Strategic Communication Certificate

Objective

This certificate provides an overview of strategic communication skills and requirements in traditional media, social media, as well as corporate sector institutions. The courses address topics that range from interpersonal communication skills, public speaking, public relations, campaigning, image production, branding, in addition to variety of advertising and marketing techniques. The certificate aims to boost the participants' capabilities in terms of constructing, packaging, promoting and selling ideas in competitive marketplaces.

Requirements

This program consists of four courses in strategic communication:

CSTC 201	Public Relations
CSTC 202	Communication Campaigns
CSTC 203	Corporate Identity and Branding
CSTC 204	Interpersonal Communication

Journalism and Strategic Communication Diploma

Objective

The Certificate offers a comprehensive insight into the practices of journalism in the digital age. The courses address a wide range of issues related to media ethics, digital storytelling, visual media production, investigative journalism, mobile reporting, in addition to other relevant fields in journalism. Through its diverse topics, rigorous content and interactive exercises, the program aims to advance the participants' skills and expertise when creating content for multimedia platforms.

Requirements

The program is composed of eight courses: four in journalism, and four in strategic communication. In other words, to complete this diploma program, students must complete the Journalism certificate and the Strategic Communication certificate.

CJRN 201	Media Law and Ethics
CJRN 202	Investigative Journalism
CJRN 203	Mobile Reporting
CJRN 204	Multimedia Journalism
CSTC 201	Public Relations

CSTC 202	Communication Campaigns
CSTC 203	Corporate Identity and Branding
CSTC 204	Interpersonal Communication

Science and Technology

Mobile Application Development Certificate

Objective

The objective of this certificate is to teach students the skills needed to advance in a career of mobile application design and development.

Requirements

This program consists of four courses to be completed within two years.

CMAD 200	Developing Hybrid Mobile Apps with PhoneGap
CMAD 201	Developing Android Apps
CMAD 202	Developing iOS Apps
CMAD 203	Developing Windows Phone Apps

Web Application Development Certificate

Objective

The objective of this certificate is to enable students with the skills needed to advance in a career of web application design and development and, eventually, architecture. Students will be creating high standard, performance and secure real-world web application projects that will involve interacting with databases, such as MySQL and MS SQLSERVER as well as Cloud Databases.

Requirements

This program consists of six courses to be completed within three years.

CWAD 200	Programming in HTML5 with JavaScript and CSS3
CWAD 201	Developing Windows Azure and Web Services
CWAD 202	Developing ASP.NET MVC Web Applications
CWAD 203	Developing PHP Web Applications
CWAD 204	Developing Node.js Applications
CWAD 205	Developing Single Page Applications with AngularJS

Certificate and Diploma Programs Course Descriptions

CABT 205 Central Aspects & Agreement to Arbitrate 30hrs.

This course provides a thorough understanding of arbitration in comparison to other ADR mechanisms and litigation, definitions of arbitration, concepts of arbitration, juridical nature of arbitration, delocalized arbitration, international and domestic arbitration, institutional and ad hoc arbitration, disputes resolved "ex aequo et bono", the relationship between state courts and international arbitration, legal issues relating to arbitration agreements, concepts of Arbitrability, Separability, and State Immunity implications on arbitration.

CABT 206 Arbitral Tribunal, Jurisdiction, Powers, and Process 30hrs.

This course provides a comprehensive discussion of all major issues relating to the arbitration tribunal, appropriate number of arbitrators and appointment procedures, main rights and obligations of arbitrators and the parties to an arbitration, understand the various theories for the source of rights and obligations of arbitration tribunals, liability of arbitrators and arbitration institutions, challenge and replacement of arbitrators, arbitration proceedings from both theoretical and practical perspectives, the effect of the commencement of arbitration, the importance and content of preliminary meetings and orders, with review of terms of reference, the role and style of written submissions, the procedure at hearings before arbitrators, hearings in international commercial arbitration, and the rules of evidence as applied in international commercial arbitration.

CABT 207 Applicable Laws of Arbitration 30hrs.

This course provides a thorough understanding of the implication of conflict of laws in international commercial arbitration, discusses how applicable law is determined in international arbitration, methods of determining applicable law by the arbitration tribunal, the application of national laws and "Contrat Sans Loi", the relevance of mandatory rules in arbitration and the importance of public policy considerations, the content of applicable substantive law, the lex mercatoria, its sources and principles, the application of general principles of law in international arbitration, the application of extra-legal standards, Lex Arbitri and Curial Law, and law applicable to arbitrability.

CABT 208 Arbitral Award 30hrs.

This course provides an in-depth evaluation of the requirements relating to form, content and delivery of awards, the appeal of the arbitral award, the circumstances for a challenge to an award and relevant and competent courts for such challenges, the recognition and enforcement of domestic and foreign awards, the grounds and procedure to refuse enforcement of foreign awards, and a comprehensive examination of the 1958 New York Convention and other conventions.

CACT 101 Principles of Accounting I 30 hrs.

This course introduces students to principles of recording transactions, the preparation of financial statements, and completion of the accounting cycle.

CACT 201 Principles of Accounting II 30 hrs.

This course is a continuation of Accounting I. It covers depreciation policies and procedures, depletion and amortization, income determination, partnership accounts, corporate capital accounts, dividends and retained earnings.

CACT 301 Cost Accounting and Control 30 hrs.

This course focuses on the nature and purpose of cost accounting; basic techniques of process and job costing; accounting of materials, labor and overhead; development and use of cost budgets and standards for planning and evaluation of performance; cost classification in relation to behavior; and cost condition statements as tools for evaluating alternative courses of action.

CACT 302 Auditing 30 hrs.

This course focuses on the principles and procedures covering the public accountant's responsibilities in examining and reporting on financial statements of business concerns, including professional ethics, legal responsibility scope, and application of audit procedures.

CAVM 101 Air Transport Fundamentals 30 hrs.

This course Studies how the air transportation system relates to airlines, airports, Civil Aviation Authorities (CAAs) and Air Navigation Services (ANS).

CACT 302 Auditing 30 hrs.

This course focuses on the principles and procedures covering the public accountant's responsibilities in examining and reporting on financial statements of business concerns, including professional ethics, legal responsibility scope, and application of audit procedures.

CAVM 101 Air Transport Fundamentals 30 hrs.

This course Studies how the air transportation system relates to airlines, airports, Civil Aviation Authorities (CAAs) and Air Navigation Services (ANS).

CAVM 102 Aviation Policy and Regulation 30 hrs.

Students obtain the necessary skills to understand and manage civil aviation policy and regulation.

CAVM 103 Aviation Operations Management 30 hrs.

This course strengthens students' understanding of the key airline and airport management principles by drawing on the best practices shared by industry experts.

CAVM 104 Aviation Safety Management Systems 30 hrs.

This course will help learners understand the function, role and importance of developing and implementing a Safety Management System (SMS).

CAVM 201 Aviation Strategic Management 30 hrs.

Students will learn the latest in strategic planning for aviation authorities and aviation related industries and benefit from comprehensive case studies.

CAVM 203 Aviation Marketing 30 hrs.

Growing uncertainty and competition in the global aviation industry is forcing airlines and airports to reinvent their marketing strategies. This course looks at the latest airline and airport marketing and commercial trends to assist participants in revamping their marketing practices.

CAVM 301 Airport Design and Master Planning 30 hrs.

This course provides the principles of airport master planning and demand forecasting. It presents common approaches to design and implement reliable ground access, airside facilities, passenger processes, as well as security and baggage systems.

CAVM 302 Airline Business Management 30 hrs.

This course provides an analytical perspective of various airline strategies and business models. Participants learn how airlines are managed and operated in a competitive global environment.

CAVM 303 Research Methods and Forecasting in Aviation 30 hrs.

This course provides participants with the theories and methods of research in the aviation industry. A range of both quantitative and qualitative methodologies is explored, and various techniques for aviation research are examined.

CBUS 101 Introduction to Business 30 hrs.

The purpose of this course is to provide students with the opportunity to study many dimensions of the business system. Subjects covered include management and organization, human resource management, information for business decision-making, financial information, and business and its environment.

CBUS 102 Business English 30hrs.

The purpose of this course is to focus on the communication requirements of participants in business situations in order to project a professional image and avoid costly mistakes. Guided activities include problem-solving, information transfer tasks, role playing and transfers to participants' work environments to develop confidence in applying common uses of language structures, business terminology, and expressions.

CBUS 202 Office Procedures and Routines 30hrs.

The purpose of this course is to present fundamental principles and successful practices for completing office work effectively and efficiently. Subjects covered include techniques for general secretarial duties, such as filing, information processing skills, preparing and publishing reports, handling mail and electronic messages, using effective telecommunication practices, making meeting arrangements, making travel arrangements, keeping company books and records, and maintaining good human relations proper etiquette.

CBUS 203 Office Automation 30hrs.

This course is intended to introduce students to computer office automation systems which are designed primarily to improve office productivity and efficiency. It focuses on topics like managing documents, electronic filing systems, electronic mail, maintaining calendars and appointments, and word processing using Microsoft Word (advanced features like manipulating tables, merging documents, using style, outline, footnotes, pictures) and spreadsheets using Microsoft Excel (advanced features like formulas, functions, charts, page setup, database management, filtering).

CCDC 101 International Relations and Diplomacy 30 hrs.

This course provides participants with the fundamental knowledge needed in the field of Cultural Diplomacy and International Relations, with a particular emphasis on the application of Cultural Diplomacy in the framework of foreign policy and as practiced by the private sector and civil

society. The course uses a historical and case study approach and addresses the most important contemporary international issues.

CCDC 201 Global Governance and Diplomacy 30 hrs.

This course provides participants with a substantial knowledge of Cultural Diplomacy as practiced by global governance institutions and international organizations around the world. A particular emphasis is put on Cultural Diplomacy's role in global governance to improve the ways in which the diversity of cultures can properly understand each other and to facilitate cooperation more effectively at the political economic, and cultural levels. The course provides analysis of the practice of Cultural Diplomacy at the multilateral level by examining specific case studies of global governance organizations and international organizations.

CCDC 202 Conflict Zone Mediation 30 hrs.

The course provides a thorough background in Cultural Diplomacy, using a historical and case study approach, while further accentuating the role and potential of Cultural Diplomacy in conflict resolution and mediation, with the end goal of strengthening international relations. It addresses contemporary international issues, with classroom lectures and seminars supplemented by lectures and briefings at international and non-governmental organizations; educational events, conferences, tours, and meetings with foreign officials are further incorporated into the curriculum. In addition, the program allows participants the opportunity to attend all ICD conferences, events, presentations, and other activities.

CCDC 203 Sustainable Development and the Global Markets 30 hrs.

The course provides participants with the fundamental knowledge needed in the field of Cultural Diplomacy and International Economics, with a particular emphasis on the role of Cultural Diplomacy in the economic policies of Nation States; the encouragement of sustainable tourism; the use of Cultural Diplomacy in the development of national brands; the international dimension of Corporate Social Responsibility (CSR) and Socially Responsible Investment (SRI); and the global economics and Environmental Responsibility. In particular, the course provides a thorough background in the practice of Cultural Diplomacy in international trade, nation branding, tourism, the engagement of international corporations & business, fostering entrepreneurship and building cultural economic bridges between nations and groups of nations.

CCDC 204 Cultural Diplomacy by the Arts, Music and Cinema 30 hrs.

This course provides participants with core knowledge in the field of Cultural Diplomacy, with a special emphasis on the use of the arts, music and cinema as methods of cultural diplomacy. It combines both theory and practical case studies from a wide variety of fields, such as international relations, diplomacy, the humanities, and culture. It also provides a thorough analysis of a diverse selection of cultural diplomacy institutions and the application of cultural diplomacy in the framework of foreign policy, domestic policy and multiculturalism.

CEDU 217 Principles of School Improvement 30 hrs.

This course aims at introducing the educational theoretical background for sustainable school-based improvement and the needed principals and strategies to initiate, implement, and transform the innovative interventions into sustainable practices that support sustainable self-renewal of schools. The course describes the characteristics of self-renewing schools, the educator who leads improvement, and the profile of the student we aspire to graduate. This course also introduces the TAMAM coaching approach and explains the coaches' roles and

responsibilities while training the school teams to follow the TAMAM research-based and contextualized approach to leading school based-improvement. The course illustrates the personal and professional characteristics and the technical skills individuals should exhibit to become a successful coach for school-based improvement.

CEDU 218 Building Capacity to Lead Change 30 hrs.

This course aims to provide coaches with the strategies used to train school teams on the TAMAM eleven competencies. The course provides a deep explanation to the knowledge, skills, and attitudes of each of the TAMAM eleven competencies and presents tips for the coaches to guide them in training the school teams. The course also presents the available resources and coaching modules related to these competencies.

CEDU 219 The school Improvement Journey 30 hrs.

This course aims to provide coaches with the strategies used to train school teams on the TAMAM School Improvement Journey that school teams follow to design an improvement project. The course provides a deep explanation to each station of the TAMAM school improvement journey and presents the available resources and coaching modules related to these competencies. The course also presents tips for the coaches to guide them in training the school teams and highlights the major aspects and challenges that coaches should be aware of.

CEDU 220 Coaching Roles and Responsibilities 30 hrs.

This course aims at introducing the steps on the coaching journey that the coaches follow to design, monitor and implement the coaching plan. The course trains the coaches on how to collect data about the school and its team, how to analyze the collected data to identify the coaching needs, how to design the coaching plan based on needs, and how to plan for the teams' learning experiences. The course also trains the coaches on how to collect data about the team's progress to monitor and evaluate their work on the improvement journey, their acquisition of the TAMAM competencies, and their motivation to work on improvement. This course also discusses the coaches' role in coordinating with expert coaches who train and support the team in special topics and areas related to their improvement project. Throughout this course, the participants will be introduced to the training modules and resources available at TAMAM, in addition to the templates and tools that coaches, and the team members can use for data collection, analysis or documentation.

CECE 201 Trends in Early Childhood Education 30 hrs.

This course will lay the foundation for understanding the field of early childhood education. Topics cover the following key areas of professional knowledge: a history and theoretical foundation of early care and education, types of early childhood programs and settings, child growth and development, an overview of the profession, professional responsibilities and ethical conduct, and current trends and issues in ECE. This course provides a basic introduction to the nature of human growth and development as it occurs from conception through early childhood. Students learn about motor, cognitive, social, emotional, moral, aesthetic, and language development in early childhood. The course will lead its way to the importance of developmentally appropriate practices (DAP) in the field.

CECE 202 Developmentally Appropriate Practices in the EC classroom 30 hrs.

This course covers an overview of developmentally appropriate practices and standards in early childhood education programs. The course begins with students discussing the major

developmental stages, domains, and milestones of child development, while exploring the significant role and impact of play on the social, emotional, physical, and intellectual growth and development of young children. Using this strategy, students will become familiar with content of various subject matter areas (including math, science, social studies, language, art, music, movement, and outdoor play) to develop appropriate activities and foster optimal learning in preschool children.

CECE 203 Curriculum and Planning in Early Childhood Education 30 hrs.

This course focuses on curriculum development and teaching strategies with a developmentally appropriate approach in early childhood contexts. Students will understand where the curriculum comes from and what are the different types of planning. This course focuses on methods of planning developmentally appropriate curriculum for preschool age children. Topics include curriculum development, thematic planning, daily schedules, lesson planning, evaluation of curriculum effectiveness, and the role of the teacher in facilitating curriculum for preschool children.

CECE 204 Managing the Early Childhood Classroom 30 hrs.

This course will address age-appropriate behavior expectations for classrooms and ideas for supporting student learning. Different factors that play a role in classroom management will be explored in depth, bringing together all previous learning related to ECE. Motivation theory, positive reinforcement and behavior support plans will be covered. Major theories of behavior will be considered as they relate to educational settings.

CECN 101 Introduction to Economics 30 hrs.

This course is a survey of economic principles that include national income accounting and analysis, monetary and fiscal policies, and demand and supply analysis.

CECN 301 Money and Banking 30 hrs.

This course focuses on management of commercial banks, the structure of commercial banking, management of bank funds and the role of money in the economy.

CJRN 201 Media Law and Ethics 30 hrs.

This course addresses media ethics as globally understood and standardized. It engages with the most common ethical dilemmas that journalists and other media practitioners face in their career, in theory and practice. In addition, the course examines the basic legal guidelines that govern the media industry and the variations in these guidelines across different countries. The course aims to delineate the interrelation between ethics and law in the digital age. It addresses issues pertaining to freedom of expression, defamation, copyright violations, invasion of privacy, and violent media representations. The course also explores the social responsibilities of journalists and editors on multimedia platforms.

CFIN 101 Principles of Finance 30 hrs.

This course is an introduction to the field of financial management, including the institutional framework of finance, the role of finance in the business firm, financial analysis, planning and control, working capital management, cash budgeting, and elements of capital budgeting.

CFIN 301 Financial Statements Analysis 30 hrs.

This course focuses on the description and interpretation of reported and audited financial statements, limitations of company reports, analysis of financial ratios, examinations of professional practices regarding measurement and disclosure of financial information, and development of skills needed to read, analyze and evaluate financial statements. Prerequisite: CFIN 101.

CFIN 302 Investment Analysis 30 hrs.

This course focuses on the description and analysis of the sources of investment information, various investment vehicles, operations of security markets, trading environment, security valuation models, investment objectives, and modern techniques of investing in securities. Prerequisite: CFIN 101.

CFIN 303 Commercial Banking 30 hrs.

This course is an introduction to banking regulations, evolution of banking activities, description of banking accounts and lending practices, functions and operations of commercial banks, credit analysis, liquidity management, assets and liability management, profitability and adequacy measures. Prerequisite: CFIN 101.

CHMN 201 Principles and Standards of Humanitarianism 30 hrs.

This course gives an overview of the main principles of humanitarian action. In this course you will learn about the most important principles of aid work, participation, doing no harm, and accountability. Participants will be exposed to realistic scenarios and apply the principles to challenges they will face while assisting disaster-affected communities.

CHMN 202 Safety, Security and Staff Care 30 hrs.

This course introduces concepts, principles and explores the safety, security and staff care measures necessary for humanitarian workers to effectively perform their roles in insecure and unsafe environments.

CHMN 203 Humanitarian Programming 30 hrs.

This course builds knowledge for any learner who is proactive about developing the core competencies of disaster readiness and survival planning. In addition, it offers essential preparation for a variety of emergency situations and inconveniences that might be encountered. Participants will also be introduced to the disaster cycle, specifically the mitigation and recovery phases, and will create an extensive personal preparedness plan for survival in the absence of common amenities, such as food and water, shelter, and communication.

CHMN 204 Humanitarian Leadership and Operations 30 hrs.

This course builds knowledge of humanitarian practices, fundamental principles and aspects of delivering aid and promoting human welfare in the context of humanitarian relief and development.

CHRM 101 Overview of Human Resource Management 30 hrs.

This course introduces the main concepts of managing human resources in organizations, discusses the various roles that HRM departments play and demonstrates how HR policies and practices help support the business strategy. Topics include the strategic role of HRM, job analysis and personnel planning, recruitment and selection, training and development, performance management, compensation and retention as well as the ethical aspect of HRM.

CHRM 201 Workforce Planning and Staffing 30 hrs.

This course explores how organizations plan for changes in their workforce, create recruitment strategies, and develop selection systems to identify the best talent for their businesses. It encompasses planning for, establishing, and maintaining a quality work force; identifying critical specifications for filling positions; recruiting a pool of talent; developing methods for selecting from the talent pool; and creating desirable person/job and organization fit.

CHRM 202 Total Compensation and Benefits 30 hrs.

This course conveys applied knowledge about compensation systems for aspiring HR professionals. The course objective is to provide a solid understanding of the art of compensation practice and its role in promoting companies' competitive advantages. It is assumed that students will be best prepared to assume the role of competent compensation strategist if they possess a solid understanding of compensation practices. Thus, we will examine the context of compensation practice, the criteria used to compensate employees, compensation system design issues, employee benefits, and contemporary challenges that compensation professionals will face well into the 21st century.

CHRM 203 Employee Training and Development 30 hrs.

Rapid changes in technology and job design, along with the increasing importance of learning- and knowledge-based organizations make training and development an increasingly important topic in human resources development. In this course, the student will learn how to identify training and development needs through needs assessments, analyze jobs and tasks to determine training and development objectives, create appropriate training objectives, design effective training and development programs using different techniques or methods, implement a variety of different training and development activities, and evaluate training and development programs.

CHRM 301 Managing Human Behavior in Organizations 30 hrs.

This course introduces students to many of the basic principles of human behavior that effective managers use when managing individuals and groups in organizations. These include theories relating to individual differences in abilities and attitudes, attribution, motivation, group dynamics, power and politics, leadership, conflict resolution, organizational culture, and organizational structure and design.

CHRM 302 Managing the Employment Relationship: HRM, Society and the Law 30 hrs.

The purpose of this course is to increase student's knowledge of legislation and practices related to employment and labor law in the work environment and to provide an introduction to the basic elements of the relationship between employers and their employees. This course provides an overview of legal issues affecting human resources management. It focuses on the impact of law on individuals in organizations, recognition of legal problems, and the legal impact of human resources decisions. It also integrates employment and labor laws with social and economic forces shaping the current diverse management-labor environment.

CHRM 401 Strategic Management 30 hrs.

This course highlights the systematic approach that companies use to plan, develop, execute and evaluate the functional decisions that will enable them to achieve their long-term goals. It focuses on the process of delimiting the company's mission, vision, strategies and corporate goals as well as developing the internal plans, policies and procedures to successfully accomplish all projects and programs. Throughout this course, students will learn how to understand the competitors'

positioning, set clear goals and review the business strategies in order to better cope with various changing factors (i.e. political, economic, social, technological, environmental and legal) which may directly and indirectly impact the company's overall performance and business operations. The course will also address the SWOT concept and how to align all divisional/departmental/unit goals to a well-defined business mission and vision, and tackle McKinsey 7S model and how to strategically manage the company's overall assets and business operations including monitoring of business results, benchmarking, evaluating the efficacy and efficiency of the processes, controlling factors and dealing with change.

CHRM 402 Advanced Topics in Human Capital Management 30 hrs.

This course is designed to give the student insights into contemporary and future HRM issues. It addresses leading-edge human resource management theories and practices in terms of their ability to have a positive impact on organizational results and encourage desired employee attitudes and behaviors. This course will help the student understand the diverse aspects of HRM, while providing knowledge of the tools and techniques of the modern Human Resource Manager. Main topics cover the importance of managing intangible assets, knowledge management and learning organizations, flexibility, empowerment and ethics.

CINR 101 Basic Skills for Interior Design 42 hrs.

This course teaches the student to develop skills and techniques in order to visualize interior design ideas; develop critical thinking and creativity in relation to space, with the ability to draw sketches and learn survey of sites; and read existing structures, scaled plans, elevations and sections with a hint of presentations, renderings and knowledge of volume and proportions. Students explore the fundamentals of interior construction.

CINR 102 Elements and History of Design Styles 42 hrs.

This course introduces the elements that affect the interior spaces, focusing on color and its implications, fundamentals of lighting design and major finish materials. Students will explore furniture styles from renaissance till modern era, with special consideration given to the cultural, social, and political contexts in which they were designed and used. Site visits to galleries, art spaces and showrooms will be organized. Prerequisite: CINR 101.

CINR 103 Drawing and Rendering for Interior Spaces 42 hrs.

This course concentrates on hand drawing and introduces rendering materials, methods, techniques, shades and shadows. Students will use mixed media to learn color theory. They will also learn the mechanical skills needed to visually communicate spatial concepts and develop floor plans into three-dimensional interiors by exploring the principles of isometric views and one point perspective drawing.

CINR 201 AutoCAD for Interior Designers 42 hrs.

Using a combination of lecture, demonstration and hands-on exercises, this course will introduce the basic tools necessary to translate drafting skills into a digital format. It will focus on the concepts and the use of key commands of AutoCAD, the leading drafting software for the construction and design industry, required to draw and print 2D engineering drawings. Prerequisite: CINR 101.

CINR 202 Practice of Interior Design 42 hrs.

The course will enhance students' problem-solving capabilities, technical drawing and analytical skills. Students will develop a professional and creative approach to design by presenting a complete residential project. Prerequisites: CINR 102 and CINR 201.

CINR 203 Technical Detailing and Execution Drawing 42 hrs.

The course concentrates on presentation techniques, survey, construction and detailing. Taking a specific area of the residential project (bathroom, kitchen), students will explore and learn construction methods, appropriate use of materials and how to detail joints and junctions. The studio project work is supported by a series of lectures on materials with visits to showrooms and suppliers to develop awareness of current ranges, materials and finishes. Prerequisites: CINR 102 and CINR 201.

CINR 301 Advanced Interior Architecture Project 42 hrs.

This course deals with large scale projects, public and commercial. Students will be involved in researching the influence of human factors and design standards to analyze existing spaces and propose creative design solutions that will satisfy the new project requirements. Prerequisites: CINR 202 and CINR 203.

CINR 302 Supervised Research Project 42hrs.

This course develops the research skills of the student in undertaking a supervised project from concept to readiness for execution. Emphasis is on methodology, structuring of ideas and final presentation of a complete rendered project. Prerequisite: CINR 301.

CJRN 201 Media Law and Ethics 30 hrs.

This course addresses media ethics as globally understood and standardized. It engages with the most common ethical dilemmas that journalists and other media practitioners face in their career, in theory and practice. In addition, the course examines the basic legal guidelines that govern the media industry and the variations in these guidelines across different countries. The course aims to delineate the interrelation between ethics and law in the digital age. It addresses issues pertaining to freedom of expression, defamation, copyright violations, invasion of privacy, and violent media representations. The course also explores the social responsibilities of journalists and editors on multimedia platforms.

CJRN 202 Investigative Journalism 30 hrs.

This course focuses on the principles, skills and tools required to complete investigative reports. Participants review examples of investigative pieces, learn the history of investigative reporting and its role in society, study various investigative techniques, and develop familiarity with online and offline sources. By the end of the course, participants will get a solid overview of fact-checking and learn about the various ways of telling/writing stories. The course is largely hands-on, with multiple investigative exercises included.

CJRN 203 Mobile Reporting 30 hrs.

This course aims to familiarize participants with the means of producing journalistic stories on mobile devices. It focuses on flexible, fast and cost-effective methods of generating media content and preparing it for publication. The intensive course is divided into two workshops, each extending over 3-4 days and separated by 2 weeks. The course is meant to highlight the possibilities presented by mobile reporting, the most important user-friendly platforms, programs and applications, in addition to the basics of shooting and editing videos using smartphones.

CJRN 204 Multimedia Journalism 30 hrs.

This course explores the emerging opportunities and challenges in the current digital age in terms

of generating data, crosschecking, networking with sources, creating and arranging audiovisual material, and expanding outreach. The course highlights the differences between reporting to TV, radio, and online outlets. It also examines the challenges of adapting to new media technologies and of diversifying the forms of engagement depending on the context and the target audience. Moreover, it highlights the distinction between digital storytelling and other forms of reporting.

CLCE 110 Daily Living Skills I 48 hrs

Students are introduced to the program learning how to give the right information about themselves and their families. They will later focus on selecting and managing a household and consider space, location, and budget while searching for a house. They will be able to identify types of houses and the advantages and the disadvantages of these different types of houses. They will also learn the difference between renting and buying a house and decide what exactly they need. Later in the semester, students will identify the basic furniture, tools and appliances needed for a specific house by sorting out what is essential and what is luxurious. They will also learn the basic cleaning and maintenance activities one needs for a house.

CLCE 111 Daily Living Skills II 48 hrs

In this course, Students will learn about caring for personal needs. They will be able to obtain, interpret, and understand health information. Students will also gain knowledge of common illness, prevention and treatment by general understanding of medical problems, medicine and their use. Students will also learn about the importance of hygiene and how cleanliness is very related to health. Later in the semester, they will build on their knowledge about the importance of dressing up appropriately according to a certain occasion and a specific place the students are going to. By the end of the semester, they will be able to know how to take care of their personal needs as well as obtaining health measures like healthy diet, exercise and stress reduction.

CLCE 112 Self Determination and Interpersonal Skills I 48 hrs

This course helps the students to work on their social and emotional well-being. In this course, the students learn about personal traits and identify personal needs. They identify personal roles and the responsibilities that each role has. The students also learn and demonstrate listening and responding skills as well as the different social behaviors needed in different situations in a society.

CLCE 113 Self Determination and Interpersonal Skills II 48 hrs

This course is a continuation of CLCE 112. It will focus on teaching additional everyday expressions, phrases, and terms that are typically used in business, social, and community settings. Emphasis will be placed on making good decisions, with regards to a variety of personal and social topics, as well as learning more about oneself and the world in which we live. Social, emotional, self-regulation, executive function, and adaptive skills will continue to be embedded in the curriculum/lessons, which will continue to be taught in lecture/small group/whole group formats, and which will include many hands-on and out of class activities.

CLCE 114 Functional Math I 48 hrs

This course focuses on teaching basic math skills that are needed for everyday life. The course covers basic counting and computation skills (in both English and Arabic), reading and writing numbers up to million, ordering & comparing numbers, as well as problem solving. It focuses on practical use such as in calculators, basic measurement, capacity, weight, temperature, shapes and patterns.

CLCE 115 Functional Math II 48 hrs

This course will elaborate on the skills learned in Functional Math I. It will focus on the concepts related to operations as well as problem solving. It will also focus on the practical use of numbers, as well as measurement of distances, weight, volume, temperature and time. Money operations related to handling money when making a purchase, knowing how much to pay, and how much to expect in change, when paying with cash or a credit or debit card.

CLCE 116 Computer Skills I 48 hrs

This course focuses on teaching basic computer skills needed to log in, send emails and attachments, and save files. The course also covers all the techniques needed to participate in online learning.

CLCE 117 Computer Skills II 48 hrs

Students will continue to develop important computer literacy skills that will allow them to navigate the web, conduct successful web searches, and send email messages.

CLCE 118 Employment Skills I 48 hrs

Students in this employment course will know and explore occupational possibilities. They will identify personal and social values met at work. Furthermore, students will learn to follow directions and observe regulations.

CLCE 119 Employment Skills II 48 hrs

During this employment course, students will classify jobs into categories and investigate local employment and training opportunities. They will learn the importance of punctuality and attendance at work.

CLCE 200 Daily Living Skills III 48 hrs

In this course, students will work on understanding relationship roles and changes with friends and others. They will also gain knowledge about reasons for establishing relationships and will learn more about joint responsibilities between family, friends and colleagues and work.

CLCE 201 Daily Living Skills IV 48 hrs

In this course, students will learn about buying, preparing, and consuming food. They will be able to plan a balanced diet. Moreover, students will learn how to store food and how to clean food preparing areas properly. This way, they will be identifying and demonstrating all the proper cleaning procedures needed in the kitchen. Later in the semester, students will learn about proper ways of dealing with cloths such as cleaning, ironing, mending, and storing cloths.

CLCE 202 Self Determination & Interpersonal Skills III 48 hrs

In this course, the students will explore their social and emotional preferences and understand the difference between personal needs and personal preferences. They will identify the communication skills necessary to become self-determined and learn to voice their personal needs. The students will explore the aspects of making and maintaining friendships and the rights and responsibilities that each individual in a friendship holds. They will learn to identify, demonstrate, and respond to praise. The course finishes by recognizing authority figures and learning how to follow written and verbal instructions.

CLCE 203 Self Determination & Interpersonal Skills IV 48 hrs

During this term, they will learn to identify and demonstrate ways that goal setting and attainment affect one's life, identify potential goals and outcomes and determine plan of action. They will identify and describe areas of self-motivation and its effects on attaining present and future goals. They will complete the course by recognizing nonverbal means of communication as well as verbal expressions that are consistent with their feelings. Later in the semester, students will learn about how to be a good problem solver by being able to identify through a certain situation, the problem, the cause, the consequences and the solution. They will also be able to critically think what could have been done to avoid this specific problem.

CLCE 206 Computer and Expressive Arts III 48 hrs

Students will learn basic computer skills that are needed for everyday functioning. These skills will include learning how to send email messages and navigate the World Wide Web. Basic Microsoft Word will also be introduced. During Art Therapy Class, students will learn how to express themselves through various forms of art. Embedded in the Dance and Body Movement Class are activities that involve social, emotional, self-regulation, executive function and adaptive skills.

CLCE 207 Computer and Expressive Arts IV 48 hrs

Students will practice their typing skills and learn to insert a relevant picture to the typed text. In Art class, students will work on their art work and prepare what is needed to be exposed for the art exhibition at the end of the semester.

CLCE 208 Functional Math III 48 hrs

This course will teach the students how to make responsible expenditures by identifying prices on labels and tags of merchandise and choosing the most economical buy among like items of a similar quality. Students will also learn to identify purchases as necessities or luxuries in the areas of food, clothing, housing, and transportation. Students will visit different sale points and compare prices to determine the amount of money saved by buying sale items.

CLCE 209 Functional Math IV 48 hrs

In this course, the students will learn to develop basic financial records. They will learn to construct a monthly personal budget for a specific income, identify financial information and financial records that should be retained.

CLCE 210 Employment Skills III 48 hrs

In this course, students will have to identify personal and societal values met through work. They will also learn about the remunerative aspects of work. Students will learn to explore occupational possibilities by locating sources of employment and training information, classifying jobs into employment categories, and investigating different employment opportunities. Students will explore jobs and different career paths through field trips and on-site training.

CLCE 211 Employment Skills IV 48 hrs

In this course, students will learn to investigate and identify major employment interests as well as employment aptitudes. They will also investigate employment choices and identify the requirements needed for a desired available employment job. Students will learn to identify the needs that can be met through one's occupation and rank them in order of personal preference.

CLCE 300 Daily Living Skills V 48 hrs

In this course, students will learn about the importance of safety in the community. They will be able to identify the proper safety rules they should follow at home, work, and in the community as a whole. Furthermore, they will learn how to respond to emergency situations. They will also learn how to secure one's home when at home and away from home using the proper safety practices.

CLCE 301 Daily Living Skills VI 48 hrs

In this course, students will learn what is abuse and harassment. They will also be exposed to several situations from which they will learn about the different types of abuse and harassment. Students will learn how to deal with each situation and when and how to ask for help. Furthermore, they will learn about the importance of reporting a certain incident which they have been exposed to.

CLCE 302 Self Determination & Interpersonal Skills V 48 hrs

Students will demonstrate awareness of how their behavior affects others and how others perceive them. They will learn how to read nonverbal cues and learn to communicate assertively and effectively in different situations. They will also learn how to respond to emergencies. They will learn to examine the emergency and the steps in first-aid process. They will learn which authority to contact in a given emergency.

CLCE 303 Self Determination & Interpersonal Skills VI 48 hrs

In this course, students will learn to develop and demonstrate appropriate behaviors and anticipate the consequences of choices and behaviors they make. They will revise the aspects of setting goals. They will develop and plan goals and try to attain them. They will learn to self-evaluate and provide feedback by developing and evaluating alternative options. They will understand the motivation of others in the decision-making process. They will learn how to establish and maintain close relationships. They will identify whom they can establish close relationships with and learn about the roles and responsibilities of the individuals in the relationship.

CLCE 306 Computer and Expressive Arts V 48 hrs

Students will learn computer skills that are needed for everyday functioning. These skills will include learning how to send email messages and navigate the World Wide Web. Basic Microsoft Word will also be introduced. Also, students will learn how to express themselves through various forms of Art and Dance movements.

CLCE 307 Computer and Expressive Arts VI 48 hrs

During computer class, students will learn how to research, copy paste information, save images, and create PowerPoint presentations. In expressive arts classes, students will learn how to express themselves through various forms of art and dance movement. This will include painting, drawing, role-playing, and participating in showing movements that reflect their emotions. Embedded in the activities are social, emotional, self-regulation, executive function and adaptive skills that are needed to function well in society. In dance classes, students will be trained on specific dance moves to be presented a show at the end of the semester.

CLCE 308 Functional Math V 48 hrs

In this course, students will continue to learn to develop basic financial records. They will learn to apply what they have learned in the previous course. They should be able to record personal major income and expenses for one month. They will also learn to calculate balances of major debts.

CLCE 309 Functional Math VI 48 hrs

Students will develop an understanding of place value and will be able to count by 5's 10's and 2's. They will also be learning how to sort and group items. Moreover, they will be able to compare numbers from smaller to greater and vice versa. Furthermore, students will be focusing on addition and subtraction problem solving by underlining the given, the required, and the keywords in a problem that help them decide whether it's an addition or subtraction math problem. By the end of the term, they will be able to read a bill and decide if the money they have is enough or not to pay the bill and how much less or more they have in relation to the number on the bill.

CLCE 310 Employment Skills V 48 hrs

In Employment classes, students will identify personal and societal values met through work. They will also learn how to exhibit the appropriate employment skills needed to be a successful and productive employee. Through internships at workplace experiences, students will be able to learn how important it's to follow directions, observe regulations, and be punctual to work. They will investigate the local employment and training opportunities and start to know more about them through their internship hours.

CLCE 311 Employment Skills VI 48 hrs

During employment, students will also learn how to exhibit appropriate employment skills while working with others. They will learn how to develop appropriate employment skills such as being punctual, following directions, dressing properly, respecting peers at work and applying the proper hygiene. Through internships at workplaces students will be practicing all what they learn in class and will be able to investigate choices and identify the desired and available employment.

CLDS 100 Introduction to Leadership Skills 30 hrs.

This course provides the participants with the basic knowledge and skills needed for a successful leader and helps them understand their role in developing their leadership skills as well as the skills of their colleagues. The main topics include characteristic of a successful leader, setting objectives, communication and listening skills, teamwork and group dynamics, and the importance of planning, evaluating and follow up.

CLDS 202 Emotional Intelligence in Leadership and Management 30 hrs.

The main objectives of this course are to help the participants assess their current leadership skills, analyze their strengths and weaknesses, and understand the role of emotional intelligence in leadership and management. The main topics include SWOT analysis, brain science and emotional intelligence, basic foundations of emotional intelligence, positive and negative emotions, and the importance of emotional intelligence in planning for development and change.

CLDS 203 Understanding Oneself Understanding Others 30 hrs.

The main objectives of this course are to introduce the participants to emotional and behavioral styles and help them discover their strengths and weakness based on their behavioral style. The main topics include understanding oneself, understanding and accepting others, understanding stress and time control problems, planning for stress and time management, and the importance of emotional intelligence and mindfulness in understanding self and others.

CLDS 204 Leading Oneself Leading Others 30 hrs.

The main objectives of this course are to introduce participants to the essential skills needed for

a successful leader in leading themselves and leading others and assist them in creating plans to develop their skills in leading themselves and in leading others. Main topics include: emotional Intelligence, mindfulness, strategic planning, problem solving, conflict management, change management, counseling, empowerment, delegation, and the role of the leader in training others.

CLDS 205 Training of Trainers on Elementary Leadership Skills 30 hrs.

The main objectives of this course are to introduce participants to the essential skills needed for a successful Trainer, and to help them plan, implement and evaluate one training course on Elementary Leadership Skills. Main topics include characteristics of a successful training program, research methods for training needs assessment, structure of a training program, managing training problems, Characteristics of a successful trainer, and importance of leadership training in development.

CMAD 200 Developing Hybrid Mobile Apps with PhoneGap 30 hrs.

This course is designed to get students started with PhoneGap by teaching them the basics of creating a PhoneGap application. In this course, students will develop a PhoneGap application using the Windows Phone 7 tools and JQuery Mobile. You will also learn how to use some of the PhoneGap native APIs to access the native libraries of various mobile platforms. Finally, students will learn how to use PhoneGap Build to build an application for iOS, Android and more! Prerequisites: Developing Single Page Applications with AngularJS.

CMAD 201 Developing Android Apps 30 hrs.

This course is designed to get students started with Android development. During the course, students will define, design and scope Android apps for mobiles and tablets. Students will draw and analyze story boards and refine the user experience. The course will allow students to develop Android apps of simple to medium complexity with the ability to connect to the cloud. Prerequisites: Developing Windows Azure and Web Services OR Developing ASP.NET MVC Web Applications OR Developing PHP Web Applications OR Developing Node.js Applications.

CMAD 202 Developing iOS Apps 30 hrs.

This course is designed to get students started with iOS development. During the course, students will define, design and scope iOS apps for mobiles and tablets. Students will draw and analyze story boards and refine the user experience. The course will allow students to develop iOS apps of simple to medium complexity with the ability to connect to the cloud. Prerequisites: Developing Windows Azure and Web Services OR Developing ASP.NET MVC Web Applications OR Developing PHP Web Applications OR Developing Node.js Applications.

CMAD 203 Developing Windows Phone Apps 30 hrs.

This course is designed to get students started with Windows Phone apps development. During the course, students will define, design and scope WP apps for mobiles and tablets. Students will draw and analyze story boards and refine the user experience. The course will allow students to develop WP apps of simple to medium complexity with the ability to connect to the cloud. Prerequisites: Developing Windows Azure and Web Services OR Developing ASP.NET MVC Web Applications OR Developing PHP Web Applications OR Developing Node.js Applications.

CMGT 101 Principles of Management 30 hrs.

This course focuses on the functions of management: planning, organizing, staffing, directing, and control.

CMKT 101 Principles of Marketing 30 hrs.

This course is an overview of the scope of the marketing function and the environment affecting marketing managers. Topics covered include the marketing environment and planning and developing of the marketing mix.

CMKT 202 Marketing Research 30 hrs.

This course covers the entire research process: problem definition, data collection methods, sample design, collection of data, tabulation and analysis, and presentation of results.

CMKT 301 Marketing Communications and Advertising 30 hrs.

This course is an overview of promotion management and integrated marketing communications. Topics covered include behavioral foundations of marketing communications, environmental influences on marketing communications, and the promotion management process and its execution.

CMKT 302 Sales Management 30 hrs.

This course focuses on the activities of first-line field sales managers. It covers sales management functions and strategies, developing the selling function, sales goals and structure, building a sales program, and leading and motivating the sales force.

CMKT 401 Services Marketing 30 hrs.

This course is an overview of the process of marketing services. It includes a study of the characteristics of services and their marketing implications, developing marketing strategies, creating value, pricing, and promoting the service performance, and ensuring a positive customer experience.

CMKT 402 Public Relations 30 hrs.

This course focuses on the communication between an individual or organization and the public to promote stakeholder acceptance and approval. Students explore traditional and emerging components of the public relations process through mass media as well as the needs of different types of businesses, such as corporations, non-profit organizations, and governmental offices.

CMKT 403 Consumer Behavior 30 hrs.

This course focuses on the customer as the key to market success. Topics covered include the roles of a customer, market values a customer seeks, determinants of customer behavior, the customer's mind-set, customer decision-making, and customer-focused marketing.

CMKT 404 International Marketing 30 hrs.

This course is an overview of the scope and challenge of international marketing. Topics covered include the cultural environment of global markets, assessing global market opportunities, and developing and implementing global marketing strategies.

CMUS 103 V Theory and Practice of Voice I 30 hrs.

This course introduces students to western voice technique and its application to the near eastern singing, vocalizing on the Equal Tempered scale and Oriental maqams, starting with the maqams: Nahawand, Ajam, and Kurd and learning repertoire from the vocal music heritage of Egypt and the Mashriq based on those maqams, focusing also on the clear Arabic articulation.

CMUS 104 V Theory and Practice of Voice II 30 hrs.

A continuation of CMUS 103 V, this course focuses on the theory and voice technique of Oriental maqams based on Hijaz: Hijaz, Zanjaran, and Hijaz Kar, Shadd Araban and Shahnaz. The course uses repertoire from the vocal music heritage of Egypt and the Mashriq.

CMUS 106 I Oriental Music Instrument: Theory and Practice I 30 hrs.

This course is the first in the series of courses intended to train students to practice an instrument for Oriental Music. It focuses on the technical foundations of playing that instrument and introduces the main Oriental maqams, exercising on each maqam and getting acquainted with the different forms of instrumental music compositions, such as Wasla and Doulab.

CMUS 107 I Oriental Music Instrument: Theory and Practice II 30 hrs.

This course is a continuation of CMUS 106 I. The course focuses on exercising maqams based on Hijaz: Hijaz, Zanjaran, and Hijaz Kar, Shadd Araban and Shahnaz. Students are introduced to two more forms of Oriental vocal compositions such as: Muwashah and Qad and the instrumental music composition the Maqtou'a Mousiqiyya.

CMUS 201 V Voice for Oriental Singing: Theory and Practice I 30 hrs.

This course focuses on the voice techniques and the vocalizing of quarter tones and the maqams: Rast and the maqams derived from Rast, like: Suznak and Nairuz. The course uses repertoire from the vocal music heritage of Egypt and the Mashriq.

CMUS 202 V Voice for Oriental Singing: Theory and Practice II 30 hrs.

This course focuses on voice technique using quarter tones and on the following maqams: Bayati, Siga, Raht el Arwah and Siga Baladi. The course uses repertoire from the vocal music heritage of Egypt and the Mashriq.

CMUS 203 I Oriental Music Instrument: Theory and Practice III 30 hrs.

This course is a continuation of CMUS 107 I. It focuses on exercising on maqams based on Kurd, Rast and the derived maqams from Rast, like: Suznak and Nairuz. Students are introduced to two more forms of Oriental music compositions: Samai, Bashraf & Taqsim.

CMUS 204 I Oriental Music Instrument: Theory and Practice IV 30 hrs.

This course is a continuation of CMUS 203 I. It focuses here on exercising Bayati, Siga, Raht el Arwah and Siga Baladi and again learning repertoire from the vocal music heritage of Egypt and the Mashriq. In this course, students are introduced to different forms: Tahmila, Longa & Taqsim.

CMUS 300 I Oriental Orchestral Performing 30hrs

This course represents the transitional phase that leads the musicians from the individual play to learning the principles of collective musical performance involving a variety of melodic and percussive instruments. Its aim is to prepare students for comprehensive orchestral teamwork

development by learning synchronization techniques and harmony with all other musicians in the ensemble. Throughout the course, students will acquire further interpretation methodology. The curriculum includes selected easy musical pieces from the Lebanese and Arab folkloric cultural heritage, taking into consideration both rhythmic and aspects of Modes (Maqamat).

CMUS 301 V Voice for Oriental Music: Theory and Practice III 30 hrs.

In this course, students are introduced to two music forms: The Muwashah and the Qad and sing the ensemble set repertoire with all students.

CMUS 302 V Voice for Oriental Music: Theory and Practice IV 30 hrs.

This course is a continuation of CMUS 301 V. In this course, students are introduced to two music forms: The Mawwal and the Taqtouqa going through all studied maqams and sing the ensemble set repertoire for a final year concert that includes a solo performance, and learn the basics of stage etiquette.

CMUS 303 I Oriental Music Instrument: Theory and Practice V 30 hrs.

In this course, students are introduced to two music forms: The Qasida and the Dawr and sing the ensemble set repertoire with all students.

CMUS 304 I Oriental Music Instrument: Theory and Practice VI 30 hrs.

In this course, students focus on the ensemble set repertoire for a final year concert that includes a solo performance, and learn the basics of stage etiquette.

CMUS 305 Oriental Music Ensemble Practice I 30 hrs.

In this course, performers from all different instruments meet for an ensemble rehearsal preparing for a certain repertoire under the supervision of a conductor. The repertoire includes instrumental pieces and vocal pieces. Ensemble practice includes all-group rehearsals or a duet or a trio or a quartet rehearsal with or without a singer.

CMUS 306 Oriental Music Ensemble Practice II 30 hrs.

This course is a continuation of Music Ensemble Practice I. The program is set in the beginning of the semester towards a concert.

CNRS 201 Leading Quality Initiatives at the Bedside 30 hrs.

This course prepares direct-care nurses to be involved in quality initiatives and take the lead in transforming care at the bedside.

CNRS 301 Foundations of Leadership and Management in Nursing 30 hrs.

This course focuses on the requisites and foundations of successful and effective leadership and management. The topics that will be discussed include problem solving, decision-making, critical thinking, communication, ethical issues, and emotional intelligence.

CNRS 302 Leading Towards Effective Patient Care Management 30 hrs.

This course focuses on various leadership skills. Organizational structure, strategic and operational planning, time management, staffing, conflict management, delegation, and performance appraisal will be discussed.

CNRS 303 Managing Quality Improvement 30 hrs.

In this course, students will be provided with the basic concepts and tools necessary to manage quality improvement. Topics include quality management and utilization, accreditation and risk management, patients relations and patients satisfaction as quality indicator, development of policies and procedures, human resource management, and evidence based nursing management.

CNRS 304 Advanced Management Practice 30 hrs.

This is an advanced short course that concentrates on the following major areas: development of policies and procedures, human resource management, and evidence-based nursing management.

CNRS 305 Practicum 60 hrs.

The practicum is divided into clinical rotation with hands on or observation depending on whether the participants are Lebanese or not. Other rotations would be to Human Resources department, patient relation department, quality, and risk management office, and nursing office for observation. This course includes a project writing related to improvement initiative or clinical problem.

CNRS 306 Data, Information and Knowledge 30 hrs.

This course focuses on the nature of data, the concepts of information and knowledge, principles of relational database systems, operations, information systems, data sets, data standards and classification systems. During the course, students will be able to gain knowledge about developing a database.

CNRS 307 Informatics and the Health Care Delivery System 45 hrs.

This course is designed to introduce students to the field of health care informatics. It focuses on the history of health care informatics, basic informatics concepts and health information management applications. During the course, students will discuss and compare information management applications related to administration, education, practice, and research.

CNRS 308 System Lifecycle 45 hrs.

This course focuses on a structured approach to the selection and implementation of an information system. The course includes four sections corresponding to the five phases of the life cycle: planning, analysis, design, implementation, and evaluation.

CNRS 309 Issues in Health Care Informatics 30 hrs.

This course is designed to encourage students to engage in a dialogue among themselves and with experts in the field of health care and health care informatics in order to come to some understanding of current issues. Using a single broad case study, students view the issues engendered by the case through the many-colored lenses of ethics, politics, society, and law.

CNRS 310 Data Standards, Terminologies and Implications for Practice 30 hrs.

This course focuses on Knowledge Representation: data standards, terminologies, and their implications for practice. The terminologies component provides an overview for nursing and

other health care terminologies in use. The data component describes the functions of data standards and implications for informatics as well as professional practices.

CNRS 311 Introduction to Community Health Nursing 45 hrs.

This course is designed to introduce students to theories of nursing and principles underlying current community health nursing practice, public health, and primary health care. The focus of care is on clients who may be represented as individuals, families, and small groups or larger aggregates and community.

CNRS 312 Practicum I: Application of Theories and Concepts 90 hrs.

The practicum course provides students with field practice experiences through collaboration with other health professionals in primary health care settings, clients' homes and schools. The focus of interventions is health promotion, health maintenance, and the prevention of illness and disability.

CNRS 313 Advanced Concepts and Issues Relevant to Community/ Public Health Nursing 45 hrs.

This course addresses advanced concepts and issues relevant to community/public health nursing. Students are provided with advanced knowledge and skills in population, family and individual needs assessment. Areas of focus include health promotion, health education, and management of chronic diseases.

CNRS 314 Practicum II: Planning and Evaluation of Community Based Interventions 90 hrs.

This course provides field experiences designed to enhance collaborating with interdisciplinary team members in planning, organizing, delivering, and evaluating population-focused programs to achieve health goals, including health promotion and disease prevention activities.

CNRS 315 Fundamental of Critical Care Nursing 30 hrs.

This course gives an overview of critical care nursing: critical care environment, relationship with patient and family, end-of-life care, infection control and safety, communication and documentation. It also focuses on dysrhythmia interpretation, ECG interpretation, hemodynamic monitoring, and ventilatory assistance.

CNR 316 Nursing Care Management of the Critically Ill Adult 30 hrs.

This course aims at enhancing the participants' know-how in cases of shock, cardiac alterations, nervous system alterations, acute respiratory failure, and acute renal failure.

CNRS 317 Nursing Management of Acute Medical and Surgical Emergencies 30 hrs.

This course aims at enhancing the participants' know how in cases of hematological and immune disorders, gastrointestinal alterations, endocrine alterations, trauma, and burns.

CNRS 318 Practicum I: Critical Care Nursing: Assessment and Evaluation 60 hrs.

This course provides field experiences designed to enhance collaborating with interdisciplinary team members in assessing and evaluating population-focused programs to achieve health goals, including health promotion and disease prevention activities.

CNRS 319 Practicum II: Critical Care Nursing: Management 100 hrs.

This course provides field experiences designed to enhance collaborating with interdisciplinary team members in managing population-focused programs to achieve health goals, including health promotion and disease prevention activities.

CNRS 320 Practicum III: Code Management 30 hrs.

This course provides field experiences designed to enhance collaborating with interdisciplinary team members in code management.

CPHM 200 Team Leading 42 hrs.

Team Leading.

CPRM 102 Emotional Intelligence and Project Leadership 30 hrs.

This interactive course is designed to provide a solid foundation in key leadership competencies and to afford students the opportunity for a truly transformational leadership experience. Students will complete a self-assessment of their project leadership skills, then master the basics of essential leadership competencies such as setting direction, aligning people, motivating and inspiring, leading teams, communicating, building relationships, facilitating ethical conduct, negotiating and leading change. Students will also gain a clear understanding of why communication is so important regardless of how a project is organized then discover how business and personal ethics can influence not only their leadership style but also the final course a project will take.

CPRM 103 Project Schedule Management 30 hrs.

Delivering a project within the promised time frame & scope and allocated budget is primordial for organizational success. Whether students are delivering a high-rise building, a new piece of software, a power plant, or a nuclear submarine, all projects require constant monitoring and controlling to meet their objectives on time and within budget. This course applies a variety of techniques to balance the competing demands of scope, schedule, and cost. It uses project management best practices to apply the latest scheduling tools and techniques. Students will learn how to establish the performance measurement baseline (PMB) and gain proficiency in modern tools and proven techniques used to compare actual work accomplished against established plans. In addition, they will learn how to plan project scope based on stakeholder budget and schedule constraints.

CPRM 104 Project Stakeholder Engagement and Management 30 hrs.

This course allows students to create healthy partnerships with their stakeholders and build a win-win environment for their business. In this course, they will learn how to manage their stakeholders efficiently with savvy communication strategies that increase engagement during project execution. Students will learn how to analyze stakeholders, map power structures, keep open lines of communication, and use interpersonal skills to connect. This course highlights the importance of stakeholder engagement, collaboration, and communication during project planning and development. It discusses the role of stakeholders and how the project leader must encourage active involvement to ensure the team has a clear understanding of the project requirements and stakeholder expectations. Also addressed are common tools used for knowledge sharing throughout the course of the project, which is essential to deliver value and keep everyone informed on the status of the project.

CPRM 202 Project Leadership and Communication 30 hrs.

This course will help project managers become better team leaders by sharpening their skills and improving their knowledge in key areas of communication, motivation, expectation setting and problem solving. Participants will be equipped with practical knowledge, skills, and tools that empower them to effectively lead projects.

CPRM 203 Project Scheduling and Control Tools 30 hrs.

Project Planning and Control is highly important in organizations. This course involves an in-depth coverage of project planning and control tools used in managing and delivering projects. The topics covered in this course are project scheduling basics and models as well as project monitoring and control tools.

CPRM 204 Project Stakeholder Management 30 hrs.

Upon completion of this course, the project manager would have learnt the tactics and tools to properly identify, categorize and prioritize stakeholders, manage stakeholders in a real and virtual world, and have a grasp of the leadership and negotiation skill sets required to manage difficult stakeholders in complex projects.

CPRM 205 Green Project Management and Sustainable Construction 30 hrs.

This course covers principles of sustainable design and construction, including life-cycle assessment, economic and environmental impacts, carbon footprint, and green building rating systems, such as LEED and BREEAM.

CPRM 216 Project Risk Analysis and Mitigation 30 hrs.

Risk is a given in any project, and the better attendees understand how to identify and prepare for it, the more likely they are to minimize their exposure to it. In this course, students will practice a systems approach and explore tools and techniques for identifying, analyzing, planning, and controlling risk. They will use both qualitative and quantitative methods to identify risk and discuss appropriate risk response strategies. They will also learn how to incorporate their risk management analysis into the overall project plan and offer alternatives to their project sponsors and decision makers when contingencies arise, and scheduled completion dates or budget targets are affected.

CPRM 302 Design Project Management 30 hrs.

The course covers the characteristics of the project design phase, design team selection, and design services agreement formation and negotiation. It focuses on value engineering and management, constructability considerations, and project cost management during design.

CPRM 303 Construction Project Management 30 hrs.

The course offers an extended overview of project management in construction. It covers integrated planning-estimating-scheduling concept; project time, budget, and quality baselines; materials management and subcontracting issues; and integrated project cost-time control.

CPRM 304 Construction Contract Administration under the FIDIC Conditions 30 hrs.

The course deals with contract documents, with a focus on specifications structure, procedural requirements, specifying methods, and the basis for unit rate estimation. It covers the Engineer's roles along with contract administration issues. The course provides the participants with an essential understanding of FIDIC contracts and the various elements of the FIDIC 1999 suite of contracts.

CPRM 305 Pre-Project Planning 30 hrs.

This course covers the work done by the owner team in the pre-project phase including preparation of a design brief and making a go/no go decision. Topics include assimilation of client needs; market assessment studies; impacts of laws and regulations on the facility program; surveys of infrastructure conditions; investigation of site conditions; scope validation; project execution planning, project costs and schedule estimation; life-cycle analysis; and financial planning.

CPRM 310 Project Economic Feasibility 30 hrs.

This course will provide the participants with an understanding of the principles involved in analyzing alternatives that arise during the project life cycle based on sound economic and financial principals. It covers the basic concepts, and methodology for making rational decisions in the design and implementation of real engineering and business projects.

CPRM 311 Managerial Risk and Decision Analysis 30 hrs.

This course prepares participants to proficiently describe, analyze and rationally respond to decision situations with uncertain outcomes. The process of developing effective decision-making tools is presented. These tools include spider and tornado diagrams, influence diagrams, decision trees, and Monte Carlo simulation, among others.

CPRM 312 Program Management 30 hrs.

This course presents a view of managing projects from an organizational perspective. The main areas of discussion will be strategic alignment, the role of effectively managing organizational assets through an enterprise project management office, portfolio management, and program management.

CPRM 313 Supply Chain Management 30 hrs.

This course will introduce the participants to supply chain management and its key issues: Procurement practice and contracts, logistics, network configuration, inventory management, distribution strategies and strategic alliances, and value of information in supply chains. Hands-on tools related to demand forecasting and setting optimal stock levels will be presented.

CPRM 316 Project Risk Management 30 hrs.

Successful project management practices must adequately assess risks and execute a successful risk response. This course presents different approaches to identify risks: qualitative and quantitative methods to analyze risks and determine their impacts; risk ranking and response techniques; and approaches to monitor, control, and communicate risks throughout the project life cycle.

CPRM 329 Technology and Innovation Management. 30 hrs.

This course covers Management of technology and innovation at an organizational level and its contribution to organizational success. It also examines engineering, science, and management principles contributing to the development of a successful framework for managing technology within an organization.

CSTC 201 Public Relations 30 hrs.

This course presents a comprehensive conceptual framework of the field and profession of

public relations. Emerging issues, such as technology, ethics, and the international aspects of public relations are considered through examining PR strategies, tactics, and case studies.

CSTC 202 Communication Campaigns 30 hrs.

This course introduces core concepts in social and political communication and their forms of application. The course examines how states, non-state actors, and media outlets produce and promote social and political messages through various marketing and advertising techniques, and how these messages impact the public's priorities and preferences.

CSTC 203 Corporate Identity and Branding 30 hrs.

This course introduces core concepts and practices pertaining to corporate identity, branding, and image management. It examines the impact of image construction and equity building on the recipients' assessment of messages and their communicators. Students will learn how to render their messages more recognizable in a marketplace in order to enhance the public's trust in the products or services they provide.

CSTC 204 Interpersonal Communication 30 hrs.

This course is meant to improve the students' understanding of their interpersonal communication behaviors to enhance their communication skills and capabilities. The course also introduces public speaking and speech writing in addition to adequate forms of engagement with press interviews and media appearances. Students will learn the basic skills for writing speeches and delivering them effectively to different live and online audiences through visuals and slides shows.

CWAD 200 Programming in HTML5 with JavaScript and CSS3 30 hrs.

This course introduces HTML5, CSS3, and JavaScript and helps students gain basic HTML5/CSS3/JavaScript programming skills. This course is an entry point into the Web applications courses.

CWAD 201 Developing Windows Azure and Web Services 30 hrs.

In this course, students will learn how to design and develop services that access local and remote data from various data sources. Students will also learn how to develop and deploy services to hybrid environments, including on-premises servers and Windows Azure.

CWAD 202 Developing ASP.NET MVC Web Applications 30 hrs.

In this course, students will learn how to develop advanced ASP.NET MVC applications using NET Framework 4.5 tools and technologies. The focus will be on coding activities that enhance the performance and scalability of the Web site application. ASP.NET MVC will be introduced and compared with Web Forms so that students know when each should/could be used. Prerequisites: Programming in HTML5 with JavaScript and CSS3.

CWAD 203 Developing PHP Web Applications 30 hrs.

In this course, students will learn the essentials for creating web-based PHP applications. Prerequisites: Programming in HTML5 with JavaScript and CSS3.

CWAD 204 Developing Node.js Applications 30hrs.

This course provides an overview of Node.js, including writing asynchronous code with callbacks

and streams, and modularizing your application with NPM and require. It also looks at built-in API's for building and scaling web applications as well as a few key third party modules. Prerequisites: Programming in HTML5 with JavaScript and CSS3.

CWAD 205 Developing Single Page Applications with AngularJS 30 hrs.

In this course participants will learn how simple it is to use AngularJS to create maintainable and testable single page applications. They will learn how to: bootstrap their AngularJS application; use AngularJS markup and expressions; create and use controllers; use built-in services and create custom services; turn their application into a SPA using routing; and create their own custom elements and handle events using directives. They will also learn how AngularJS allows you to do all things using test-driven-development.

Prerequisites: Programming in HTML5 with JavaScript and CSS3, Developing Windows Azure and Web Services, or Developing ASP.NET MVC Web Applications, or Developing PHP Web Applications, or Developing Node.js Applications.

Special Programs

The SPAAC Summer Program

Program Overview

The American University of Beirut's Continuing Education Center (CEC), in collaboration with the Office of Alumni Relations and the Worldwide Alumni Association of the American University of Beirut (WAAAUB), hosts the SPAAC Summer Program to enhance participants' knowledge of Lebanese culture and expand their understanding of the modern Middle East while experiencing campus life at AUB.

The SPAAC Program is a rich and pleasurable educational experience, and a unique opportunity to enjoy the summer, make new friends, get a taste of college life, and explore Lebanon.

The summer program is open to bright and motivated students from around the world between the ages of 14 and 18. Participants' stay on campus is facilitated and carefully supervised by our highly qualified staff. Participants will be accompanied by staff on all planned activities including on-campus activities and field trips to extraordinary historical sites throughout Lebanon.

Program Structure

Required Courses

Participants will take courses in Arabic language, history, and folk dance. We use a curriculum rich in social and cultural activities. Participants will also get the chance to explore the archaeology of Lebanon through field trips and museum visits. The language of instruction is English. Arabic will be used when appropriate.

All participants will take the following courses:

- **Arabic Language and Culture for Beginners (8 hrs)**

  In this course, students will discover the beauty of the Arabic language and the rich tapestry of Lebanese culture. The course will cover the Arabic alphabet and pronunciation through essential everyday life topics, equipping students with the language necessary for basic communication in various contexts. It will also delve into the cultural nuances of Lebanon, exploring its traditions, customs, and historical landmarks. Through engaging activities such as listening to traditional songs, watching short movies, and participating in cultural discussions, students will gain a deeper understanding of Lebanese culture and its significance in the Arab world.

- **Intermediate Arabic Language and Culture (8 hrs)**

  This course is designed to elevate students' proficiency to an intermediate level while immersing them in the vibrant cultural landscape of Lebanon. Students will engage with everyday life topics essential for effective communication within the Lebanese community. Students will have the opportunity to explore Lebanese culture through the lens of music, cinema, and cultural presentations. By immersing themselves in authentic cultural artifacts, students will deepen their appreciation for Lebanese traditions, values, and societal norms.

- **The Lead Historian: Inventions in the Middle East (8 hrs)**

  This course aims to give participants a historical journey within our region to discover important milestones and past figures. Historical inventions will be discussed from both historical and technical context.

- **Folk Dance (8 hrs)**

  This course introduces participants to Lebanese cultural roots through the Lebanese traditional dance "dabke". The course aims at teaching participants the basic dabke steps, which they will then be able to practice at Lebanese community gatherings and/or during other special occasions.

Elective Courses

Participants may choose to participate in one or two afternoon courses (Drawing, The Young Designer, Well-Being Through Acting, Game Development, and Mobile App Development).

- **Drawing (8 hrs)**

  Students will learn how to execute a freehand drawing from observation. They will use a variety of media including graphite, charcoal, and ink to draw from still life and nature. Basic principles of composition, proportion, and perspective are stressed. This course will also cover the theory of color, and the different types of color mediums and techniques.

- **The Young Designer (8 hrs)**

  This is a fun and engaging course for creative minds to explore graphic design, product design, interior design, and architecture.

- **Well-Being Through Acting (8 hrs)**

  This course utilizes acting techniques and exercises that provide essential tools for

participants' overall well-being and their development as stronger members of their communities, while helping them overcome the anxieties, insecurities, and expectations that they may be experiencing.

- **Game Development (16 hrs)**

  This course introduces students to the fundamentals of programming through the exciting world of game development. They will experience hands-on learning as they create two-dimensional (2D) games using Gamemaker Studio 2, culminating in stand-alone executable games ready to be shared with friends and showcased in their digital portfolio.

- **Mobile App Development (16 hrs)**

  This course provides students with an overview of the mobile app development environment, focusing on the fundamentals of programming in Java. It will cover Android App components and layouts, and tackle views and user interactions. At the end of the course, students will be equipped with the skills needed to develop their own Android App.

Other Activities

The SPAAC team will organize community engagement activities and a cooking session for the whole SPAAC group. SPAAC participants will also enjoy dinner outings to various places in Beirut.

Country Excursions

One-day trips to significant historical and cultural destinations will ensure participants' exposure to the rich diversity Lebanon has to offer.

Among the field trips that may be organized are:

- Visits to archaeological and historical sites in Jbeil, Batroun, Beiteddine, Mousa Castle, and Jeita.
- Hikes in the Cedars and Qadisha Valley
- A visit to a Lebanese beach

Meals and transportation on planned excursions are included in the program cost.

Next Step Program

The "Next Step" program is a collaborative initiative between Next Step NGO and the Continuing Education Center at the American University of Beirut targeting students with intellectual disabilities. It is a university-based higher-education program for youth and adults with intellectual disabilities whose main objective is to introduce an innovative educational environment that facilitates the learning and practice of both vocational and life skills needed to participate in the workforce and reach independent living.

Vision

The “Next Step” program aims at establishing a post-secondary educational program that focuses on and caters for the individual needs and career choices of each student, as per the following criteria:

- The program positively nurtures and supports the students’ strengths and interests.
- The program provides mentoring and guidance in the students’ chosen career paths.
- The program is versatile and diverse in terms of the curriculum and educational set-up, and the tools and strategies that will be used are adaptable to respond to each individual need.
- The program will follow-up on the students’ implementation of the skills they have learned, evaluate their impact, and accommodate their placement and employment.

Program Models

The “Next Step” program is modeled, inspired, and adapted after different models that have been successfully implemented around the world and whose impact has been considered a breakthrough in the lives and quality of employment for people with intellectual disabilities.

Examples of similar programs:

- Lesley University, Threshold Program, Cambridge
- University of Iowa, Reach Program, Iowa City

The main source of curriculum material used by the “Next Step” program is extracted from the Life Centered Education resources published by the Council for Exceptional Children, Virginia. Another source of information and guidance has been Think College, Institute for Community Inclusion, University of Massachusetts, Boston, MA.

The Life Centered Education Program (LCE)

Life Centered Education (LCE) is a research-based program developed by the Council of Exceptional Children led by a task force of leading transition professionals. The LCE curriculum is designed for students who have learning disabilities, mild intellectual disabilities, autism spectrum disorders, and those whose ability to live independently is in question. Since its creation, practitioners and professionals have developed and refined the curriculum so that it continues to provide a viable approach for life skill and transition education for students with special needs. During the process, the curriculum has grown to become the most widely used transition education program used in the U.S. in all fifty states.

The LCE curriculum matrix identifies three critical domains for adults living in the 21st century, and then, it further divides these domains into twenty core competences:

1. Daily Living Skills Teaching students how to use and manage their personal finances, households, personal needs, family responsibilities, food preparation, citizenship responsibilities, and leisure activities.
    1. Managing Personal Finances
    2. Selecting Adequate Housing

3. Caring for Personal Needs
4. Demonstrating Relationship Responsibilities
5. Buying, Preparing, and Consuming Foods
6. Buying and Caring for Clothing
7. Exhibiting Responsible Citizenship
8. Utilizing Recreational Facilities and Engaging in Leisure
9. Choosing and Accessing Transportation

2. Self-Determination and Interpersonal Skills Helping students develop self-awareness, self-confidence, socially responsible behavior, effective interpersonal and communication skills, and positive agency and decision-making.
    1. Understanding Self-Determination
    2. Becoming Self-Aware
    3. Developing Interpersonal Skills
    4. Communicating With Others
    5. Good Decision Making
    6. Developing Social Awareness
    7. Understanding Disability
3. Employment Skills Paving way to employment possibilities and choices by teaching constructive work habits, physical and manual skills, specific job competencies, and seeking and maintaining jobs.
    1. Knowing and Exploring Employment Opportunities
    2. Exploring Employment Choices
    3. Seeking, Securing, and Maintaining Employment
    4. Exhibiting Appropriate Employment Skills

Special courses include computer, art therapy and music therapy classes.

Lesson Plans

The twenty competencies are further divided into ninety-four sub-competencies and broken down by objective. Within each objective are at least three lesson plans that follow an Awareness, Explanation, Preparation (AEP) learning sequence in order to ensure true content mastery. Many lesson plans have accompanying fact sheets, worksheets, and other activities that provide additional engagement and hands-on learning. It is also important to note that while most of the LCE instruction occur within the classroom, a considerable amount of home and community-based experience is also incorporated to maximize impact.

Scholarships and Endowments

Refugees Aid Scholarship

The Continuing Education Center at the American University of Beirut has launched a Syrian Refugee Training Program using a designated fund. The Objective of the program is to equip the participants with tools to help them rebuild their country as well as to enhance their living conditions. The program will provide education for students and teachers by providing:

- The following Five Teaching Certificates: (4 courses each, total of 120 Contact hours)
    - Early Childhood Education (Nursery, KG1, KG2)
    - Special Needs Education (Learning Disabilities | Nursery- Grade 4)
    - Elementary School Education (Grades 1-5)
    - Middle School Education (Grades 6-9)
    - Secondary School Education (Grades 10-12)
- Professional Certificates (4 courses each, total of 120 Contact hours) in the following specializations:
    - Office Management
    - Essentials of Business
    - Associate Project Management
- English Language:
    - Level I
    - Level II
    - Level III
    - Level IV
    - Level V

WAAAUB Abu Dhabi Chapter CEC Endowed Fund

The WAAAUB Abu Dhabi Chapter made a gift that was allocated towards the “WAAAUB Abu Dhabi Chapter CEC Endowed Fund”.

This gift was made by the Chapter to expand the benefits of CEC offerings in Lebanon and the region.

The annual return of the endowment fund will be allocated to support selected CEC Diploma students to complete their CEC diploma courses. The fund will cover up to two courses per student that s/he is taking as part of the graduation requirements for a CEC Diploma after the completion of the relevant CEC Certificate. Scholarship eligibility include:

- First priority: students applying or registered for a CEC diploma program. Scholarship will be offered to student(s) with the highest GPA of courses taken towards the relevant CEC certificate. Any student can benefit up to a maximum of two courses pertaining to a CEC Diploma.
- Second priority: if funding is still available, then eligibility for students registered for CEC Certificate programs will be based on the highest GPA of at least two courses taken by the student towards the CEC certificate. Any student can benefit up to a maximum of one course pertaining to a CEC Certificate.

Endowed Faculty Chairs; Academic Centers, Programs, Institutes; Student Scholarships, Hardships; Fellowships; Awards; and Research Funds

Endowed Faculty Chairs

Faculty of Medicine

- Azeez and Marie El-Khoury Professorship in Ophthalmology
- Iskandar & Olina Haurani Visiting Professorship in Medicine
- The Pillar Genomics Institute of Precision Medicine Endowed Chair
- Raja N. Khuri Deanship for the Faculty of Medicine

Maroun Semaan Faculty of Engineering and Architecture

- Al Mu'allim Mohamed Awad Binladin Chair in Architecture in the Islamic World
- Dar Al-Handasah (Shair & Partners) Endowed Professorship in MSFEA
- Howard W. Page Professorship in Engineering
- Mohammed Abdulmohsin Al-Kharafi Chair in Engineering
- The Qatar Chair for Energy Studies

Suliman S. Olayan School of Business

- The Abdul Aziz Al-Sagar Chair in Finance
- Coca-Cola Chair in Marketing
- Husni Ahmed Sawwaf Chair in Business and Management
- Kamal Shair Chair in Leadership at OSB
- Sheikh Said Himadeh Distinguished Visiting Professorship

Faculty of Arts and Sciences

- Alfred H. Howell Chair in History and Archaeology
- Altaf S. Al Sabah Visiting Chair in Women and Societal Development Studies
- Constantine H. and Bonnie Issidorides Chair in Organic Chemistry
- Edward W. Said Endowed Chair in American Studies
- Jabre-Khawarizmi Endowed Chair in Arabic and Islamic Science
- Mamdouha El-Sayed Bobst Dean of the Faculty of Arts and Science
- Mamdouha El-Sayed Bobst Visiting Professorship

- Margaret Weyerhaeuser Jewett Chair of Arabic
- Mary Fox Whittlesey Visiting Professorship
- Michael Atiyah Chair in Mathematical Sciences
- The Mohammad Atallah Chair for Ethics
- Philippe Jabre Endowed Professorship in Art History and Curating
- Sheikh Zayed Bin Sultan Al-Nahyan Chair of Arab and Islamic Studies

Faculty of Health Sciences:

- Gangarosa Family Endowed Chair for Safe Water and Sanitation

Academic Centers, Programs, and Institutes

Office of the Provost

- Asfari Institute for Civil Society and Citizenship
- Center for Advanced Mathematical Sciences (CAMS)
- Center for Civic Engagement and Community Service (CCECS)
- Center for Teaching and Learning
- Continuing Education Center
- Farouk Jabre Center for Arabic and Islamic Science and Philosophy
- Global Health Institute (GHI)
- Issam Fares Institute for Public Policy and International Affairs (IFI)
- Munib and Angela Masri Institute of Energy and Natural Resources
- Nature Conservation Center (NCC)
- Palestine Land Studies Center (PLSC)

Faculty of Agricultural and Food Sciences

- Advancing Research Enabling Communities Center (AREC)
- Environment and Sustainable Development Unit (ESDU)
- The Laboratories for The Environment, Agriculture and Food (LEAF)

Faculty of Arts and Sciences

- Anis K. Makdisi Program in Literature

- Center for Arab and Middle Eastern Studies (CAMES)
- Center for Arts and Humanities (CAH)Critical Humanities for the Liberal Arts (CHLA) Program
- Environmental Policy Planning Program (ENVP)
- Graduate Program in Computational Sciences (GPCS)
- General Education (GE) Program
- Islamic Studies Program
- Institute of Financial Economics (IFE)
- Kamal A. Shair Central Research Science Laboratory
- Science and Mathematics Education Center (SMEC)
- Prince Alwaleed Bin Talal Bin Abdulaziz Alsaud Center for American Studies and Research (CASAR)
- Science and Mathematics Education Center (SMEC)
- The Writing Center
- University Preparatory Program (UPP)
- Zaki Nassif Music Program (ZNMP)

Faculty of Health Sciences

- Center for Public Health Practice (CPHP)
- Center for Research on Population & Health (CRPH)
- Knowledge-to-Policy (K2P) Center

Faculty of Medicine

- Abu-Haidar Neurology and Behavioral Science Center (AHNI)
- Children's Cancer Institute
- Children's Heart Center
- Clinical Research Institute
- Hamdi Al Zaim Interstitial Lung Disease Outpatient Center
- Health & Wellness Center
- Naef K. Basile Cancer Institute (NKBCI)
- Nehme and Therese Tohme Multiple Sclerosis Center

- Pillar Genomics Institute of Precision Medicine
- Salim El-Hoss Bioethics and Professionalism Program
- Women's Health Center
- Wound Care Center

Maroun Semaan Faculty of Engineering and Architecture

- Munib and Angela Masri Institute of Energy and Natural Resources
- Rada and Mutaz Sawaf Center for Arab Comics Studies

Suliman S. Olayan School of Business

- Center for Women in Business (CIBL)
- Samih Darwazah Center for Innovation Management and Entrepreneurship
- Rami F. Makhzoumi Corporate Governance Initiative (RMCGI)

Multidisciplinary and Inter-faculty

- Center for Systematic Reviews on Health Policy and Systems Research
- Charles Hostler Student Center
- Evidence-Based Healthcare Management Unit
- Global Health Institute
- Humanitarian Engineering And Public Health Innovations Unit
- Kadifa Family Computer Science and Engineering (CSE) Program Fund
- Talal and Madiha Zein AUB Innovation Park (Zein AUB iPark)

Donor- Funded Scholarships

Donor-funded scholarships are an important part of AUB's financial aid program. Donor-funded scholarships are available to provide support to qualified students in financial need.

- 150 for 150 Endowed Scholarship
- A Family Scholarship
- A Giving Hand and Hope - M. Nassif et Fils Scholarship
- A. Hawi Scholarship
- A. Karim and Soraya El Cheikh Endowed Scholarship

- A. Sayour-Greek Orthodox Scholarship
- A.G. Massabki Scholarship
- A.M. Rabbat Endowed Scholarship
- A.M. Students Scholarship
- Abdallah and Samia Tamari Foundation Endowed Scholarship
- Abdallah Darwiche Scholarship
- Abdallah Youssef Lahoud Endowed Scholarship
- Abdul Aziz Al-Bahar Scholarship
- Abdul Ghani and Inayat Hammour Endowed Scholarship
- Abdul Halim Jabre Memorial Scholarship
- Abdul Mohsen Al-Qattan Endowed Scholarship
- Abdullah Osseiran Memorial Endowed Scholarship
- AbdulMalik Yousuf Al-Hamar Memorial Scholarship
- Abdulrahman Mohamad Al Bahar Scholarship
- ACTS Scholarship
- Adham El Khalil Scholarship
- Adib Bassatne Scholarship for Medical Students
- Adib Kouteili Scholarship
- Adnan and Samia Dandan Scholarship
- Advancement Scholarship
- Aghnie Farouk Abi Rafeh Endowed Scholarship
- Agnes Varis Endowed Scholarship
- Ahmad Abdul Jabbar Endowed Scholarship Fund
- Ahmad Abu Ghazaleh Scholarship
- Ahmad and Shirine El Khatib Endowed Scholarship
- Ahmad S. El-Khalidy Endowed Scholarship
- Ahmad S. Zaabri Endowed Scholarship
- Ahmad Shamsuddin Memorial Endowed Scholarship
- Aida Ashur Hannun Endowed Scholarship

- Ajialouna Scholarship
- Akram Miknas Scholarship
- Al Reem Marble Scholarship
- Al-Anoud Afif Al-Mahmassani Scholarship
- Alarab Education Foundation Scholarship
- Albert and Loreen Rihani Endowed Scholarship
- Alfred & Dina Khoury Nursing Scholarship
- Ali and Layla Nsouli Scholarship
- Ali and Leila Makki Scholarship
- Ali El-Bachir Scholarship
- Ali Ghandour Endowed Scholarship
- Ali Hojeij Scholarship
- Ali Nesr Educational Program (ANEP) Fund
- Alice and Brahim Fuleihan Scholarship
- Alice Michael Endowed Scholarship
- AlJaber Engineering Scholarship
- Allen Page McKee Endowed Scholarship
- ALMA Scholarship for Medical Students
- Alsaad General Contracting Endowed Scholarship
- Alumni Class Reunion Endowed Scholarship
- Alya A. Al-Katami Scholarship
- Amal and Farouk K. Jabre Endowed Scholarship Fund
- Amina & Deeb Haidar Scholarship
- Andre Antoine Merab Memorial Endowed Scholarship
- Andre Dirlik and Raja Ghandour Endowed Scholarship
- Angela Jurdak Khoury Endowed Scholarship
- Angela Jurdak Khoury Endowed Scholarship Fund
- Anis A. Bibi Memorial Scholarship Fund
- Anis B. & Mima Malouf Endowed Scholarship

- Anis Bibi Endowed Scholarship
- Anis Mouasher Memorial Scholarship
- Annette and Nabil Habayeb Endowed Scholarship
- Anthony Bing Scholarship
- Anthony E. Mansour Endowed Scholarship
- Antoine Saad Hamra Memorial Endowed Scholarship Fund
- Antoine Sabbagh Scholarship
- Antoun Saadeh Cultural Foundation Current Scholarship
- Antoun Saadeh Endowed Scholarship
- Arabia Insurance Nabih Faris Memorial Endowed Scholarship
- Archak & Maroun Senekjian Scholarship Fund
- AREC ’82 Endowed Scholarship Fund
- AREC ‘78 And Friends Endowed Scholarship Fund
- AREC ‘80 Endowed Scholarship
- AREC 80 Student Hardship Fund
- Areen Projects Scholarship Fund
- ASAI Scholarship
- ASD48 Family Office Scholarship
- Asfari Foundation Solidarity Scholarship
- ATFL Scholarship in the name of Joseph J. Jacobs
- AUB Alumni Association of North America
- AUB Alumni At NPCC Abu Dhabi Scholarship
- AUB Alumni Club of Jordan Scholarship Fund
- AUB Alumni Development Scholarship
- AUB Alumni Student Scholarship
- AUB Emergency Fund
- AUB Emergency Fund - Student Aid
- AUB Faculty & Staff Scholarship Fund
- AUB Fine & Performing Arts Endowed Fund

- AUB Scholarship Fundraising Committee Endowed Scholarship
- AUB UNRWA-EU Scholarship
- AUB Women Centennial Fund
- AUB4Students Scholarship
- Avicenna Scholarship
- Awni Toukan Endowed Scholarship
- Ayman Taji Farouki Scholarship Fund
- Azeez & Saleemeh Shaheen Scholarship Fund
- Aznive Etinoff Memorial Scholarship
- Bana and Nabil Hilal Scholarship
- Bana Hilal Endowed Scholarship
- Bank Audi Scholarship
- BAPCO Endowed Scholarship
- Barakat-Sawabini Endowed Scholarship Fund
- Bashar Hassan Khayat Memorial Endowed Scholarship
- Bassel Michel Bayoud Scholarship
- Bechara Raad (EE 89) and Yen Fong Raad Scholarship
- Beit El Baraka Scholarship
- Bilani Family Scholarship
- Bliss Memorial Scholarship
- BLOM Bank Scholarship for Business Students
- Boutros and Ziad Noujaim Scholarship
- Burhan Beidas and Oussama Aboughazale Scholarship
- C. R. Whittlesey Memorial Scholarship
- C.A.T. Group Scholarship for Engineering
- C.A.T. Group Scholarships
- C.R. Whittlesey Memorial Scholarship
- C.V. Starr Endowed Scholarship Fund
- Carmen and Ray Debbane Scholarship

- Carole and Abdullah Al-Hobayb Scholarship
- CCE' 95 Scholarship
- Chalhoub Group Scholarship
- Charbel & Aida Tagher Family Endowed Scholarship
- Charbel Tagher Family Scholarship
- Charles Hagopian Endowed Scholarship
- Charles J. Hinkaty Scholarship
- Charles Saleh and Mary Haddad Saleh Endowed Scholarship
- Chartouni Scholarship
- Chinyeh Hostler Endowed Scholarship
- Christa Maria and Maria Nour Makzoume Scholarship
- Clapp-Constan Endowed Scholarship
- Class of MD 89 Endowed Scholarship
- Cleartag-Mirum Endowed Scholarship
- CMA-CGM Scholarships
- Computer Science Alumni Chapter Endowed Scholarship
- Constantine Zurayk Endowed Scholarship
- Daniel & Emily Oliver Endowed Scholarship
- Daniel Bliss Scholarship
- David A. Fuleihan Endowed Scholarship
- David S. Dodge Arabic Fund
- David S. Dodge Endowed Scholarship
- Dean Lutfi Diab Endowed Scholarship
- Dean Robert Najemy Endowed Scholarship
- Deloitte ME Scholarship
- Dina and Karim Chams Eddine Scholarship
- Diraar Y. Alghanim Scholarship Fund
- Don and Nancy Mafrige Endowed Scholarship
- Donald C. Platten Scholarship

- Doris Dodge Endowed Scholarship
- Dorothy H. Rogers Memorial Endowed Scholarship
- Douma Ladies Charitable Society Endowed Scholarship
- Dr. Abderrahman Samih Toukan Scholarship
- Dr. Abdulla Al-Thani Scholarship
- Dr. Adnan and Mrs. Vesta Dajani Endowed Scholarship
- Dr. Afif and Mrs. Zamzam Abdulwahab Scholarship
- Dr. Ahmad Moussalli Scholarship by Z Moukahal Foundation
- Dr. Albert Kuran Dubai Alumni Endowed Scholarship
- Dr. Ali Abu-Alfa and Mrs. Leila Hachicho Scholarship
- Dr. Ali and Rima Bazarbachi Endowed Scholarship
- Dr. Anne-Marie Irani Scholarship
- Dr. Antoine Zahlan Endowed Scholarship
- Dr. Dimitri Bitar Endowed Scholarship Fund
- Dr. Fadlo Raji Abu-Haydar Endowed Scholarship
- Dr. Fady and Mrs. Roula Dalloul Sharara Endowed Scholarship
- Dr. Farahe Maloof Medical Endowed Scholarship
- Dr. Farouk S. Idriss Endowed Medical Scholarship
- Dr. Fawwaz Habbal Scholarship
- Dr. Fawzi N. Abu-Jamra Endowed Scholarship
- Dr. Fuad and Alice Trabulsi Endowed Scholarship
- Dr. Fuad Rafidi and Dr. Sawsan Barakat Endowed Scholarship
- Dr. Gebran and Mrs. Salma Farah Endowed Scholarship Fund
- Dr. Georges Fakhoury Endowed Scholarship
- Dr. Harry G. Dorman Scholarship
- Dr. Jamil Karsh Endowed Scholarship
- Dr. Jean Moadie Memorial Endowed Scholarship
- Dr. John I. Makhoul Endowed Scholarship
- Dr. John I. Mirhij Scholarship

- Dr. Joseph Yammine Endowed Scholarship
- Dr. Khaled Zreik and Family Endowed Scholarship
- Dr. Marcel and Jane Saghir Endowed Scholarship Fund
- Dr. Marwan Mneimneh Scholarship
- Dr. Maurice H. Bisharat Endowed Scholarship
- Dr. Melhim Bou Alwan Scholarship
- Dr. Michael A. Shadid Endowed Scholarship
- Dr. Mohamad and Nada Haidar Endowed Scholarship
- Dr. Mohammad Chatah Endowed Scholarship
- Dr. Mohammad Yaghi Endowed Scholarship
- Dr. Muhammad Hijazi and Mrs. Nuha Mikdashi Endowed Scholarship
- Dr. Nada T. Kobeissi Endowed Scholarship
- Dr. Nadim and Mrs. Noura Daouk Scholarship
- Dr. Naji Sahyoun Memorial Endowed Scholarship
- Dr. Osama Elansari Endowed Scholarship
- Dr. Randa Antoun Endowed Scholarship
- Dr. Reem Renno Scholarship
- Dr. Robert A. Chahine Endowed Scholarship
- Dr. Saad Hamdi AlZaim and Family Endowed Scholarship
- Dr. Saad Hamdi AlZaim and Family Scholarship
- Dr. Said H. Sayegh Endowed Scholarship
- Dr. Salim Musalli Pasha Scholarship
- Dr. Sami Kabbani Endowed Scholarship
- Dr. Samia J. Khoury and Dr. Mohamed H. Sayegh Endowed Scholarship
- Dr. Samuel White Endowed Scholarship
- Dr. Shahrokh Mokhtari Memorial Endowed Scholarship
- Dr. Suad Rayyis Endowed Scholarship
- Dr. William Carslaw Memorial Scholarship
- Dr. Yakub Inati Scholarship

- Dr. Yusuf K. Hitti Endowed Scholarship
- Dr. Zoheir and Hana Abdelbaki Scholarship
- Drs. Abdullah and Daoud Sulaiman Kassir Memorial Endowed Scholarship
- Drs. Adel and Larry Anna Afifi Endowed Scholarship
- Druze Foundation For Social Welfare Scholarship Fund
- E. Maxine Bruhns Endowed Scholarship
- Earthquake Relief Scholarship Fund
- Eileen Page Medical Endowed Scholarship
- Eissa A. Bateh and Brothers Foundation Scholarship
- El Khalil Foundation Scholarship
- Elaine Hagopian Scholarship
- Elia M. Elia Family Graduate Business Scholarships at OSB/AUB
- Elias A. Husni Endowed Scholarship
- Elias and Nada Doumet Scholarship
- Elias and Shirine Matta Endowed Scholarship
- Elias Aractingi Scholarship
- Elie Khalil Khouri Endowed Scholarship
- Elissar Farah and Assaad Antonios Endowed Scholarship
- Elsa and Stanley Kerr Scholarship
- Emile and Helen Chartouni Endowed Scholarship
- Emile and Helen Murr Dabaghi Endowed Scholarship
- Enno and Hildegard Ercklentz Endowed Scholarship
- Faculty of Medicine Education Hardship Fund
- Fadi and Naila Majdalani Scholarship
- Fadil and Nijmeh Khalil Matta Endowed Scholarship
- Fadwa Nassif Taleb Endowed Scholarship
- FAFS 50Th Anniversary Graduate Student Endowed Fund
- FAFS Student Solidarity Fund
- Faisal AlMutawa Endowed Scholarship

- Farid and Hala Homsi Scholarship
- Farid I. Haurani Endowed Scholarship
- Farid Sa'd Graduate Endowed Scholarship in Science-Technology
- Faris S. Malouf Memorial Endowed Scholarship
- Farouk and Amal Jabre Endowed Scholarship
- Farouk Kamal Endowed Scholarship
- Farouk W. Agha Scholarship
- FAS General Scholarship
- Fatimah Abu-Ghazaleh Scholarship
- Fawwaz Ulaby and Jean Cunningham Endowed Scholarship
- Fawzi and Lili Farah Endowed Scholarship
- Faysal and May El Khalil Scholarship
- FFA Private Bank Scholarship
- Financial Aid to Medical Students
- Fingerprints Endowed Scholarship Fund
- Fouad G. Khouri Scholarship Fund
- Fouani Family Scholarship
- Francis Asbury Palmer Scholarship Fund
- Francois and Jill S Hamze Endowed Scholarship
- Francois and Jill S Hamze Scholarship
- Frank H. Teagle, Jr. Memorial Endowed Scholarship
- Friends of the AUB Museum Endowed Scholarship-in honor of Dr. Leila Badre
- Fuad and Noha Hamzeh Endowed Scholarship
- Fuad Es-Said Scholarship
- Fuad Muhsin Afnan Memorial Fund
- Fuad Nakhleh Endowed Scholarship
- Fundación Kareema Scholarship
- Gaza Endowed Scholarship
- General Scholarship Fund

- General Wissam Al Hassan Endowed Scholarship in Computer and Communication Engineering
- George and Alexandra Fattouh Endowed Scholarship
- George and Wafaa El-Azar Scholarship
- George Faris Memorial Scholarship
- George Issa Hazbun Memorial Scholarship
- George Salibi Scholarship
- Georges Makhoul Endowed Scholarship
- Ghassan Abou-Alfa and Eileen O'Reilly Endowed Scholarship
- Ghassan Al-Mahasini Scholarship
- Ghassan and Manal Saab Endowed Scholarship
- Ghassan Jdeed Scholarship Fund
- Gladys Brooks Endowed Scholarship
- Gordon H. Ward Scholarship
- Graduate Regional Scholarships-Ford Foundation Match
- H. Morton Esty Endowed Scholarship
- H.H. Mar Ignatius Zakka Iwas Endowed Scholarship
- Habib B. Yared Memorial Endowed Scholarship
- Habib Jaafar Scholarship
- Hana Jabsheh Scholarship
- Hanane Koteiche Scholarship
- Hani AboulJabine Scholarship
- Hani Qaddumi Foundation Scholarship
- Hanna Bisharat Endowed Scholarship
- Hanna Said Choulji Scholarship
- Harold B. Hoskins Endowed Scholarship
- Harry G. Dorman, Jr. and Virginia Whitney Dorman Memorial Scholarship
- Hasan Said Abdallah Scholarship
- Hassan Fahmy Jamal Endowed Scholarship

- Hassan Husseini – Eastern Province Endowed Scholarship
- Hassan Mohamed Halaby Endowed Scholarship
- Hassan Smadi Endowed Scholarship
- Hassib J. Sabbagh Endowed Scholarship
- Hazar - AUB Development Scholarship
- Hazel Reed Baumeister Trust Endowed Scholarship
- Hazem and Nadine Haddad Scholarship
- Hazimeh S. Rasi Scholarship Fund
- Helene Hanna Ayoub Endowed Scholarship
- HH Shaikh Khaled Bin Hamad Al-Thani Endowed Scholarship
- HH Sheikh Dr. Sultan Bin Mohamed Al Qasimi Endowed Scholarship
- HH Sheikh Dr. Sultan Bin Mohamed Al Qasimi Endowed Scholarship for FHS-Ford Foundation Match
- HH Sheikh Dr. Sultan Bin Mohamed Al Qasimi Endowed Scholarship-FAFS
- Hisham and Lina Jaroudi Scholarship
- Hisham Baalbaki and Dina Jannun Scholarship
- Howard W. Page Endowed Scholarship
- Hrayr and Marguerite Soghomonian Scholarship
- HRH Father Emir Sheikh Hamad Bin Khalifa Al Thani Sch. via Embassy of Qatar
- HRH Prince Talal Ben Abdel Aziz Endowed Scholarship
- Huda Onsi Zaabri Scholarship
- Husni Ahmad Sawwaf Endowed Scholarship
- Hussein Oueini Memorial Scholarship
- Husson Halabi Yassir Foundation Scholarship
- IFANCA Scholarship
- Ihsan Omar Baalbaki AUB Scholarship
- Imad Gholmieh Endowed Scholarship
- Imad Taher Endowed Scholarship
- Impact Scholarship

- Intermedic (Jean Farah & Co.) Sal Scholarship
- Isam and Awatef Soufan Scholarship Fund
- Isam Ibrahim Nubani and Khalil Ibrahim Noubani Endowed Scholarship
- Issa and Reine Sakr Scholarship
- Issam and Najat Saliba Scholarship
- Issam Shammas Scholarship
- J.J. Arakelyan Endowed Scholarship
- Jabir Shibli Endowed Scholarship
- Jacques A. Nasser Endowed Scholarship
- Jalal and Gabrielle Saad Endowed Scholarship
- Jamile Dagher Jureidini Endowed Scholarship
- Jassim Boodai Scholarship
- Jawad Sabbah Scholarship
- Jean and Rania Abouhamad Scholarship
- JH Syrian Students Scholarship
- Job Fair Committee Endowed Scholarship
- John Makhoul Scholarship
- John Miskoff Endowed Scholarship
- John Naim Hanna Dagher Scholarship
- Joseph Asmar Endowed Scholarship
- Joseph Daher Scholarship
- Juergen Lorenz Endowed Scholarship
- Julia Dodge Rea Scholarship
- Julia Ziadeh Endowed Scholarship
- Jusoor - AUB Scholarship
- K.S. Scholarship
- Kamal and Nuha Hemady Endowed Scholarship
- Kamel Abdelrahman Endowed Scholarship
- Kamel Dajani Memorial Scholarship

- Kamel, Aliya, and Nassim Saidi Endowed Scholarship Fund
- Karagulla Endowed Scholarship
- Karim Habre Endowed Scholarship
- Karim Karagulla Scholarship
- Karim W. and Dora Nasser Endowed Scholarship
- Kasim and Khazneh Shehadeh Scholarship
- Kasim O. Ardati and Najah R. Zayyani Endowed Scholarship
- Katrine and Ramez Hakim Scholarship
- Khadijah Sabahat Kahhalet Takieddine Endowed Scholarship
- Khaled Akkawi Scholarship
- Khaled and Mona Miqdadi Scholarship Fund
- Khaled El-Yashruti Memorial Endowed Scholarship
- Khalil and Adele Haddad Endowed Scholarship
- Khalil and Taghrid Khoury Scholarship Fund
- Khalil Barrage Family Endowed Scholarship
- Khalil Barrage Undergraduate Scholarship
- Khalil Bsheer Memorial Endowed Scholarship
- Khalil Tabet Memorial Endowed Fund
- Khawla Hobeika Rizk Endowed Scholarship
- Khushroo N. J. Patel Memorial Endowed Scholarship
- Kuzbari Family Scholarship
- LASeR - AUB Graduate Scholarship
- LASeR - Graduate Scholarship
- Laurice Khoury Maalouf Scholarship
- Lebanese International Finance Executives (LIFE) - AUB Scholarship
- Lebanese International Finance Executives (LIFE) Scholarship Award
- Leo and Arminé Aroian Merit Scholarship
- Lina Jazi Environmental Excellence Award- Current
- Lina Naaman Azhari Endowed Scholarship

- Liu Shiming Endowed Scholarship Fund
- LM Scholarship
- LNI - AUB Endowed Graduate Scholarship
- Lydia Haddad Tannous Endowed Scholarship
- Magida El-Roumi Endowed Scholarship
- Maha and Talal Shair Endowed Scholarships
- Maha and Talal Shair Scholarships
- Mahmoud Abbas Foundation - AUB Scholarship
- Mahmoud Abbas Foundation Scholarship
- Mahmoud Dalal Endowed Scholarship
- Makhlouf J. Haddadin Scholarship
- Makram Ghassan Tweini Endowed Scholarship
- Malcolm H. Kerr Memorial Scholarship
- Malcolm Kerr Aid
- Maloof Family Endowed Scholarship Fund
- Mamdouha El-Sayed Bobst Endowed Scholarship
- Mamdouha El-Sayed Bobst Scholarship
- Mamdouha El-Sayed Bobst Scholarship Fund
- Margaret and Joseph Nader Endowed Scholarship
- Margit Bliss Orange Scholarship
- Maria Aziz Scholarship
- Marie El-Khoury Scholarship in Fine Arts
- Marwan A. Takieddine Scholarship
- Marwan and Lynne Muasher Endowed Scholarship Fund
- Mary and Archie S. Crawford Scholarship
- Mary and Yousef Nassar Scholarship
- Mary Bajada Memorial Scholarship for Women
- Mary Jaber and Pierre Nachar Scholarship
- Mary R. Robinson Endowed Scholarship

- Marzouk Jassim Al Marzouk Scholarship
- Matiel Mogannam Endowed Scholarship
- May El Khalil Endowed Scholarship for Exceptional Athletes
- May Rihani Endowed Scholarship
- Maysoon Akrawi Dowling Scholarship
- Mazen Dajani Scholarship
- MD Class of 1994 Scholarship
- MD Class of 1998 Fund
- MEAB OSB Student Solidarity Fund
- Medical Alumni Endowed Scholarship
- Michael N. Malouf Endowed Scholarship
- Michel Alexandre Namour Memorial Endowed Scholarship
- Michel Rais Endowed Scholarship
- Micheline and Francois Nader Endowed Scholarship
- Midis Group Scholarship Fund
- Mikati Foundation Scholarship
- Mikhail and June Nasrallah Endowed Scholarship
- Miles & Nancy Lovelace Scholarship
- Mohamad Ali Zameli and Dina Tabbara Endowed Scholarship
- Mohamad S. Dimashkieh Endowed Scholarship
- Mohamad Samih Ghaddar Scholarship
- Mohamad-Kheir and Wahiba Salem Endowed Scholarship Fund
- Mohamed and Aziza Harajli Scholarship
- Mohammad Al Saadi Scholarship
- Mohammad Hassan El-Chaar Memorial Scholarship
- Moise Antun Khayrallah Endowed Scholarship
- Mona Chemali Khalaf Endowed Scholarship
- Monzer Hourani Scholarship
- Monzer Wehbe Scholarship Fund

- Morris Janowitz Endowed Scholarship
- Mounir R. Sa'adah Endowed Scholarship
- Moustapha and Falak Abouljoud Scholarship
- Mr. and Mrs. Mustafa Jundi Scholarship Fund
- Mr. and Mrs. Nafez Jundi Endowed Scholarship
- Mr. Nicholas Abumrad Scholarship Fund
- Mrs. Annie and Dr. Munir Nasr Endowed Scholarship
- Mrs. Daniel Bliss Endowed Scholarship
- Mrs. Ibtissam Akkad Elansari Endowed Scholarship
- MSFEA Class of 1964 Endowed Scholarship
- MSFEA Class of 1966 Endowed Scholarship
- MSFEA General Scholarship
- Muneef Assaf Farah Endowed Scholarship
- Munib and Angela Masri Endowed Scholarship
- Murex Endowed Scholarship Fund
- Murex Scholarship Fund
- Musa and Amal Freiji Endowed Scholarship
- Mustapha and Leila Bissat Endowed Scholarship
- Nabil & Billie Sakkab Scholarship
- Nabil Zuhair Haddad Scholarship
- Nada Debs Endowed Scholarship
- Nada Mneimneh Scholarship
- Nadia Cheaib Hoballah Endowed Scholarship
- Najeeb N. Meshaka Memorial Endowed Scholarship
- Naji and Hiba Kassir Scholarship
- Najib Ibrahim Salha Scholarship
- Najjad Zeenni Scholarship
- Nariman Aboughazale Scholarship
- Nasser Jalal Bitar Scholarship

- Nasser Saidi Scholarship
- Nazih and May Taleb Endowed Scholarship
- Near East Scholarship Fund
- Nemeh and Maha Sabbagh Endowed Scholarship
- Nerces and Diana Dermenjian Endowed Scholarship
- Nicholas and Claudia Barakat Scholarship
- Nicola Ziadeh Endowed Scholarship Fund
- Nizam Shammas Scholarship
- Nizar Banat Memorial Scholarship
- Nouhad and Rasha Daouk Scholarship
- Noura Hatem Juffali Endowed Scholarship
- Novus Aviation Capital Scholarship
- Odette Atalla Scholarship
- OF Scholarship
- Oliver Maki Endowed Scholarship
- Oliver Maki Scholarship
- Osama Hadid Scholarship
- OSB General Scholarship
- OSB International Student Scholarship
- Osmane Aidi Scholarship Fund
- Oussama Aboughazale Scholarship
- Palestinian Cultural Club Scholarship Fund
- Palestinian Students Emergency Fund
- Palestinian Students' Fund - Scholarship
- Pauline Nadim Makdisi Memorial Scholarship
- Petrofac Fund for Engineers
- Philip and Mary G Hitti Endowed Scholarship
- Philippe Jabre Scholarship
- Pierre and Maria Abousleiman Endowed Scholarship

- Pilgrim Endowed Scholarship
- President's Club Endowed Scholarship
- President's Fund for Exceptional Scholars
- Prof. Majid and Mrs Alice Fakhry Endowed Scholarship
- Professor Khalil Malouf Memorial Scholarship Fund
- Professor Maan Z. Madina Endowed Scholarship
- Professor Nabil and Mrs. Huda Dajani Endowed Scholarship
- Quencia Capital Scholarship
- R. Bayly Winder Endowed Scholarship
- Rabih and Rana Hamze Endowed Scholarship
- Rafeek Program Scholarship
- Raffy Manoukian Scholarships
- Rafic Gazzaoui Scholarship
- Rafic Hariri Endowed Scholarship for Nursing Students
- Rafic Hariri School of Nursing General Scholarship
- Raja Tannous Endowed Scholarship
- Raja Trad Dubai Alumni Endowed Scholarship
- Raji and Fawzieh Sinno Scholarship in Agriculture
- Rami Bitar Scholarships
- Ramsey U. Sheikh Scholarship
- Ramzi and Marianne Hakim Scholarship
- Ramzi F. Daouk Memorial Endowed Scholarship
- Ramzi Fawaz Scholarship
- Ramzi K. Alamuddin and Asma M. Fathallah Endowed Scholarship
- Ramzi Kteily Scholarship
- Ramzi Mohamad Safadi Endowed Scholarship in FAS
- Ramzi Mohamad Safadi Scholarship in FHS
- Ramzi Raad Advertising Scholarship
- Rana Ahmad Hajjeh Scholarship

- Randa El-Sayed and Naseem Haffar Fingerprints Endowed Scholarship
- Ray R. Irani Endowed Scholarship
- Reem Acra Scholarship
- René Saade Scholarship
- Reverend Dr. Lois A. Aroian Endowed Scholarship
- Riad and Hassana Sadik Endowed Scholarship
- Riad Kamal Scholarship
- Riad Mneimneh Scholarship
- Rida Irani Memorial Endowed Scholarship
- Rima Abdul Jabbar Endowed Scholarship
- Rima Aiko and Maya Farah Makhoul Financial Aid Fund
- Rima Moussallem Otrakji Endowed Scholarship
- Robert and Myrle Linnell Endowed Scholarship
- Roosevilt and Georgette Fattouh Endowed Scholarship Fund
- Roula and Fouad Tamer Scholarship
- Ruhi K. Hindawi Endowed Scholarship for Medical Students
- S. M. Minassian Endowed Scholarship
- Saadat Hasan Endowed Scholarship
- Sabbah Media Corporation Scholarship
- Sabra Purtill Endowed Scholarship
- Sadie B. Latouf Endowed Scholarship
- Said and Angela Hitti Endowed Scholarship
- Said and Insaf Agha El Shami Scholarship
- Said and Marianne Darwazah Scholarship
- Said Khalaf Scholarship
- Salem Suleiman Al-Othman Memorial Endowed Scholarship
- Salwa Es-Said Endowed Scholarship
- Samer and Hiba Al-Rayyes Endowed Scholarship
- Samer and Hiba Al-Rayyes Scholarship

- Sami Kteily Scholarship
- Sami Maurice Atallah Scholarship
- Sami Mubarak Endowed Scholarship
- Sami Sidawi Endowed Scholarship
- Samia Ghobril Endowed Scholarship
- Samia Taji Farouki Arts and Sciences Merit Scholarship
- Samih Alami Memorial Endowed Scholarship
- Samih Alami Scholarship
- Samir & Salwa Khoury Scholarship
- Samir Ahmad Zaabri Scholarship
- Samir and Malak Abdulhadi Scholarship
- Samira AbdelKader Kalache Scholarship
- Samira Fadli Scholarship Fund
- Samuel B. and Grace H. Kirkwood Scholarship
- Samuel Van Allan Undergraduate Scholarship
- Sansabil AbuRaslan Current Scholarship
- Sansabil AbuRaslan Endowed Scholarship
- Sarah Al-Turki Endowed Scholarship
- Sarah and Rafic Kaaki Endowed Scholarship
- Selma Shaheen Nursing Scholarship
- Serene Dajani Memorial Scholarship Fund
- Shafic Melhem Shabshab Endowed Scholarship
- Shafik and Mary Tumeh Endowed Scholarship
- Shaheen Brothers Endowed Scholarship
- Shawki Gholmieh Endowed Scholarship Fund
- Sheikh Mohamad Soleiman Scholarship
- Shireen Abu Akleh Endowed Memorial Scholarship
- Shocair-Reda Scholarship
- Sidani Scholarship Fund

- Simone Fattal and Etel Adnan Endowed Scholarship
- Sleyman and Sofia Trabulsi Endowed Scholarship
- Souad Malaeb Zobian Scholarship
- Soumaya Makdisi Khuri Endowed Scholarship
- Spring Scholarship
- SSG - AUB Scholarships
- Stella B. Kern Endowed Scholarship
- Stephen A. Miller Endowed Scholarship
- Strategy& Endowed Scholarship
- Student Solidarity Fund
- Student Solidarity Scholarship
- Sudan Students Endowed Scholarship
- Sufyan Saleh Scholarship
- Suhayl Assaf Farah Endowed Scholarship
- Suhayla Harami Georges (Dipl Nursing 1956) and George Georges (MD 1990) Scholarship
- Suheil and Shermine Bulos Endowed Scholarship
- Sulayman Salim Alamuddin Memorial Endowed Scholarship
- Suliman S. Olayan Endowed Scholarship
- Syria Resilience Fund
- Syrian and Lebanese Students Scholarship Fund
- Syrian Students Hardship Fund
- T.A.K. Scholarship
- Taawon Scholarship
- Talal Nasereddin Scholarship
- Tamim and Lamis Sahli Endowed Scholarship
- Teddy and Diana Abdo Endowed Scholarship Fund
- Terry and Pierre Aboukhater Endowed Scholarship
- Teta Endowed Scholarship

- The Abdulrahim Abuissa Memorial Scholarship in Agricultural and Biosystems Engineering
- The Advancement of Women in Engineering Scholarship
- The Aisha Al Mana Endowed Graduate Scholarship for Women in Nursing and the Health Sciences
- The Alexis and Anne-Marie Habib Foundation Scholarship
- The Altaf S. AlSabah Endowed Scholarship for Arab Women
- The Ameen and Sophia, Taft and Nelly Antoun Endowed Scholarship
- The Armenian Catholicosate of Cilicia Scholarship Fund
- The Armenian Students Endowed Scholarship Fund
- The Bassam Hamdi Al Aker Scholarship in Agricultural and Biosystems Engineering
- The Brummana High School Cultural Society Endowed Scholarship
- The Cleveland H. Dodge Foundation Endowed Scholarship (Ford Foundation Match)
- The Cleveland H. Dodge Foundation Scholarship
- The Dorothy Fahs-Beck Endowed Scholarship Fund
- The Fadi and Maha Makki Scholarship
- The Family of Khaireddine El Jisr Endowed Scholarship
- The Family of Late Najib Daoud Sahyoun Endowed Scholarship
- The George Abu Khader Scholarship Fund
- The George and Mary Farah Endowed Scholarship
- The Hassun Scholarship
- The Herter Endowed Scholarship
- The Houda Idriss Memorial Endowed Scholarship Fund
- The IC Alumni Association - AUB Scholarship
- The Karim El Arab Endowed Scholarship for Distinguished Athletes
- The Khayreddine and Adel Abdul-Wahab Endowed Scholarship
- The Makassed - AUB Scholarships
- The Maximilian E. & Marion O. Hoffman Endowed Scholarships
- The Maximilian E. & Marion O. Hoffman Foundation, Inc. Endowed Scholarship for Medical Students

- The Medicine Class of 1982 Endowed Scholarship Fund
- The Nada Suheil Muasher Endowed Scholarship Fund
- The Nemr and Helene Chamoun Scholarship
- The Peggy Smith Scholarship
- The Ramez Mikdashi Endowed Scholarship
- The Sami Kassar Scholarship
- The Spark of Hope Foundation Scholarship
- The State of Qatar Endowed Scholarship
- The Suad Husseini Juffali Endowed Scholarship
- The Tarraf Foundation Scholarship Program
- The Taufik Pacha Moufarrige Scholarship Award
- The Wellspring Learning Community Endowed Scholarship
- Tomooh Scholarship Fund PepsiCo - Ajialouna
- Tony and Lak Bikhazi Scholarship
- Toufic and Oumaya El Zouheiri Endowed Scholarship
- Transmed Scholarships
- Trustee Amabel James Nursing Scholarship
- Trustee Amabel James Student Solidarity Scholarship
- ULYP Scholarship
- USFC Endowed Fund
- Violette Haddad Kteily Memorial Endowed Scholarship
- Viviane Tabar Scholarship
- UNIFERT Student Development Endowed Fund
- WAAAUB - Oman Chapter Scholarship
- WAAAUB - Abu Dhabi Chapter Endowed Nursing Scholarship
- WAAAUB - Abu Dhabi Chapter Endowed Scholarship
- WAAAUB - Abu Dhabi Chapter Endowed Scholarship for FAFS
- WAAAUB - Abu Dhabi Chapter Endowed Scholarship for FHS
- WAAAUB - Abu Dhabi Chapter Endowed Scholarship for Undergraduate FHS

- WAAAUB - Abu Dhabi Chapter Medical Sciences Endowed Scholarship
- WAAAUB - Abu Dhabi Chapter Scholarship
- WAAAUB - Atlanta Chapter Endowed Scholarship
- WAAAUB - Australia Chapter Scholarship
- WAAAUB - Dubai and Northern Emirates Chapter Endowed Scholarship
- WAAAUB - Dubai and Northern Emirates Chapter Scholarship
- WAAAUB - Eastern Province Chapter Endowed Scholarship
- WAAAUB - Engineering and Architecture Chapter Endowed Scholarship
- WAAAUB - Greece Chapter Endowed Scholarship
- WAAAUB - Houston Chapter Endowed Scholarship
- WAAAUB - Jeddah Chapter Endowed Scholarship
- WAAAUB - Kuwait Chapter Endowed Scholarship
- WAAAUB - Kuwait Chapter Scholarship
- WAAAUB - Mount Lebanon Branch Scholarship
- WAAAUB - New England Chapter Endowed Scholarship
- WAAAUB - New York Tristate Area Chapter Endowed Scholarship
- WAAAUB - Oman Chapter Endowed Scholarship
- WAAAUB - Ottawa Chapter Scholarship
- WAAAUB - Philadelphia/Delaware Valley Chapter Endowed Scholarship
- WAAAUB - Qatar Chapter Endowed Scholarship
- WAAAUB - Riyadh Chapter Endowed Scholarship
- WAAAUB - Riyadh Chapter Endowed Scholarship for FHS
- WAAAUB - Swiss Chapter Endowed Scholarship
- WAAAUB - Syria Chapter Scholarship
- WAAAUB - UK Limited Endowed Scholarship
- WAAAUB- AUB Alumni Club of Jordan Palestinian Scholarship
- WAAAUB- Dubai & Northern Emirates Chapter Fund for Graduated Students
- WAAAUB Dubai Chapter Student Aid Scholarship
- WAAAUB Greater Los Angeles Chapter Endowed Scholarship Fund

- WAAAUB Orange County Chapter Endowed Scholarship
- Wadi N. Suki, MD Scholarship
- Wael Jalal Bitar Pay it Forward Scholarship
- Wa'el Nohad Chehab Endowed Scholarship for Business
- Wahida and Dina Mikati Scholarship
- Walid and Nada Abushakra Endowed Scholarship
- Walid Chammah Scholarship
- Walid Joumblatt Endowed Scholarship
- Walid Joumblatt Scholarship
- Wellspring Learning Community Employees Scholarship Fund
- WHISH Fund
- William and Aida Haddad Endowed Scholarship for Engineering
- William and Huda Zoghbi Endowed Scholarship for Medical Students
- William and Huda Zoghbi Scholarship
- William J. Gossen Fund
- William Mitri Endowed Scholarship
- Women Leaders in Engineering Scholarship
- Women's Auxiliary Nursing Scholarship
- Women's League Scholarship
- Yasser and Lala Ezzedine Scholarship
- Yasser and Zeina El-Hajj Endowed Scholarship
- Youssef Matar and Madeleine Ghantous Matar Scholarship
- Yusef Abu Khadra Endowed Scholarship
- Yusuf and Najat Zarour Dubai Alumni Endowed Scholarship
- Yusuf Mansour Scholarship
- Zahir and Wahida Fansa Scholarship
- Zahra Bissat Endowed Scholarship Fund
- Ziad and Ruan Elkhalil Scholarship
- Ziad Beydoun Endowed Memorial Scholarship

- Ziad Korban Endowed Scholarship
- Zohrab A. Kaprielian Endowed Scholarship
- Zouheir Chafic Daouk Memorial Endowed Scholarship

Fellowships

- Anonymous Pierre Amin Gemayyel Endowed Doctoral Fellowship in MSFEA
- Dr. John I. Makhoul Endowed Fellowship
- John Waterbury Endowed Fellowship Fund
- Louise L. Massabki Fellowship-Scholarship
- Maroun Semaan Foundation Endowed PhD Fellowship
- Marwan Chedid Endowed Fellowship
- Mohamad Makhzoumi Endowed Fellowship Fund
- Moufid Farra Endowed Education Fund
- Nayel Al Harith Endowed Fellowship Professor Maan Z. Madina Endowed Fellowship
- MSFEA Research Endowment
- Zakhem Endowed Fellowship

University Prizes and Awards

Penrose Award: Non-cash honorary award made to the outstanding graduate of each faculty on the basis of scholarship, character, leadership, and contribution to university life.

Farid Saab Student Athlete Award: Awarded to a full-time student who has been a varsity athlete for at least one year, has maintained an average of at least 77 and has been a member of an athletic team that is one of the top two ranked teams in the national league in the previous year. Awardee should be expected to have earned regional and international awards and/or medals and will embody the very highest standards of sportsmanship and leadership.

Distinguished Student-Athlete Endowed Award: Awarded on equal basis to both female and male athletes who have excelled in sports; top two winners of local or regional championships (Average 77 or above).

Salwa Siniora Baasiri Exceptional Volunteer of the Year Endowed Award: Awarded to one undergraduate student who meets the following criteria as evaluated by AUB's Director of CCECS: Maintains a high academic standing, volunteers in innovative areas leading to a positive impact, dedicates a substantial number of volunteer hours, demonstrates traits of reliability, integrity, commitment, and teamwork, demonstrates commitment to diversity, equity, and inclusion.

The Brummana High School Cultural Society Excellence Award: Awarded to the top graduate student who is a Brummana High School alumnus with a high average.

WAAAUB - Abu Dhabi Chapter Student Endowed Award: Awarded to the student with the highest GPA in each faculty, who graduated from a high school in Abu Dhabi.

Mary Jones Memorial Award: Awarded to a graduating female student who exemplifies outstanding commitment to community service and volunteerism.

Dr. Hassan Abbas Endowed Award in Citizenship and Social Justice: Awarded to a graduating student who has a record of academic excellence, shows a commitment to citizenship, social justice, and freedom as well as promotes tolerance and inclusivity. The student must be receiving a minimum of 20% financial aid to qualify for the award.

FAS Mamdouha S. Bobst Student Award for Civic Engagement: Awarded to a graduating student who has a record of academic excellence and has shown a commitment to civic engagement.

Abdul Kader Sbaiti Spirit in Sports Endowed Award: Awarded to student who is involved in varsity sports and shows exemplary team spirit, fair play, and integrity in sports.

Mercury Prize for Distinguished Athlete: Awarded to qualified athletic student(s) who is/are professionally involved in a sport as evaluated by the AUB Athletic Department. This award will be used to cover tuition fees.

Nabil Boukhaled Endowed Excellence Award in Computing: Awarded to a graduating student who has demonstrated an excellence in the field of computing.

Faculty of Agricultural and Food Sciences

Abdul Hadi Debs Endowment Award for Academic Excellence: Awarded to a graduating student who has an outstanding academic record. The award is given to one student in the Faculty of Agricultural and Food Sciences, one in the Faculty of Arts and Sciences, and one in the Maroun Semaan Faculty of Engineering and Architecture.

Dean Edgecombe Memorial Prize: Awarded to the outstanding student in third year agriculture.

Kashadurian Award: Awarded to a deserving student who was at AREC and has shown outstanding performance in farm skills and practices, and an appreciation for farm life at AREC.

Dean Thomas M. Sutherland Prizes: Awarded annually at graduation to outstanding FAFS graduates. Awarded to the undergraduate recipient of the Penrose award as well as the most outstanding graduate student with the best thesis.

Dean Nuhad Daghir FAFS Graduate Student Award: Awarded to the graduating student with a Master's degree in the Animal Science or Poultry Science major at the Faculty of Agricultural and Food Sciences who succeeded to accumulate the highest average over his/her graduate studies at AUB.

Dr. Musa Najib Nimah Endowed Award for Academic Excellence: Awarded to an undergraduate student who has the highest cumulative GPA.

Nehme Moujaess Student Award in Landscape Architecture: Awarded to final year Landscape Architecture students whose final year project is selected by the department as the most deserving.

Ali Nehme Nesr Student Award: This is a competitive, graduate or undergraduate level award for research or development thesis/capstone/FYP topics in the MENA and Sub-Saharan Regions. All FAFS disciplines are eligible to be considered as long as the topics revolve around WEFRAH nexus (commodities, value chain, processing, marketing, product innovation or any related topic in emerging markets in the MENA region and Sub-Saharan Africa specifically).

Nahla Hwalla Endowed Award in Nutrition and Dietetics: Awarded to the graduating students in nutrition and dietetics who have exhibited collegiality and leadership with active engagement in student life to promote principles of nutrition and wellbeing.

Rabi and Samia Mohtar Award: Awarded to a graduating FAFS student who demonstrated leadership and potential to impacting the food and agriculture system and with a documented financial need.

Director Fawwak Slieman - Dean John Fischer Endowed Award: Awarded to an undergraduate student who meets the following criteria: a 3rd or 4th year student who has committed to a FAFS major, demonstrates financial need and academic promise in the fields of agriculture, food or water security in the Middle East region or Africa.

Dr. Yusuf Abou Jawdah Endowed Award: Awarded to 3rd or 4th year undergraduate Agriculture student who has the highest cumulative average in at least three plant protection courses and shows a good understanding of the principles of food safety and sustainable agricultural development and demonstrates the ability to provide environmentally safe and innovative solutions/recommendations to deal with damaging and new or emerging plant pests.

Boecker Prize for Excellence: The Three Minute Thesis (3MT®) is an international competition celebrating the exciting research conducted by graduate students. Developed by the University of Queensland in 2008, the competition requires contestants to condense their research into a three-minute, one-slide presentation for a non-specialist audience.

Aiman Suleiman Student Development Fund: Awarded to a student or a team who receives the highest ranking for the Capstone Project.

Faculty of Arts and Sciences

Abdul Hadi Debs Endowment Award for Academic Excellence: Awarded to a graduating student who has an outstanding academic record. The award is given to one student in the Faculty of Agricultural and Food Sciences, one in the Faculty of Arts and Sciences, and one in the Maroun Semaan Faculty of Engineering and Architecture.

Murad al-Akl Awards: Competition organized by the Department of English for the best essay, speech, or debate on the subject of “How I Can Serve My Fellow Man”.

Abdallah Lahoud Foundation Endowed Award: Awarded to an undergraduate student with the highest average in history or archeology.

Shehadeh Abboud Memorial Excellence Award in English Language: Awarded to a graduating student majoring in English with the highest average in the major English courses.

HE Ghassan Al-Rashash Excellence Award in Political Studies: Awarded to a graduating student with the highest average in the graduate program in Political Studies.

Sheikh Fawzi Azar Memorial Prize: Awarded to student(s) in SBS with a commendable paper or study submitted to the department. Annual balance will be used for the purchase of educational materials and subscription to scientific journals.

The Educators' Endowed Award in Education: Awarded to one or two outstanding in the Education Department in acknowledgment of their achievement. These students should have known innovation, performed community service and had an average of 75 or above.

Dr. Fuad Said Haddad award in Education: Awarded to the graduate MA student in Education with the best thesis as selected by the Education department of the Faculty of Arts and Sciences.

Makhlouf Haddadin Award for the Outstanding Chemistry Undergraduate Student: Awarded at the end of each academic year to a graduating senior chemistry student who has demonstrated research capabilities through a paper or project and has an excellent academic record.

Makhlouf Haddadin Award for Outstanding Chemistry Graduate Student: Awarded at the end of each academic year to a graduating MS chemistry student with outstanding research and academic record.

Dr. Philip K. Hitti Prize: Awarded to the senior student in the Faculty of Arts and Sciences who, in the judgment of the president of the university, the dean of the faculty, and the chairman of the department concerned, exemplifies in her/his academic career the scholarly spirit of AUB at its best.

Mrs. Jinan Majzoub Excellence Award in English Literature: Awarded to a graduating student with the highest average in the graduate program in English literature.

The Muhanna Foundation in Mathematics Award of Excellence: Awarded annually to the most outstanding senior Lebanese student in the Department of Mathematics.

Amal Saidi Memorial Prize: Awarded to a graduating senior excelling in the subject of anthropology or sociology.

Majida Sanioura Memorial Prize in Humanities: Awarded to a top graduate senior in arts and humanities at the Faculty of Arts and Sciences.

Suad Sabbagh Sanioura Memorial Prize: Awarded to a graduating majoring in economics, in a very good academic standing.

M&C Saatchi MENA Award: Awarded to one or more graduating students in the Media Studies Program, Department of Sociology, Anthropology and Media Studies, with the highest academic achievements.

Lebanon Renaissance Foundation Award: Awarded to one or more graduating students in political studies, economics, social and behavioral sciences, public administration or history with the highest academic achievements.

William Van Dyck Endowed Award in Biology: Awarded to the graduating senior student with the highest average.

Dr. Randa Antoun Annual Award for Public Service and Civic Engagement: Awarded to an outstanding senior student in PSPA.

Professor Fuad I. Khuri Award in Anthropology: Awarded to an outstanding Lebanese student graduating with a master's degree in Anthropology. If in a given year no graduate student in Anthropology was identified to meet the stated criteria, the award will be given to a graduate student majoring in Middle Eastern Studies.

Mark Sawaya Endowed Award: Awarded to the graduating senior student in Computer Science with the highest average.

Nadim Khalaf Endowed Award: Awarded to a senior economics student with the highest average.

Remy Rebeiz Award in Economics: awarded to a junior student majoring in economics who has the highest average in a specific set of economics, mathematics, and humanities courses.

Dr. Basil Fuleihan Excellence Award in Economics: Awarded to the graduating student with a BA degree in Economics who succeeded to accumulate the highest average over his/her period of study.

Dr. Mohammad Chatah Excellence Award: Awarded to the graduating student with a BA degree in Political Studies who succeeded to accumulate the highest average over his/her period of study.

Jack and Hoda Afram Manok Endowed Award: Awarded to a graduating student in Education with the highest GPA.

Kamel Mrowa Award in Media Studies: Awarded to a graduating student with a Master's degree in Media Studies who demonstrates outstanding academic achievement (above 90 average) and successfully completes his/her end-of-year project or thesis with a topic revolving around the past, present or future of Journalism.

Usama al-Khalidi Endowed Award: Awarded to an outstanding senior student majoring in Biology who has demonstrated academic excellence as well as a commitment to community service and/or passion of arts.

Hussein Oueini Memorial Awards: Awarded equally between a graduating senior student in PSPA with the highest average and the best thesis written during the same academic year, as recommended by the department and dean.

Ibrahim and Loulu Durr Endowed MRVP Award: Two awards given annually to two students (one male, one female) enrolled in MRVP who have demonstrated outstanding medical research capabilities, based on the MRVP committee evaluation. Special consideration will be given to students who have shown outstanding research capabilities in the biochemistry field.

President Elias Hraoui Endowed Student Award in Economics: Awarded to an outstanding graduate economics student accepted in a PhD program and to an outstanding undergraduate student who has shown leadership and scholastic work in the economic Student Society.

Selma Mirshak and Mohsen Slim Endowed Student Award: Awarded to a graduate student majoring in sociology who has conducted best field work research.

Antoun Saadeh Cultural Foundation Best Student Essay Endowed Award: Awarded to the outstanding student essay on social reform in the Arab World.

Dr. Assaad Khairallah Endowed Award in Social Sciences: Awarded to an undergraduate

student pursuing a Sociology/Anthropology major or a graduate student in Sociology who submits the best paper in Arabic during his/her period of study.

Hana Jabsheh Endowed Award: Awarded to an undergraduate student majoring in the department of Fine Arts and Arts History, with the highest GPA.

Professor Mohamed Harajli Excellence Award in Humanities: Awarded to the top student in humanities.

Professor Ramzi Mounir Baalbaki Excellence Award in Arabic: Awarded to the top graduating with an undergraduate degree in Arabic or to a top graduating student with a Master's degree in Arabic.

Samir Makdissi Award in Economics: Awarded to a graduate student in economics for the best project/thesis.

Salim Ali Salam Endowed Award: Awarded to a graduate student with the best graduate thesis in Ottoman or Arab studies in the fields of History, Political studies and Middle Eastern Studies.

MT2 Best Achievement Award: Awarded to the computer science student(s) who prove their achievements through an acquired and demonstrated skillset across various accomplishments in specific area(s) of computer science.

Mona Chemali Khalaf Endowed Award: Awarded to the undergraduate student majoring in economics who has the highest GPA in the fall term of his/her graduating year.

Anwar Salman Award in Literature: Awarded to a graduating undergraduate student in Arabic in recognition of creative writing skills and exceptional research related to poetry and/or the literary works of Anwar Salman.

CCT Computer Science Student of the Year Award (Undergraduate): Awarded to an undergraduate computer science student who has an outstanding academic record and actively participates in events organized by the Computer Science Department and the Computer Science Society.

CCT Computer Science Student of the Year Award (Graduate): Awarded to a graduate student in computer science with a record of achievement in research, academics, and service.

Khawla Hobeika Rizk Endowed Award in Education: Awarded to the top senior female student in education.

Murex Best Collaborative Development Project: This award recognizes teamwork, group spirit, and collaboration in support of a development projects across different industries, geographies, and departments.

Murex Best Computer Science Student in Development: This award honors the top computer science student who has focused in his/her courses, projects, internships, and research assistant assignments on development and programming.

Murex Best Innovative Development: The award recognizes and rewards development projects that spotlight ideas, concepts, and methodologies that are "out of the box".

Wadia Noureddin Endowed Award in Biology: Awarded to a graduating student who

demonstrates excellence in his/her academic studies in biology, as well as a mature commitment to a career in the same or related field.

Burhan and Rabab Baalbaki Award in Elementary Education: The Burhan and Rabab Baalbaki Award in Elementary Education is conferred on a graduating student in Elementary Education who demonstrates excellence in his/her academic studies.

Poet Said Fayad Graduate Prize in Literature and Humanities: Awarded to a graduate student in Arabic who participates in the Al-Abhath Essay Prize competition.

Samia Abdul Basset Siniora Endowed Award in Education: awarded to an AUB undergraduate student completing his/her BA in education who has demonstrated a record of academic excellence, a commitment to the education pledge, promote moral and academic excellence, tolerance, inclusivity, and innovation in education, and is on financial aid.

Haykal Media Award in Arabic: Awarded to the top graduating student majoring in Arabic with the highest cumulative average during his/her undergraduate studies.

Randa Azzam Khoury Endowed Award in Education: Awarded to a graduating education Teaching Diploma (TD) student, with preference to Elementary Education.

Nader Prize for Excellence in Arabic Language and Literature: Awarded to a graduating student in the Department of Arabic and Near Eastern Languages who has achieved the highest academic distinction and/or creativity during her/his tenure as an undergraduate.

Ahmad and Fadwa Dannawi Award: Awarded to graduate MA or diploma student in Islamic studies who has demonstrated academic excellence and commitment.

Dana Kambris Memorial Award: awarded to a senior Economics student leading community service through apolitical and asectarian volunteering.

Teddy Christidis Excellence Award in Physics: awarded to an excelling student graduating with a bachelor's degree in physics who has demonstrated depth and maturity and a keen appreciation of physics.

Maroun Semaan Faculty of Engineering and Architecture

Narine Bolghourjian Exemplary Engagement Endowed Award : Awarded to an undergraduate student in recognition of leadership, character, and contribution to the AUB life/community.

Abdul Hadi Debs Endowment Award for Academic Excellence: Awarded to a graduating student who has an outstanding academic record. The award is given to one student in the Faculty of Agricultural and Food Sciences, one in the Faculty of Arts and Sciences, and one in the Maroun Semaan Faculty of Engineering and Architecture.

Farouk W. Agha Excellence Award: Awarded to a graduating student with a BE degree in Mechanical or Civil Engineering who accumulated the highest average during her/his period of study at AUB.

Fawzi W. Azar Award: Awarded annually toward the tuition of one or more fifth year student(s) in the architecture program of the Maroun Semaan Faculty of Engineering and

Architecture based on a project they present in their fourth year that is deemed best by a special jury.

Dean's Award for Creative Achievement: Awarded to a student in each of the main programs of the Maroun Semaan Faculty of Engineering and Architecture (architecture, graphic design, civil engineering, computer and communications engineering, electrical engineering, and mechanical engineering) who has demonstrated outstanding creativity in her/his approach to academic work.

The Distinguished Graduate Award: Awarded to a graduating student in each of the undergraduate engineering programs of the Maroun Semaan Faculty of Engineering and Architecture (civil engineering, computer and communications engineering, electrical engineering, mechanical engineering) in recognition of outstanding academic achievement, character, and contribution to the faculty throughout her/his tenure in the faculty.

Youssef M. Salam Civil Engineering Excellence Award: Awarded to a graduating student with a BE degree in Civil Engineering who accumulated the highest average during her/his period of study at AUB.

George R. Rais Endowed Architecture Awards: They are awarded to three students in their third year of studies pursuing a degree in Architecture. Selection is based on best project as determined by the Administrative Committee of the Department of Architecture. The first prize is $8,000, the second prize is $5,000, and the third prize is $3,000.

The Holcim Endowed Award in MSFEA: An annual award for the best project at the Department of Civil and Environmental Engineering.

Hayat Salam Liebich Travel Award in Islamic Architecture: Awarded to a student in his fourth, fifth year or a graduate student of Architecture, to enable research in Islamic architecture as a travel grant.

Nicolas and Faride Moujaes Student Award in Engineering: Awarded to graduating student/students who presented the most innovative final year project.

Mohamad Ali Safieddine Endowed Award for Academic Excellence: Awarded to a graduating student who is receiving financial assistance and has a high academic record, in addition to demonstrating good character as per his/her professors.

Resource Group Entrepreneurship Award: Awarded to students who present the best project in Cybersecurity or Privacy to support the establishment of a startup.

Faculty of Health Sciences

Kiram Sanioura Memorial Prize in Public Health: A certificate and prize will be awarded to the graduating student completing his/her undergraduate studies with the highest GPA in the Environmental Health program or Health Communication program at the Faculty of Health Sciences.

Abdelbasset Ahmad Sanioura Memorial Prize in Health Professions: A certificate and a prize will be awarded to the graduating student completing his/her undergraduate studies with the highest GPA in one of the disciplines of Health Professions at the Faculty of Health Sciences: Medical Audiology Sciences, Medical Imaging Sciences, or Medical Laboratory Sciences.

Graduate Academic Achievement Award: It is a non-cash honorary award in recognition of excellence in academic performance that is awarded to a student in the MS programs.

The Dr. Musa Najib Nimah Endowed Award: Awarded to a graduating student at the graduate level from the Faculty of Health Sciences who exhibits the "spirit" of public health and demonstrates excellent leadership skills and social involvement.

Dr. Nadim Adib Haddad Endowed Award: Awarded to a graduate student in the MPH program who has the highest GPA.

The Raghda Kurdi Exceptional Leader Award: Awarded to a senior female student pursuing her undergraduate studies at the Faculty of Health Sciences, who has demonstrated a record of academic excellence and leadership skills, and is on financial aid.

Lina Jazi Environmental Excellence Award: To be awarded to a graduating student who has demonstrated excellence through either a project, presentation, research, and or volunteer efforts in the area of environmental sciences in the Faculty of Health Sciences.

Faculty of Medicine

Franklin Thomas Moore — Ethel Jessup Memorial Prize: Established by the children and friends of Dr. and Mrs. Franklin T. Moore; awarded to the senior medical student who has shown the highest proficiency in obstetrics and gynecology or, lacking such, in any department, and in the student's personal life a dedication to humanity, a zeal for truth, and a belief in God.

Nimr Tuqan Memorial Prize in Pathology: It is in memory of the late Dr. Nimr Tuqan and is to be awarded to the student of Medicine II who excels in her/his work in the Department of Pathology.

Hatem and Fuadi Moukaddem Award in Medicine: Awarded to a graduating student majoring in Medicine with top academic achievement and demonstrated dedication to the profession.

Professor Ziad Salem Endowed Award: Awarded to a fellow training in oncology.

Dr. Majid-Uddin Kazi Excellence Award in Medicine: Awarded to graduating student majoring in Medicine with top academic achievement and demonstrated dedication to the profession.

Henry and Amelia Nasrallah Endowed Teaching Award: Awarded to a resident or fellow in the Department of Psychiatry who exhibits a track record of excellent teaching and mentoring skills.

Dr. M. Amin Arnaout Award in Medicine: Awarded to a student majoring in medicine graduating with High Distinction or Distinction and has demonstrated integrity, diligence, and dedication to the academic profession.

Rafic Hariri School of Nursing

Florence Nightingale Award: Awarded to an undergraduate senior student who meets the following criteria: academic achievement, professional integrity, contribution to professional and university life.

Women's Auxiliary Awards: Awarded to senior students who meet the following criteria: academic achievement, professional integrity and seriousness of purpose, contribution to professional and university life,. willingness to join AUBMC after graduation.

Janet Jeries Haddadin Nursing Award: Awarded to an undergraduate student with the highest GPA.

Rouzan Al-Najjar Memorial Award in Nursing: Awarded to 3 Arab students, one in each year of the nursing program, who are the most academically qualified.

Salma Mansur Jurdak Excellence Award in Nursing: Awarded to a graduating student majoring in Nursing at the Rafic Hariri School of Nursing with top academic achievement and demonstrated dedication to the profession.

Suliman S. Olayan School of Business

Dr. Emile Ghattas Memorial Award: Awarded to the best graduating student in the Bachelor of Business Administration program.

Aida Sanioura Memorial Prize in Business: Awarded to a top graduate senior from the Suliman S. Olayan School of Business.

Ali Abdelbasset Sanioura Memorial Prize: Awarded to a senior graduating student studying Business Administration, in good academic standing with team spirit commitment.

Quantum Communications Award in Business: Awarded to one or more graduating students in Business with the highest academic achievements.

Imad and Annelie Baalbaki Award in Marketing: Conferred on a graduating student in Business Administration with track concentration in Marketing and who demonstrates excellence in his/her academic studies.

Mohamad Ali Safieddine Endowed Award for Entrepreneurship: Awarded to a graduating student who is receiving financial assistance and who demonstrates a strong potential or path towards entrepreneurship and business ownership.

Gravitas Consultants' HRM Leadership Award: This award is in recognition of leadership in the field of HRM through active engagement in promoting a positive perception of HR.

Nada T. Kobeissi Endowed Excellence Award in Management: Awarded to the top graduating student majoring in Management at AUB's Suliman S. Olayan School of Business. The student should be recipient of financial assistance from the university, and should have the highest GPA as she/he graduates majoring in Management.

Roosevelt and Georgette Fattouh Excellence Award in Business: Awarded to a graduating student majoring in Business with top Academic achievement.

Sami Kteily Excellence Award for Graduate Students: Awarded to a graduating graduate student with top academic achievement.

Endowed Research Funds

- Dar Al-Handasah (Shair and Partners) Endowed Fund for Research in Engineering

- Farouk K. Jabre Fund for Biomedical Research
- The Hani Salaam Research Fund (CAMES)
- Henry and Amelia Nasrallah Endowed Research Award
- The Joseph and Ilham Cicippio Endowed Research Fund at FAFS
- Kamal A. Shair Central Research Science Laboratory
- Khaled Y. Daouk Research Fund
- Mikati Endowed Research Fund (CSR)
- Professor Fawwaz Ulaby MSFEA Endowed Research Fund
- Rockefeller Foundation Graduate Education and Research
- Salim A. Salam Endowed Fund
- Suheil Jamil Muasher Endowed Medical Student Research Award

Faculty List

Deans Emeriti

- Bitar, Khalil; PhD, Yale University; Emeritus Dean; Faculty of Arts and Sciences - Dean's Office
- Cortas, Nadim; MD, American University of Beirut; Emeritus Dean; Faculty of Medicine - Dean's Office, Internal Medicine, Endocrinology and Metabolism, Pharmacology and Toxicology
- Daghir, Nuhad; PhD, Iowa State University; Emeritus Dean; Faculty of Agricultural and Food Sciences - Dean's Office, Poultry Science

Professors Emeriti

- Bashour, Munir; PhD, University of Chicago; Emeritus Professor; Education
- Berbari, Adel; MD, American University of Beirut; Emeritus Professor; Internal Medicine
- Bikhazi, Anwar; PhD, University of Michigan - Dearborn; Emeritus Professor; Anatomy, Cell Biology, and Physiology
- Crow, Ralph; PhD, University of Michigan - Dearborn; Emeritus Professor; Faculty of Arts and Sciences - Dean's Office
- Dajani, Nabil; PhD, University of Iowa; Emeritus Professor; Sociology, Anthropology and Media Studies
- Issa, Philip J.; MD, USJ - Faculte Francaise De Medicine; Emeritus Professor; Radiation Oncology
- Kawar, Nasri; PhD, Pennsylvania State University; Emeritus Professor; Agriculture
- Kazarian, Shahe; PhD, University of Western Ontario; Emeritus Professor; Psychology
- Khairallah, Assaad; PhD, Princeton University; Emeritus Professor; Arabic
- Khalaf, Samir; PhD, Princeton University; Emeritus Professor; Faculty of Arts and Sciences - Dean's Office
- Khalidi, Tarif; PhD, University of Chicago; Emeritus Professor; Faculty of Arts and Sciences - Dean's Office
- Khalil, Ismail; MD, American University of Beirut; PhD, New York University; Emeritus Professor; Surgery, Vascular Surgery
- Makdisi, Samir; PhD, Columbia University; Emeritus Professor; Economics
- Mavromatis, Harry A.; PhD, Princeton University; Emeritus Professor; Physics
- Muallem, Musa; MD, American University of Beirut; Emeritus Professor; Anesthesiology
- Muwafi, Amin; PhD, University of Florida; Emeritus Professor; Mathematics

- Najjar, Samir; MD, American University of Beirut; Emeritus Professor; Pediatrics and Adolescent Medicine
- Sabah, Nassir Hussni; PhD, State University of New York; Emeritus Professor; Electrical and Computer Engineering
- Sakkal, Fateh; PhD, University of Mancheste; Emeritus Professor; Mechanical Engineering
- Seeden, Helga; PhD, University of London; Emeritus Professor; History and Archaeology
- Seikaly, Samir; PhD, University of London; Emeritus Professor; History and Archaeology
- Simaan, Joseph; MD, American University of Beirut; Emeritus Professor; Faculty of Medicine - Dean's Office
- Zurayk, Huda; PhD, Johns Hopkins University; Emeritus Professor; Epidemiology and Population Health, Biostatistics

Faculty Members

- Abadjian, Gerard; MD; Clinical Associate; Pathology and Laboratory Medicine
- Abbas, Jaber; MD, American University of Beirut; Clinical Associate Professor; Surgery
- Abbas, Ossama; MD, American University of Beirut; Professor of Clinical Specialty; Dermatology
- Abboud, Ali; PhD, University of Southern California; Assistant Professor; Economics
- Abboud, Diana; MD; Clinical Associate; Internal Medicine
- Abboud, Jacques; PhD; Lecturer; Industrial Engineering and Management
- Abboud, Miguel; MD, American University of Beirut; Chairperson and Professor (Tenure Appointment); Pediatrics and Adolescent Medicine
- Abboud, Pamela; M.Eng, American University of Beirut; Instructor; Civil and Environmental Engineering
- Abdalhay Alkhayat, Nadine; PhD, University of Sheffield; Senior Lecturer; Landscape Design and Ecosystem Management; Architecture and Design
- Abdallah, Emane; MS, American University of Beirut; Instructor; Biology
- Abdallah, Hanin; PhD, Virginia Polytechnic Institute and State University - Virgina Tech; Senior Lecturer; Suliman S. Olayan School of Business
- Abdallah, Khaled; PhD, Barrington University (University of Atlanta); Lecturer; Suliman S. Olayan School of Business
- Abdallah, Nour; MS, American University of Beirut; Clinical Instructor; Hariri School of Nursing

- Abdallah, Reem; MD, Universite Saint Joseph; Assistant Professor of Clinical Specialty; Obstetrics and Gynecology
- Abdel Baki, Jasmine; MD; Clinical Associate; Dermatology
- Abdel Rahman, Abdel Fattah; PhD, McGill University; Professor; Earth Sciences
- Abdel Samad, Khaled; MBA, Lebanese American University - Beirut; Instructor; Suliman S. Olayan School of Business
- Abdelmegeed, Maha; PhD, SOAS University of London; Assistant Professor; Arabic and Near Eastern Languages
- Abdelnabi, Reem; MD, Beirut Arab University; Clinical Associate; Pediatrics and Adolescent Medicine
- Abdelnoor, John; MD, American University of Beirut; Clinical Associate; Surgery
- Abdo Mouawad, Amer; PhD; Assistant Professor; Computer Science
- Abdul Nabi, Sarah; MD; Clinical Associate; Emergency Medicine
- Abdulrahim, Sawsan; PhD, University of Michigan - Dearborn; Professor (Tenure Appointment); Health Promotion and Community Health
- Abi Aad, Amine; PhD; Assistant Professor; Suliman S. Olayan School of Business
- Abi Aad, Nour; BS, American University of Beirut; Assistant Instructor; Chemistry
- Abi Abdallah Doumit, Myrna; PhD, Duquesne University; Associate Professor (Tenure Appointment); Hariri School of Nursing
- Abi Chahine, Maya; MA, French Faculty of Medicine; Instructor of Practice; Faculty of Health Sciences - Dean's Office
- Abi Fakher-Saab, Faysal; MD; Clinical Associate; Diagnostic Radiology
- Abi Fakhr, Lina; Ed.D, University of Phoenix; Clinical Associate Professor; Hariri School of Nursing
- Abi Ghanem, Alain; MD, Universite Saint Joseph; Assistant Professor of Clinical Specialty; Diagnostic Radiology
- Abi Hanna, Margherita; MA, University of Wales; Lecturer; Architecture and Design
- Abi Khuzam, Farouk; PhD, Syracuse University; Professor; Mathematics
- Abi Nassif, Tania; MD, Beirut Arab University; Clinical Associate; Pediatrics and Adolescent Medicine
- Abi Rafi', Randa; MS, American University of Beirut; Instructor; Chemistry
- Abi Saab, Marie Therese; PhD, University of Bari; Lecturer; Agriculture
- Abi Saad, George; MD, American University of Beirut; Professor of Clinical Specialty; Surgery

- Abi Said, Ashraf; B.Eng, American University of Beirut; Assistant Instructor; English
- Abiad, Firass; MD, American University of Beirut; Instructor of Clinical Specialty; Surgery
- Abiad, Mohamad Ghassan; PhD, Purdue University; Professor (Tenure Appointment); Nutrition and Food Sciences
- Abi-Saleh, Bernard; MD, Lebanese University; Associate Professor of Clinical Specialty; Internal Medicine
- Abou Chebel, Naji; MD, Universite Saint Joseph; Clinical Instructor; Dentofacial Medicine
- Abou Dagher, Gilbert; MD, American University of Beirut; Associate Professor of Clinical Specialty; Emergency Medicine
- Abou Daher, Ghadi; MD, American University of Beirut; Clinical Associate; Emergency Medicine
- Abou Dalle, Iman; MD, Lebanese University; Assistant Professor of Clinical Medicine; Internal Medicine
- Abou Fayad, Antoine; PhD, University of St Andrews; Assistant Professor; Experimental Pathology Immunology and Microbiology
- Abou Faycal, Ibrahim; PhD, Massachusetts Institute of Technology; Professor; Electrical and Computer Engineering
- Abou Habib, Lina; MPH, American University of Beirut; Research Associate and Director; Asfari Institute for Civil Society and Citizenship
- Abou Hamad, Mehdi; BS, Lebanese University; Assistant Instructor; Chemistry
- Abou Hussein, Tarek; PhD, Harvard University; Instructor; History and Archaeology
- Abou Ibrahim, Hicham; PhD, American University of Beirut; Assistant Professor; Industrial Engineering and Management
- Abou Jaoude, Dany; PhD, Virginia Polytechnic Institute and State University - Virgina Tech; Assistant Professor; Mechanical Engineering
- Abou Jaoude, Lena; PhD; Research Associate; Faculty of Agricultural and Food Sciences - Dean's Office
- Abou Jaoudi, Nadim; MD; Clinical Associate; Dentofacial Medicine
- Abou Jawdeh, Youssef; PhD, Faculte des Sciences Agronomiques; Professor (Tenure Appointment); Agriculture
- Abou Kheir, Wassim; PhD, Yeshiva University; Associate Professor (Tenure Appointment); Anatomy, Cell Biology, and Physiology
- Abou Matar, Tamara; MS, American University of Beirut; Instructor; Chemistry
- Abou Mjahed, Mirna; MBA, University of Houston; Instructor; Industrial Engineering

and Management

- Abou Nafeh, Nancy; MD, Universite Saint-Esprit de Kaslik; Clinical Instructor; Anesthesiology and Pain Medicine
- Abou Rahal, Jihane; MD, American University of Beirut; Assistant Professor of Clinical Specialty; Dermatology
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