AMERICAN UNIVERSITY OF BEIRUT

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AMERICAN UNIVERSITY OF BEIRUT
MSCHE
MIDDLE STATES COMMISSION ON HIGHER EDUCATION
Graduate Catalogue 2026-27

Notice

Graduate Program Information

For information pertaining to graduate programs offered by the various faculties and schools at AUB, consult the 2026-27 edition of the Graduate Catalogue. The Information in this catalogue applies to academic year 2026-27. The university reserves the right to make changes into programs, course offerings, academic requirements, and teaching staff without prior notice as the need arises.

Student Responsibility for Catalogue Information

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

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PO Box 11-0236, Riad El-Solh
Beirut 1107 2020, Lebanon
T +961 1 35 00 00

New York Address

American University of Beirut
The Debs Center – New York Office
3 Dag Hammarskjold Plaza, 8th floor
New York, NY 10017, USA
T +1 212 583 7600

This catalogue, along with relevant updates, can also be viewed at: www.aub.edu.lb/registrar. Additional information about course requirements is available on the online Banner Catalogue accessible through at the AUB webpage.

AUB is committed to the principle of equal opportunity in education and employment to the fullest extent permitted by applicable laws. This includes prohibition against sexual harassment as mandated by Title IX of the US Education Amendments of 1972. Inquiries or complaints may be addressed to the Title IX Coordinator (titleix@aub.edu.lb), Office of the President, College Hall, telephone +961 1 35 00 00 - Ext. 2514. For AUB's policies, visit: www.aub.edu.lb/titleix.

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University Calendar 2026-27

https://www.aub.edu.lb/registrar/documents/calendars/calendar2026-27.pdf

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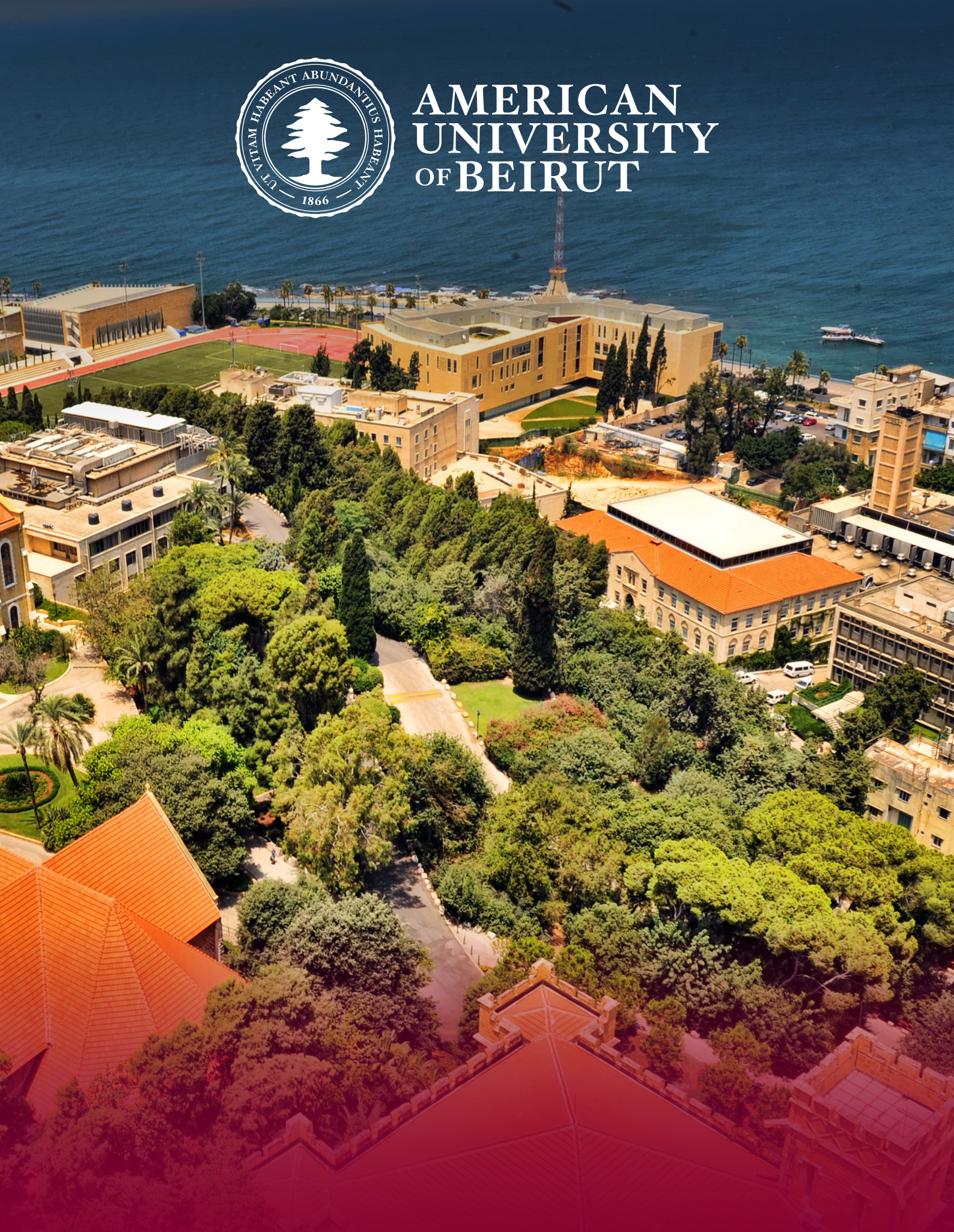

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AMERICAN
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OF BEIRUT
Administration

University Administration 2026–27

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- Wickens, Drew; MBA, CPA, Chief Financial Officer

Academic Affairs

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- Choueiri, Lina; PhD, Deputy Provost, Founding Director of The Institute for Academic Innovation and Development
- Akl, Elie; MD, Vice Provost for Research
- Tucker, Bradley Jon; MM, Vice Provost and Registrar
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- Mahfouz, Rami; MD, Director of the Human Research Protection Program (HRPP)
- Meho, Lokman; PhD, University Librarian
- Panayot, Nadine; PhD, Curator of the AUB Archaeological Museum
- Sabbagh, Antoine; MBA, Director of Admissions and Financial Aid
- Shibli, Rabih; MS, Executive Director of the Center for Community Engagement
- Srour, Issam; PhD, Executive Director of AUB Online

Faculty of Agricultural and Food Sciences

- Olabi, Ammar; PhD, Dean
- Jaafar, Hadi; PhD, Associate Dean for Research and Innovation
- Nasreddine, Lara; PhD, Associate Dean for Academic and Student Affairs

Faculty of Arts and Sciences

- El-Dahdah, Fares; PhD, Dean
- Boujaoude, Saouma; PhD, Interim Dean
- Baytieh, Hoda; PhD, Associate Dean for Online Education
- Karam, Pierre; PhD, Associate Dean for Faculty Development and Outreach
- Knio, Khouzama; PhD, Associate Dean for Advancement and Impact
- Raji, Wissam; PhD, Associate Dean for Research and Innovation

Suliman S. Olayan School of Business

- Sidani, Yusuf; PhD, Dean
- Moussawi, Lama; PhD, Associate Dean for Research and Faculty Development
- Zablith, Fouad; PhD, Associate Dean for Online Learning and Program Development

Maroun Semaan Faculty of Engineering and Architecture

- Shihadeh, Alan; PhD, Dean
- Al-Hindi, Mahmoud; PhD, Associate Dean for Academic Affairs and Staff
- Asmar, Daniel; PhD, Associate Dean for Research
- Chedid, Riad; PhD, Associate Dean for Outreach
- Elhajj, Imad; PhD, Associate Dean for Academic Transformation

Faculty of Health Sciences

- Mehio Sibai, Abla; PhD, Dean
- Shaya, Monique; PhD, Associate Dean

Faculty of Medicine

- Sawaya, Raymond; Vice President for Medical Affairs and Dean
- Alam, Samir; MD, Associate VP for Health & Chief of Medical Staff
- Badr, Kamal; MD, Deputy Vice President and Vice Dean
- Eid, Assaad; PhD, Associate Dean for Research and Graduate Education
- Haidar, Mohamad; MD, Associate VP for Faculty Financial and Governmental Affairs
- Kanafani, Zeina; MD, Assistant Dean for Medical Student Affairs
- Sabra, Ramzi; MD, Associate Dean for Medical Education
- Taher, Ali; MD, Associate VP for Academic Centers, Development and External Affairs
- Zein-el-dine, Salah; MD, Associate VP for Clinical Affairs, DIO, and Chief Medical Officer
- Ziyadeh, Fuad; MD, Executive Associate Dean for Faculty Affairs

Rafic Hariri School of Nursing

- Noureddine, Samar; PhD, Dean
- Fares, Souha; PhD, Associate Dean for Research
- Yazbik-Dumit, Nuhad; PhD, Associate Dean for Academic Affairs

Student Affairs

- Al Akl, Nayla; MA, Dean of Student Affairs
- Aramouny, Carla; MArch, Associate Dean of Student Affairs
- Kharroubi, Samer; PhD, Associate Dean of Student Affairs
- Aboulhosn, Sara; PhD, Director of the AUB Career Center
- Abou Omar, Tarek; MS, Director of Charles Hostler Student Center
- Badaoui, Lama; MS, Director of Accessible Education Office
- Chamate, Sarah Joe; MS, Director of Counseling Center
- Abou-Fakhr, Nisrin; MSN, Student Housing Manager

Administrative Affairs

- Jaber Nachar, Mary; MBA, VP for Administration & Chief of Staff
- Andraos, Gaby; MS, Director of Facilities
- Bikhazi, Hala; MBA, MPH, Director of Benefits
- Diab Rouhana, Samar; MA, Director of Human Resources
- Ghorayeb, Fadi; BA, Chief of Protection
- Hussein, Rania; MPH, Director of Strategic Planning and Process Improvement
- Kachar, Simon; PhD, Executive Director of Communications
- Tauk, Mitra; MPH, Equal Opportunity Officer and Title IX Coordinator

Finance

- Wickens, Drew; MBA, CPA, Chief Financial Officer
- Dayya, Imad; MBA, CPA, Comptroller
- Hahn, Diana; MS, CPA, Assistant Comptroller (New York Office)
- Itani Ramadan, Hanan; MPH, Senior Director of Procurement and Contracts Administration
- Mansour, Maria; EMBA, Director of Financial Planning
- Zakhem Nakhle, Katia; MS, Director of Auxiliary Services

Information Technology

- Asfour, Yousif; PhD, Chief Innovation and Transformation Officer (CITO)
- Abbass, Mohammad; BS, Infrastructure Services Director
- Antoun, Rula; ME, Medical Center Applications Director
- Arslan, Romy; BS, Service Delivery Director
- Assaf, Antoine; BEng., Data Governance and Analytics Director
- Farran, Rami; BE, IT Academic and Applications Services Director
- Zouwayhed, Maha; MBA, I-Park and Digital Accessibility Director

Medical Center

- Otayek, Joseph; MBA, Medical Center Director
- Khayyat, Jad; MBA, Deputy Medical Center Director and Finance Director
- Bawadi, Hisham; MSN, Director of Nursing
- Itani, Lama; BS, Director of Human Resources
- Jamaleddine, Rawad; MPH, Patient Affairs, Quality, Accreditation, and Risk Management Director
- Wehbe, Mira; MPH, Administration and External Affairs Director
- Zayour, Samah; PharmD, Logistics and Supply Chain Director

Advancement

- Baalbaki, Imad; PhD, Senior Vice President for Advancement and Business Development
- Dannawi Oueida, Salma; EMBA, Associate Vice President for Advancement
- Jazi, Lina; MS, Associate Vice President for Alumni Relations (North America) and General Secretary of the Worldwide Association of the American University of Beirut (WAAAUB)
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- O'Connell, Patrick; MA, Associate Vice President for Advancement, North America
- Tannir, Lina; MBA, Director of Business Development
- El Sayyed, Rana; BA, Director of Stewardship
- Hallak, Mona; MArch., Director of AUB Neighborhood Initiative
- Nassar, Samar; BS, Director of Advancement Services
- Sbaiti El Zein, Nada; BA, Director of Prospect Research

The University

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

AUB comprises seven faculties/schools: 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. AUB offers programs leading to bachelor's, master's, 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), an institutional accreditor recognized by the United States Department of Education (USDE). The university was first accredited in June 2004, with reaffirmations in 2009, 2014, and 2019. In 2022, MSCHE approved the American University of Beirut – Mediterraneo (AUB Mediterraneo) in Pafos, Cyprus, as a branch campus. The university's full and updated Statement of Accreditation Status is available on the MSCHE website.

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

- **The Faculty of Agricultural and Food Sciences**
  The bachelor of science (BS) degree in nutrition and dietetics coordinated program was the first and only nutrition and dietetics program in the Middle East to receive US accreditation. It was accredited in 2013 under the International Dietitian Education Program standards by the Accreditation Council for Education in Nutrition and Dietetics (ACEND), the accrediting agency of the Academy of Nutrition and Dietetics. The program was fully reaccredited in 2017 for the maximum seven-year term. In 2025, ACEND granted full re-accreditation, for a seven-year term, to the MS in nutrition and dietetics coordinated program (MSNDCP), under the International Coordinated Program (ICP) in dietetics standards, and to the BS in nutrition and dietetics coordinated program (NDCP), under the Foreign Dietitian Education (FDE) program standards.

- **The Maroun Semaan Faculty of Engineering and Architecture**
  The 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); and renewed in 2016 and 2023. The BS in chemical engineering and BE in chemical engineering programs were also accredited by ABET in 2016 (retroactive to 2012 and 2013, respectively); and renewed in 2023. The BE in industrial engineering program 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) of the American Society of Landscape Architects (ASLA) in 2021.

- **The Faculty of Health Sciences**

  The Public Health Program (PHP) received 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. This accreditation was reaffirmed in 2012 and 2019.

  The accredited PHP includes: BS in environmental health, bachelor of arts (BA) in health communication, master of public health (MPH), master of science (MS) in epidemiology, MS in environmental sciences—major environmental health, and a PhD in epidemiology.

  The PHP at FHS was the first program to be accredited by CEPH outside the Americas and remains the only CEPH-accredited public health program in the Arab region. Internationally, it is one of only seven non-US PHPs to hold CEPH accreditation. This has enabled 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**

  The Faculty of Medicine received full accreditation in 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. In September 2025, the Faculty of Medicine was granted a full three-year re-accreditation of its undergraduate medical program by the Association for Evaluation and Accreditation of Medical Education Programs (TEPDAD), effective January 1, 2025. This accreditation confirms the faculty's compliance with the requirements of the Educational Commission for Foreign Medical Graduates.

  The Faculty of Medicine received initial institutional accreditation from the Accreditation Council for Graduate Medical Education International (ACGME-I) in 2014 and has maintained accreditation since then. Currently, 20 residency programs and two fellowships are accredited by ACGME-I. These include: anatomic pathology, anesthesiology, clinical pathology, dermatology, diagnostic radiology, emergency medicine, family medicine, general surgery, internal medicine, endocrinology and metabolism, adult hematology-oncology, neurology, neurosurgery, obstetrics and gynecology, ophthalmology, orthopedic surgery, otorhinolaryngology, pediatrics, plastic surgery, psychiatry, radiation oncology, and urology.

- **The Rafic Hariri School of Nursing**

  The Rafic Hariri School of Nursing was the first nursing school outside American territories to have its baccalaureate and master's degree programs receive accreditation in 2007 by the Commission on Collegiate Nursing Education (CCNE). The baccalaureate and master's programs were reaccredited by CCNE in 2012 and 2022.

- **The Suliman S. Olayan School of Business**
  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 and the 100th business school outside the US to earn AACSB accreditation, first achieved in 2009, with successful reaffirmations in 2014, 2019, and 2025. OSB offers a comprehensive portfolio of AACSB-accredited degree programs, including the bachelor of business administration (BBA), with concentrations in accounting, finance (corporate finance and investment management), marketing, entrepreneurship and innovation, management and organization, information systems, operations management, and general business. The graduate portfolio includes the master of business administration (MBA), online master of business administration (OMBA), executive master of business administration (EMBA), master in finance (MFIN), master of arts in human resource management (MHRM), and master of science in business analytics (MSBA).
  In 2025, AACSB accreditation was extended to include programs offered at the Faculty of Business of the American University of Beirut – Mediterraneo. These include the bachelor of business administration in management, the bachelor of business administration in digital marketing, and the master of science in business analytics, all delivered under the same academic standards and quality assurance framework as the Beirut campus.

Contact Information for Accrediting Agencies

AACSB: 777 South Harbour Island Boulevard, Suite 750, Tampa, FL 33602, +1-813-769-6500
ABET: 415 North Charles St., Baltimore, MD 21201, +1-410-347-7700
ACEND: 120 South Riverside Plaza, Suite 2190, Chicago, IL 60606-6995, +1-312-899-0040, Ext. 5400
ACGME-I: 401 North Michigan Avenue, Suite 2000, Chicago, IL 60611, +1-312-755-7042
CCNE: 655 K Street NW, Suite 750, Washington, DC 20001, +1-202-887-6791
CEPH: 800 I Street NW, Suite 4008, Washington, DC 20001, +1-202-789-1050
LAAB/ASLA: 636 Eye Street NW, Washington, DC 20001-3736, +1-202-898-2444, +1-888-999-2752 (Toll Free)
MSCHE: 1007 North Orange Street, 4th Floor, MB #166, Wilmington, DE 19801, +1-267-284-5011
TEPDAD: Kazım Dirik Mah. Ankara Cad. Doktorlar Sitesi, A Blok, No:231 Daire:2, 35100 Bornova, İzmir, Türkiye, +90-530-1234570

For information on AUB's mission statement and history, visit:
https://www.aub.edu.lb/AboutUs/Pages/default.aspx.

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/ 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 is committed to the principle of equal opportunity in education and employment to the fullest extent permitted by applicable laws. This includes prohibition against sexual harassment as mandated by Title IX of the US Education Amendments of 1972. Inquiries or complaints 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, visit www.aub.edu.lb/titleix.

AMERICAN UNIVERSITY OF BEIRUT

Admissions

Graduate

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

Graduate Studies

Graduate study at AUB began in 1904. The first master's degree was awarded the following year. Doctoral study was initiated in 1961, and the first PhD was granted in 1966.

Graduate study is directed by the Graduate Studies Committees (GSC) of the various faculties/schools and the Board of Graduate Studies (BGS), which reports to the University Senate. The Graduate Council serves as the executive body responsible for overseeing all graduate programs at AUB.

New programs may be added upon the recommendation of the faculty/school Graduate Studies Committee—endorsed by any other faculty/school concerned—and approved by the Board of Graduate Studies, the University Senate, and the Board of Trustees. All residential programs are approved and registered by the Minister of Education and Higher Education in Lebanon and all programs, residential and online, are approved and registered by the New York State Education Department (NYSED) and listed in the NYSED Inventory of Registered Programs.

Graduate Council

The Graduate Council (GC) reports to the provost of the university and plays a key role in ensuring the uniform implementation of the rules and regulations governing graduate studies across the university, in accordance with policies approved by the BGS and the Senate, and as recommended by the faculties and schools. The GC facilitates and coordinates graduate education and monitors the implementation of graduate policies and deadlines. The GC works closely with the BGS and faculty/school GSCs to maintain quality control across all aspects of graduate education. In collaboration with faculty, students, and staff, the Graduate Council coordinates graduate recruitment to ensure a selection process from a highly qualified pool of student applicants and manages the graduate admissions process at the university-level. It provides information on admissions to all graduate programs, administers graduate academic standards of scholarship and policy, and supports student development and success through workshops, training activities, counseling, and initiatives that promote timely degree completion. The GC also administers AUB's Graduate Assistantship and Fellowship Policy (GFAP).

Areas in Which Graduate Study is Offered

The university offers master's degrees, PhD degrees, and two types of graduate diplomas: academic and professional.

Master's Degrees

Faculty of Arts and Sciences

Thesis-based	
MS	> Biology > Chemistry > Computational Sciences > Computer Science > Geology > Mathematics/Applied Mathematics > Mathematics/Pure Mathematics > Physics
MSES	> Environmental Policy Planning
MA	> Anthropology > Arabic Language and Literature (frozen admission) > Archaeology > Art History and Curating > Clinical Psychology > Economics > 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 > English Language > English Literature > Psychology (frozen admission) > History > Islamic Studies > Media Studies > Middle Eastern Studies > Philosophy > Political Studies > Public Administration (frozen admission) > Public Policy and International Affairs > Sociology

Non-thesis project-based	
MS	> Computer Science
MSES	> Environmental Policy Planning
MA	> Anthropology > Clinical Psychology > Computing in Education (online program) > 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 > Media Studies > Middle Eastern Studies > Public Policy and International Affairs

Faculty of Agricultural and Food Sciences

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

Non-thesis project-based	
MS	> Agricultural Economics > Animal Science > Food Safety > Food Security > Food Technology > 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	> Executive Master of Business Administration
MBA	> Accounting (residential or online) > Business Information and Decision Systems (residential or online) > Finance (residential or online) > Management (residential or online) > Marketing (residential or online)

Non-thesis project-based	
MS	> Business Analytics

Non-thesis course-based	
MF	> Finance
MBA	> Accounting (residential or online) > Business Information and Decision Systems (residential or online) > Finance (residential or online) > Management (residential or online) > Marketing (residential or online)

MA	> Human Resource Management

Maroun Semaan Faculty of Engineering and Architecture

Thesis-based	
MS	> Biomedical Engineering > Chemical Engineering > Energy Studies
MSES	> Environmental Technology
MUDS	> Urban Design
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	> Chemical Engineering (frozen)
MSES	> 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 (residential or online)

Faculty of Health Sciences

Thesis-based	
MS	> Epidemiology > Public Health Nutrition
MSES	> Environmental Health

Non-thesis project-based	
MSES	> Environmental Health

Non-thesis course-based	
MPH	> Epidemiology and Biostatistics > Health Management and Policy > Health Promotion and Community Health
MS	> Executive HealthCare Leadership, online

Faculty of Medicine

Thesis-based	
MS	> Health Research (SHARP) > Orthodontics
MS	> Biomedical Engineering
MSBS	> Biochemistry > Human Morphology > Microbiology and Immunology > Neurosciences > Pharmacology and Therapeutics > Physiology

Non-thesis project-based	
MSBS	> Biochemistry > Human Morphology > Microbiology and Immunology > Neurosciences > Pharmacology and Therapeutics > Physiology

Non-thesis course-based	
MS	> Biomedical Engineering

Rafic Hariri School of Nursing

Thesis-based and non-thesis project-based	
MSN	> Adult Gerontology Clinical Nurse Specialist > Community and Public Health Nursing > Nursing Administration and Management (hybrid program) > Pediatric Clinical Nurse Specialist > Psychiatric Mental Health Clinical Nurse Specialist

Interfaculty Program

Thesis-based	
MSES	> Ecosystem Management > Environmental Health > Environmental Policy Planning > Environmental Technology
MS	> Health Research (SHARP) > Biomedical Engineering > Biomedical Sciences/Neurosciences > Public Health Nutrition

Non-thesis project-based	
MSES	> Ecosystem Management > Environmental Health > Environmental Policy Planning > Environmental Technology

MS	> Biomedical Engineering > Biomedical Sciences/Neurosciences > Public Health Nutrition

PhD Degrees

AUB offers the doctor of philosophy (PhD) degree in fourteen disciplines. The programs are designed for students whose academic backgrounds and research interests indicate a strong potential for scholarly success and significant contribution to their field of knowledge. Students will work on a specific research plan with a contributing scholar and mentor in their department.

All PhD students at AUB will normally receive full tuition waiver and a monthly stipend. They are required to participate in teaching activities, which may include teaching a full course, assisting in group learning activities, or supporting laboratory work as assigned by the department.

Further information on programs, research opportunities, requirements for admission, and specific PhD degree requirements can be found on the relevant faculty/school's section of this catalogue and on its webpage.

PhD programs offered include the following:

Faculty of Arts and Sciences

- Arabic Language and Literature (frozen admission)
- Arab and Middle Eastern History
- Cell and Molecular Biology
- Chemistry
- Mathematics
- 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 can be accessed at https://join.aub.edu.lb/apply/.

Applications are reviewed based on the deadlines stated below (and indicated on the online application). Admission decisions — made by the department/program and the Graduate Studies Committee — are announced by the Graduate Council. Accepted applicants are given one month to accept, defer, or decline the offer of admission.

FOR ADMISSION TO:	APPLICATION DEADLINE	DECISIONS
Spring 2026-27	Thursday, November 5, 2026	Monday, December 14, 2026
Fall 2027-28	Monday, March 15, 2027	Friday, May 14, 2027

Readiness for University Study in English (RUSE)

Applicants to graduate programs at AUB must demonstrate proficiency in the English language. RUSE is a requirement for all diploma, master's, and doctoral programs. 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 Test (TOEFL iBT),
- International English Language Testing System (IELTS),
- Graduate Record Examination GRE (Verbal Part), and
- Graduate Management Admission Test (GMAT) – GMAT (Verbal Part).

Updated score requirements to meet RUSE can be found at: https://www.aub.edu.lb/admissions/english/.

Applicants who submit English language proficiency test scores below the required levels may still be admitted. In such cases, they will be required to take an English language course upon enrollment in their graduate degree programs.

Applicants to graduate diploma programs are also expected to demonstrate English language proficiency in accordance with the university's requirements for graduate diploma admission.

English Language Remedial Course

Applicants who obtain scores lower than those required must enroll in the remedial graduate English course, ENGL 300. After the change of schedule period (drop and add), no new test scores will be accepted and no new placement will be made.

RUSE Waivers

RUSE requirement is waived for applicants who meet any of the following conditions at the time of application:

1. Have completed an undergraduate or graduate degree at AUB or AUB-Mediterraneo.
2. Were admitted to a degree program at AUB no more than five years ago and completed at least two regular terms with good academic standing.
3. Have completed an undergraduate or graduate degree at an accredited college or university in North America, Great Britain, Australia, and New Zealand.
4. Have completed, within the past five years, an undergraduate or graduate degree at an accredited college or university elsewhere in the world where English is listed as the only language of instruction in the International Association of Universities (IAU) World Higher Education Database and where admission requires English language proficiency test scores that meet RUSE requirements.

For more information about RUSE, visit: https://www.aub.edu.lb/admissions/english/

Further Requirements

Applicants' scores on the tests listed below must be submitted to the appropriate departments and faculty/school Graduate Studies Committees in time for graduate study admission selection. It is the applicant's responsibility to register for and take the required tests on the appropriate dates to ensure that the Graduate Council receives the scores in time for admission selection.

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

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

Applicants to the MBA program are required to take the Graduate Management Admission Test (GMAT). Official and valid GMAT scores must be submitted no later than one month after the application deadline. A valid GMAT score should be recent (no older than five years at the time of the application) and no less than 570. Upon registering for GMAT, applicants must specify that the results be sent to the AUB Graduate Council (ETS school code: 0902).

Some faculties/schools and departments have additional admission requirements to their programs. Prospective applicants should confirm with the relevant faculty, school, department, or program concerned that they meet all admission criteria. For detailed information regarding admission to a particular faculty/school or department, refer to the corresponding sections on graduate study in this catalogue.

Admission

Admission to Master's Programs

Graduate study is offered on a selective basis to students who have demonstrated distinctive academic ability. 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 with an excellent record of academic achievement and demonstrated potential for creative and independent work may be admitted under one of the following categories:

- Admission as a regular graduate student, with the possibility of financial support through the Graduate Fellowship and Assistant Program (GFAP)
- Admission on probation (with no possibility of financial support via the Graduate Fellowship and Assistant Program (GFAP))
- Admission as a prospective graduate student (FAFS, FAS, and MSFEA) (undergraduate courses are not covered by GFAP)

The minimum admission requirements for all categories above are described below. Additional requirements for admission may be established by the individual departments/programs, as approved by faculty/school Graduate Studies Committees. Applicants are advised to consult the relevant department or program to which they are applying or the Graduate Council for further details on specific requirements.

Admission to the master's program at AUB is competitive and based on the applicant's academic record and overall achievements. Departments may also recommend admission for applicants whose research interests or academic background align with the expertise of faculty members or the strategic priorities of the faculty or school offering the program.

Applicants holding degrees from institutions other than AUB must submit, along with their official transcript, a letter from the degree-awarding institution specifying the details of its grading system, expressed either in terms of its equivalence to a 4.0 GPA scale or letter grades (A, B, C with +/- scales). Alternatively, applicants may provide an official letter from the Office of the Registrar of their institution indicating the graduating class average of previous years, along with standard deviation and class size.

Admission as a Regular Student

Applicants are considered for admission as regular students to a graduate program if they meet the following minimum admission requirements:

- An undergraduate GPA of at least 3.3 (B+, or the standardized equivalent from another recognized institution of higher learning) in the major field of study and a cumulative GPA of at least 3.0 (B, or standardized equivalent) for all undergraduate coursework 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, the interfaculty graduate environmental sciences program (IGESP), and the master in finance, a GPA of at least 3.3 (B+) is required for the last two years of undergraduate study or its equivalent at AUB or another university as determined by the faculty/school.
- Students who hold a minor in a field of specialization with a GPA of at least 3.3 (B+) may be considered for admission as regular students in that field.
- At least two letters of recommendation.

- A detailed statement of purpose (around 400-500 words) for each selected major or concentration, outlining the applicant's motivation for pursuing graduate study in that particular field at AUB and specifying research interests and/or practical experience in the field.
- Some graduate programs may have additional admission requirements listed in their respective department or program sections.

In selecting students for master's programs, the faculty/school Graduate Studies Committee may also consider other indicators of achievement, such as research potential, professional or work experience, publications, or other creative work or scholarly activities. In considering such criteria, the Graduate Studies Committee of the faculty/school may, in some cases, give serious consideration to departmental recommendations for applicants who do not meet the minimum undergraduate GPA requirements but who demonstrate instead clear evidence of creative activity and academic potential. Departments submitting such recommendations must provide a written justification to the faculty or school Graduate Studies Committee, which will review each case and make its final recommendation to the dean on a case-by-case basis.

Admission on Probation

Applicants are considered for admission on probation if they meet the following minimum requirements:

- An undergraduate GPA of at least 3.0 (B, or the standardized equivalent from another recognized institution of higher learning) in the major field of study and a cumulative GPA of at least 3.0 (B, or standardized equivalent) for all undergraduate coursework 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 and the interfaculty graduate environmental sciences program (IGESP), a GPA of 3.0 (B) is required for the last two years of undergraduate study or its equivalent at AUB or another university as determined by the respective faculty/school.
- The application requirements and admission regulations governing recommendations, as outlined under Admission as a Regular Student, also apply in this category.

In addition, applicants who do not meet the above minimum requirements but demonstrate reasonable potential for success as graduate students—through relevant practical experience or high scores on a standardized test such as the GRE or GMAT—may also be considered for admission on probation.

The academic performance of students admitted on probation should be evaluated after their completion of at least 20 percent of the total credits of the graduate program in which they are enrolled. For master's programs of 30 credits, that would be 6 credits. For master's programs of 40- 42 credits, that would be 8 credits. These must be credits from at least two courses that are not remedial English language courses, are a minimum of 6 credits and are required by their graduate program. Students admitted on probation must pass and attain a minimum cumulative GPA of 3.3 in these courses to achieve regular status. If students fail to meet any of these conditions, they will be dropped from the program.

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

Applicants who hold a bachelor's degree in a major field of study different from the one to which they are applying, and who lack sufficient academic preparation in that field, may be admitted as prospective graduate students.

Such students are required to complete specific undergraduate course requirements before being granted regular admission to a graduate program. The guidelines governing these course requirements are outlined below.

- To be considered for admission as a prospective graduate student, applicants must have attained an undergraduate GPA of at least 3.0 (B, or standardized equivalent) in all coursework 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, applicants may be considered for admission as prospective graduate students if they have attained a GPA of 3.0 (B) at AUB for the last two years of undergraduate study or its equivalent at another recognized university, as determined by the faculty, and have demonstrated strong performance in courses related to the intended field of study.
- The application requirements and the governing regulations for admission are the same as those outlined under Admission as a Regular Student.
- 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 a GPA of at least 3.3 (B+) in these courses to be admitted to the graduate program and begin work toward their master's degree.
  - Departments may recommend reducing this requirement below fifteen (15) credits, subject to justification and the approval of the faculty/school Graduate Studies Committee. Such reductions may be considered when students have already completed relevant coursework or possess significant academic or professional experience related to the intended field of study. When determining prerequisite courses for admission to MA, MS, or ME programs, departments may also recommend the inclusion of courses outside the strictly defined field of study if deemed relevant. In exceptional cases, outstanding work or research experience in the intended field may be considered in partial fulfillment of the course requirements. All recommendations for reductions below fifteen (15) credits must be supported by departmental justification and approved by the faculty/school Graduate Studies Committee.
  - Departments may also recommend, after the student's first term, waiving certain course requirements in recognition of outstanding performance, pending justification and approval by the faculty/school Graduate Studies Committee.
- Change of Status:
  To change from prospective to regular graduate student status after completion of requirements, students must attain a minimum GPA of 3.3 (B+) in all fifteen (15) credits of undergraduate courses in the field required for admission (including the ones taken prior to acceptance). Students who attain a GPA of 3.0-3.3 (B to B+) may be considered for graduate on probation status, pending a department recommendation and the approval of the faculty/school 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/school Graduate Studies Committee. All supplementary courses must be completed within four consecutive regular terms. Undergraduate courses are not covered by GFAP.

Reapplication and Readmission

Students who seek to return to AUB after a period of non-enrollment exceeding one academic year, without having secured approval for a leave of absence must reapply and will be considered for readmission in accordance with the regular AUB application/admission procedures. If readmitted into the same graduate program, their previous residence as a graduate student will count toward maximum residency.

Requirements for Dual Master Degrees

Qualified graduate students may enroll and earn two master's degrees in distinct fields from two programs within the same or different faculties/schools. Dual master's degrees are programs jointly proposed by two departments/programs from the same or different faculties/schools, recommended by them to the Board of Graduate Studies and approved by the University Senate. In such cases, students will be concurrently granted two degrees at the time of graduation, contingent upon successful completion of the requirements of both programs.
If tuition differs between the two programs, students will pay the higher tuition rate. Students may register as dual degree candidates only in programs that are approved by the university and listed in the AUB Graduate Catalogue. The list of approved dual degree programs is limited to compatible pairs of master's degrees that students can pursue in parallel while maintaining focused research. Students should refer to the relevant section of this catalogue to determine whether dual master's degrees are available in their areas of interest.

To fulfill the basic requirement for the two degrees, students must complete a minimum of eighteen (18) credit hours of graduate coursework in each degree program. The remaining credits include additional coursework and either a thesis (for thesis-option program) or a project (for non-thesis option) that counts toward both master's degrees. In cases where one program offers a thesis option and the other a project option, the thesis option must be adopted. Students will submit one thesis/project for the two degrees. The thesis/project must be approved by both departments/programs and by the relevant faculty/school Graduate Studies Committees. The Thesis/Project Committee for dual degrees must include at least one faculty 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 is determined as follows:

- If both programs require thirty (30) credit hours for degree completion, the dual degree program must include forty-eight (48) graduate credit hours, applicable 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 required for the dual degrees is sixty (60) credit hours, including the thesis/ project as mentioned in the previous paragraph.

In addition to the credit requirements, students must fulfill any other specific requirements set by each master's program. The minimum residency requirement for dual master's degrees is six regular terms.

Application Processes for Dual Master Degrees

Students who wish to apply for dual degrees may submit a single dual degree application, which will be forwarded to both degree programs simultaneously at the time of initial application for graduate admissions. Students already registered in one master's degree may apply for the second degree no later than the end of their second term at AUB to be considered for the dual degree.

- Each program/department will review the application independently. Applicants must meet the admission requirements of both programs and must be accepted into both in order to be admitted to the dual degree program.
- Students admitted to a dual master's degree program may benefit from the Graduate Fellowship and Assistantship Program (GFAP) in either or both participating units; however, the total support awarded cannot exceed what each unit provides for a graduate assistant for one academic year.
- Students admitted to dual master's degree programs will receive a single transcript identifying both degrees and the titles of the two programs.
- Students may withdraw from the dual degree program before completing both degrees. If the requirements for one degree have been fulfilled, that degree may be awarded. Obtaining the other degree is then subject to re-evaluation and would require additional credit and residency requirements.

Transfer of Credits

Up to nine (9) graduate credits may be transferred and applied to one of the two degree programs or distributed between them. Credit transfer follows university policy with regards to the minimum grade required for transferrable courses from other institutions.

Admission to PhD Programs

Admission to the PhD program for students holding a master's degree at AUB is competitive, based on the applicant's academic record, achievements, and alignment with the research priorities of the department/program. Applicants are expected to have demonstrated distinctive academic ability and are considered for admission to the PhD program if they meet the following minimum requirements:

- Hold a master's degree in a discipline approved by the department/program to which the applicants are applying from AUB or another recognized institution of higher learning, with a minimum cumulative GPA of 3.7 (A-) or its equivalent.
- Submit a complete application that includes:
  - Official transcripts from all institutions attended after high school.
  - General GRE test scores. Most programs accept scores that are up to five years old. Departments may set minimum score requirements; applicants should refer to the specific program for more information.
  - A written statement of purpose (approximately 400-500 words) indicating the purpose for pursuing doctoral study in the particular field at AUB, including their research interests and/or relevant practical experience.
  - A portfolio that includes a resume and samples of work, if required by the specific program.
  - Three letters of recommendation.
- Complete an interview which may be conducted in person, by phone, or online.
- Demonstrate English language proficiency. For details on English proficiency requirements, refer to RUSE in the section above.

Additional requirements may be set by the individual programs as approved by the faculty/school Graduate Studies Committee and the Board of Graduate Studies. Applicants are encouraged to consult the relevant department or program, or the Graduate Council for details regarding any additional requirements.

Applicants who hold a master's degree from institutions other than AUB must submit official transcripts along with a letter from each degree-awarding institution 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 provide an official letter from the Office of the Registrar of their institutions indicating the graduating class average of previous years, along with standard deviation and class size.

Admission to a Graduate Diploma Program

Applicants for graduate academic diplomas must hold a bachelor's degree (or its equivalent from AUB or another recognized institution of higher learning) with a GPA of at least 3.0 (B, or an equivalent standardized score from another institution of higher learning). Applicants who do not meet the minimum GPA requirement may still be considered for admission if they demonstrate strong potential for academic success evidenced by relevant practical experience or high scores on relevant standardized tests, and if supported by justified recommendation.

Admission requirements for graduate professional diploma programs are the same as those for graduate academic diplomas, except that there is no minimum undergraduate GPA requirement.

For both graduate professional and graduate academic diplomas, faculties/schools may set additional admission requirements. Some programs require letters of recommendation, while others do not. Applicants to certain diploma programs in certain faculties/schools may be required to submit scores from standardized tests such as the Graduate Record Examination (GRE) or the Graduate Management Admission Test (GMAT) along with the application. GRE and GMAT test scores are valid for five years after the testing year in which they were taken.

Applicants must demonstrate proficiency in the English language. For additional information, refer to RUSE in the section above.

Admission as a Visiting Graduate Student

This category applies to students participating in a study abroad from another university or those enrolled through an exchange program.

Applicants must either hold a bachelor's degree or be currently enrolled in a recognized institution of higher education, pursuing graduate level studies at the master's or PhD level.

Applications must be submitted to the Graduate Council along with the degree and transcript of record by the following deadlines:

- End of January for admission for the following fall term
- End of October for the following spring term
- End of March for the following summer term

GRE test scores are not required for admission as a visiting student.

Applicants must indicate their intended course of study during their visit. Applications are reviewed by the departments offering the selected courses. Recommendations for admission as visiting students require the approval of the faculty/school Graduate Studies Committee.

Admission is typically offered for one term, but may be extended an additional term based on the specific agreement and with the approval of the hosting department/s and the faculty/school Graduate Studies Committee.

Deferred Registration of Admitted Students

Applicants to master's programs who are offered admission for a term and wish to defer enrollment to the next admitting term when that program is offered, may apply do so only if they pay their enrollment confirmation fee and submit a deferral petition through the AUB Application Status Portal. If the acceptance is successfully deferred, the applicant will be informed. The applicant must confirm their enrollment by the deadline for confirmation of enrollment for that next admitting term to which they have requested deferral.

Medical Record, NSSF, and HIP

Medical Record

All new undergraduate and graduate 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 medical clearance process by following the steps below:

- Download the Entrance Student Medical Record from: http://www.aubmc.org.lb/clinical/FM/Documents/student_medica_record.pdf
- Complete, sign, and stamp by the students' personal physician or a physician at the AUBMC Family Medicine clinics, which is located in Wassef and Souad Sawwaf Building on Clemenceau Street (phone: +961 1 35 00 00 - Ext. 3000). Students should not forget to take their vaccination records to the physician's visit.
- Activate their AUB net account and complete the necessary information, including immunization and other medical history, and upload the Student Medical Record form using the following link: http://uhs.aub.edu.lb. Students may scan or take a snapshot of the signed form using their phone, provided that the document is readable.

If the submitted form is declined by UHS, an automatic email will be sent to the concerned student. Students will be responsible for updating the vaccination with their personal physician and resubmitting the form.

Old returning students need to update their medical record by contacting UHS at +961 1 35 00 00 - Ext. 3015 or 3013.

All medical records are confidential.

For more information, please contact the University Health Services at +961 1 35 00 00 - Ext. 3015 or 3013, Monday to Friday, from 8:00 am to 5:00 pm.

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

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, except freshmen and students over 30 years of age. Non-Lebanese students are not eligible to join.

All new students, as well as returning students who have been absent from AUB for several terms and meet the above eligibility criteria, are required to complete the NSSF declaration form in person at the Office of the Registrar window, according to the deadlines circulated to students.

Please read the following carefully before filling out the form:

A- Students who already benefit from NSSF:

- Students who benefit from one of their parent's NSSF, or
- Students who are employed and have their own NSSF number must submit a certificate showing their NSSF number or that of their parents so that the fee can be refunded. The fee is non-refundable after the deadline.

B- Students who do not benefit from NSSF:

- Students who do not benefit from one of their parent's NSSF, or
- Students who are not employed must submit 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.

Note: AUB staff dependents must also declare.

Health Insurance Plan (HIP)

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

- Second-class health care coverage is mandatory for all students throughout their years of study at AUB. Therefore, any new or continuing student registered for at least 6 credit hours is automatically enrolled in the Health Insurance Plan (HIP). However, students may be exempted from enrolling in HIP if they provide proof of coverage by another healthcare insurance provider.
- HIP members are required to exclusively use the medical services of the AUB Medical Center (AUBMC). Student HIP coverage is limited to medical care within Lebanon only.
- A 'student' is defined as a person registered for a course of study at the university, whether working towards a degree or not, on either a full-time or part-time basis. Auditors are not considered students.
- While registered, PhD students are eligible for HIP until they complete 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 annually by the AUB Benefits Office.
- Students who register at the beginning of the second term are covered until August 30 of the same year, provided they do not graduate, withdraw, or become suspended and/or dropped from the university.
- Students who register at the beginning of the summer term are covered until August 30 of the same year. Summer coverage is strictly limited to services provided by AUB Medical Center (AUBMC).
- During the fall and spring terms only, students who are not on campus or outside the vicinity of the AUB Medical Center may seek care at the nearest medical service provider in case of emergency. Reimbursement of the bill will not 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, provided 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.
- Students will be covered by HIP from the beginning of a specific term, provided registration and payment of fees are completed. Coverage ends 48 hours after graduation or upon leaving the university due to withdrawal or being dropped from the university.

Note: These guidelines are provided as a summary for convenience only. They do not define, alter, or limit the official provisions of the plan.

Fees, Expenses, Tuition, and Withdrawal Information

The American University of Beirut (AUB) is a non-profit institution. Costs to students, including 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 apply to both currently registered students and new students.

Payment of Fees

- Students are required to pay their tuition fees as well as any additional university charges, including health insurance, internet fees, social activity fees, and contributions to the National Social Security Fund.
- Fee statements can be accessed on the AUB website/AUBsis.
- All students must complete their registration and pay tuition fees, along with any other charges, according to the university calendar available online for both the first and second terms. Late payments may be accepted under special circumstances, within five working days after the official deadline, subject to a late payment fee of $100.
- Students with a zero balance or an outstanding credit balance must notify the Office of the Comptroller—Students Section via email at: compt_sas@aub.edu.lb to finalize their registration.
- Sponsored students, staff dependents, graduate assistants, and student staff members must contact the Office of the Comptroller—Students Accounts Section—before the payment deadline to finalize their registration and confirm their enrollment and attendance.
- Students who require financial assistance must apply to the Office of the Comptroller for deferred payment arrangements (installment plans) for tuition fees, according to the university calendar for the first and second terms. Applications for deferrals will not be accepted after the specified deadline. Deferred payments are not an automatic right and will only be granted under specific, exceptional circumstances. Students who arrange deferred payments must complete all registration procedures within the designated deadlines and make the initial payment by the due date. Deferred payment plans are not available for the summer term in any faculty.
- The Office of the Comptroller is responsible for reviewing applications for deferred payment arrangements and overseeing the administration of such plans.
- Students applying for deferred payment arrangements must pay at least 50 percent of the net tuition amount due. All other charges must be paid in full with no deferrals. A $36 application fee is required regardless of whether the application is approved. If approved, students must pay the remaining tuition balance, the $36 application fee, and 1 percent monthly interest on the deferred amount. All payments must be made by the announced deadlines.
- Due dates are final, and late payment fees will not be waived for any reason.
- Students are expected to fulfill all financial obligations to the university by the specified due date. Failure to do so will result in the university deleting students' courses, and/or placing an encumbrance on the students' records, which will prevent future registration, release of transcripts and diplomas, and access to other university services. In the case of course deletion, students lose the right to sit in classes, take examinations, access Moodle, and enter campus. It is the responsibility of the students to be aware of all registration and fee payment 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 available on the following website: www.aub.edu.lb/comptroller/Pages/Student.aspx.

Withdrawals

In the event students withdraw 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 applies to refunding fees for the summer term:

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.

Financial Aid

Graduate

AUB offers financial aid to deserving and qualified students applying for first graduate degree in the form of Need-Based Financial Aid Grants.

Need-Based Financial Aid Grants

Prospective Students

The financial aid application period is 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 containing information on the financial aid process, instructions on 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 application period announced on the Office of Financial Aid website. They 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, provided the student remains in good academic standing.

Governmental Student Aid for North American Students

US Federal Student Loans

American students pursuing their studies at AUB may apply for low-interest federal loans offered by the US Treasury in the form of Direct Stafford and PLUS loans. Applications are submitted annually 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 satisfactory academic progress are eligible for these loans.

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

AUB and its Office of Financial Aid have developed a consumer information portal to provide details about the university and the federal student aid loans it offers, as part of its response to the Higher Education Act (HEOA) of 1965, as amended. The university discloses general information and reports on various policies, procedures, and operations related to academic programs, admissions and financial aid, student outcomes, and health and safety.

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

Canadian Grants and Loans

The Governments of Canadian provinces offer student grants and loans to eligible Canadian students enrolled at AUB.

Students should consult the student grants and loans service of their province to determine their eligibility for student grants and loans, find out how much they can receive, and apply for the student grants and/or optional loans through a single 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.

AMERICAN
UNIVERSITY
OF BEIRUT
Assessment and Testing Center

Mission

The Assessment and Testing Center supports AUB's mission of academic excellence by providing a high-quality, secure, and accessible testing environment. The center facilitates a broad range of assessments that contribute to academic and professional development while upholding the highest standards of quality, integrity, and confidentiality.

Vision

The center aspires to be a regional leader in testing services by continuously enhancing its offerings to meet international standards and the evolving needs of the academic and professional communities. In alignment with AUB's mission, the center strives to create a secure, inclusive, and supportive testing environment for all.

Services Offered by the Assessment and Testing Center

The Assessment and Testing Center offers a comprehensive range of testing services, including:

1. Language Proficiency Testing (AUB-EN, AUB-IET, AUB-EET): language proficiency assessments for academic admission and recruitment purposes.
2. Writing Placement Testing (WT): assessments used to place students into appropriate writing courses within AUB's Communication Skills Program (CSP).
3. College-Level Skills Testing (Territorium EPP® E-Proficiency Profile): assessments designed to measure essential academic skills such as critical thinking, reading, writing, and mathematics.
4. Testing for International Organizations (British Council: IELTS, ETS: Digital SAT): globally recognized assessments that support students in meeting international educational and professional standards.
5. Proctoring Services for Distance Education: secure proctoring services for students enrolled in distance education programs from other institutions, ensuring the integrity of remote exams.
6. AUB Faculty Exams: secure testing environments that enable AUB faculty to administer exams to students.

Facilities

The Dr. Samer Kamil Al-Rayyes Assessment and Testing Center is located on the fifth floor of Nicely Hall. The facility includes 192 desks, 120 of which are computer workstations for online exams, and is equipped with surveillance systems to ensure confidentiality and exam integrity. The environment is designed to be quiet, comfortable, and conducive to focused testing.

AMERICAN UNIVERSITY OF BEIRUT

Center for Community Engagement (CCE)

Executive Director	Shibli, Rabih
Administrative Assistant	Bou Fadel, Mireille
Staff and Research Assistants	Abou Farraj, Lina; Fleihan, Hala; Chahine, Karen; Bou Matar, Sarah; Massalkhi, Fatima; Ziadeh, Raghda; Gabriel, Alan; Khayata, Rim; Bzeih, Bachar

Vision

To position AUB as a civic convener and frontline responder to societal conflicts and challenges, while realizing the potential of university students as changemakers in local and global contexts.

Mission

To leverage operational research, campus community, and socially responsive partnerships to address societal challenges, while equipping students with the professional skills necessary for ethical and effective crisis management. This mission is reflected in three cross-cutting tenets:

1. **Engaged Scholars Program (ESP)**
   Each year, CCE guides more than 700 undergraduate and graduate scholarship recipients from Lebanon, the Middle East, Africa, and Afghanistan through a four-track journey beginning with volunteering rotations, advancing to internships with community-based organizations, and culminating with the development of Community Engagement Projects (CEPs), which are grounded in both scholars' expertise and local community needs. Throughout this process, scholars are provided with sequentially layered skills-building workshops enabling them to complete program milestones.
2. **Fundamentals in Community Engagement (FCE)**
   CCE offers three-credit Community Engaged Learning courses as part of AUB's core General Education curriculum. Students first enroll in Phil 200A, a one credit self-paced online prerequisite that introduces the principles and values of community engagement and features field reports from AUB student-led community projects. The remaining two credits are completed through Phil 200B and Phil 200C, which combine in-person seminars with supervised field work and volunteering rotations with partners from the public sector and community-based organizations. This course sets the foundation for experiential learning to become an integral component of the academic journey for students across all disciplines.

3. **Strategic Community Initiatives (SCIs)**
   CCE plays a leading role in empowering the most vulnerable populations through high impact multi-year interventions by first identifying themes, setting a roadmap for project development, and establishing strategic partnerships with academia, stakeholders, and funding agencies. Each contextualized SCI begins as a meticulously designed prototype aimed at tackling local complexities; it must be flexible, resilient, and positioned in the most appropriate setting 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. By leveraging cutting-edge operational research, SCIs produce tangible solutions that can be expanded to cover a wider scope within the same targeted community and transferred to various locations enduring similar challenges.

AUB's community engagement through CCE has earned international recognition. AUB has been designated as the "most civically engaged campus" in the Middle East and North Africa, and has 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.

AMERICAN
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OF BEIRUT
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 center fulfills this mission through its peer tutoring program, support for General Education Writing in the Disciplines courses, and various special projects and events at AUB and beyond. Both the administration and tutors of the center are committed to research and community outreach. The Writing Center offers support to 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, working to help individuals become stronger writers in both English and Arabic. Appointments can be scheduled through the online platform: https://aub.mywconline.com.

Writing resources, along with more information about Writing Center tutors and services, are available on the following website: https://www.aub.edu.lb/fas/writing_center/Pages/default.aspx.

The Writing Center also supports faculty members through workshops on writing in different genres, small group meetings, and individual consultations. Writing Center staff collaborate with faculty members as they develop, assess, and revise courses that fulfill the General Education-mandated requirement to offer Writing in the Disciplines instructions in every major. In addition, special discussion groups organized by the tutors are also offered to read and analyze certain issues of style as related to the sense of the written texts in different genres. Workshops for programs or departments and individual consultations for faculty seeking to enhance writing assignments and activities in their courses can be scheduled by emailing the Writing Center directly at writingcenter@aub.edu.lb.The Writing Center office is located in West Hall Basement.

AMERICAN
UNIVERSITY
OF BEIRUT
Office of Student Affairs

The Office of Student Affairs oversees student activities, athletics, counseling, accessible education, student housing, and career and placement services. It also manages university-wide operations, such as the new student orientation, student elections, and the work-study program. The office is dedicated to enhancing students' overall well-being and create opportunities for them to enrich and broaden their educational experience.

Contact Information
West Hall, Ground Floor
Tel: +961-1-374374 Ext. 3170
Fax: +961-1-744478
Email: osa@aub.edu.lb
Website: www.aub.edu.lb/SAO/Pages/default.aspx

Student Activities

The Department of Student Activities enhances the student experience beyond the classroom by offering opportunities for student development through co-curricular activities that complement academic programs at AUB. The Department of Student Activities strives to enrich students' intellectual, ethical, and social development by engaging them in university and community events and providing leadership opportunities. Our aim is to foster holistic student development. Students can join clubs, societies, student government, student publications, the AUB Outdoors Festival, and other major student-led events.

All student activities, whether on or off campus, must be approved by the Department of Student Activities and the Dean of Student Affairs. The department facilitates these activities and ensures that students follow proper event-planning procedures. West Hall building is considered the student hub, hosting most student activities as well as various AUB events sponsored by faculties, departments, centers, and alumni.

Contact Information
West Hall, Ground Floor
Tel: +961-1-374374 Ext. 3197
Email: studentactivities@aub.edu.lb
website: www.aub.edu.lb/SAO/activities/Pages/default.aspx

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) serves as the hub for athletics, recreation, and wellness on campus.

CHSC is comprised of three buildings. Located 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. Adjacent to the pool building, the official-size greenfield is surfaced with artificial turf and surrounded by a 6-lane, 400-meter track.

The gymnasium building houses three full-size multipurpose courts for basketball, volleyball, handball, futsal, badminton, and table tennis. It also hosts two annual engineering competitions in robotics and civil design. Additional activities include two free-weight areas, two cardiovascular training zones, a stretching area, an activity room for fitness classes, yoga, dance, martial arts, and two squash courts.

The third building features a 280-seat auditorium and a rooftop amphitheater with natural grass terraces. The auditorium hosts student classes, exams, TED talks, conventions, and other events.

During the summer, AUB opens its private beach for the community to enjoy swimming and recreation. The facilities include a shallow pool for children and a beach volleyball court, providing a relaxing environment by the crystal blue waters.

Student-athletes may join one or more of AUB's 26 varsity teams, collectively known as the AUB Phoenix. In fall 2025-26, 1,906 students registered for tryouts and 532 in the spring tryouts. 515 were selected in the fall. Since 2023, AUB has been competing in the Federation Sportive Universitaire du Liban (FSUL) which organizes collegial sports competitions for 24 universities across Lebanon.

In Addition, AUB will participate in two main events: the 27th Panathlon Club University, PCU University Games 2026 in Antwerp, Belgium and the World Inter-Universities Conference WIUC 2026 in Rome, Italy.

AUB Athletics will award three full tuition-free scholarships to highly distinguished athletes for the years 2026-27, along with several partial scholarships. The President's Athletic Scholarship and the Distinguished Athlete Scholarship Award recognize student-athletes who have made significant contributions to their respective sports. Partial athletic scholarships are also available based on athletic performance and achievements during the season.

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 Junior Varsity)	Handball (Men, Women)
Archery (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)	Cheerleading (Men, Women)

Contact Information
Charles Hostler Student Center
Tel: +961-1-374374 Ext. 3208 or 3217
Email: chsc@aub.edu.lb
Website: www.aub.edu.lb/sao/sports/Pages/default.aspx

Student Housing

AUB is one of the few residential universities in the Middle East offering a vibrant campus environment where extracurricular activities thrive and strong communities flourish.

Priority for housing is given to undergraduate applicants, starting with freshman students (eligibility criteria available on the Student Housing homepage).

Students need to apply via AUBsis. Application steps can be found under Important Housing Information on the Student Housing website: www.aub.edu.lb/sao/housing/Pages/default.aspx. Students are strongly encouraged to apply as soon as the application portal is open, as spaces are in high demand.

Housing charges appear on the student's statement of fees after registration and vary depending on the accommodation type. Student Housing Rates are published here: www.aub.edu.lb/SAO/housing/Pages/Housingrates.aspx.

Guests affiliated with AUB programs are also not forgotten at AUB. For more information on available room categories, rates, and booking details, visit our dedicated page through the following link: www.aub.edu.lb/SAO/housing/Documents/GUEST-POLICY-2324.pdf

Residence Halls

AUB has eight student residence halls: six for women and two for men. All halls are equipped with heating, air-conditioning, hot water, washing machines, dryers, irons, wireless internet, and vending machines with snacks and soft drinks. Rooms are furnished with a bed, desk, chair, and closet.

- **Women's Residence Halls:** Four are located on lower campus overlooking the Mediterranean, one is located on upper campus, and one off-campus dorm is in the heart of Hamra, within short walking distance of campus.
- **Men's Residence Halls:** Both are located in the west part of upper campus, overlooking the splendid Mediterranean Sea and close to Bliss Street with its abundance of shops.

Each hall features a reception area, a shared kitchen, a social lobby, and laundry facilities.

Contact Information
West Hall, Ground Floor
Tel: +961-1-374374 Ext. 3175, 3183
Email: studenthousing@aub.edu.lb
Website: www.aub.edu.lb/sao/housing/Pages/default.aspx

Career Hub

The Career Hub at AUB empowers students and alumni to navigate and achieve their career goals through personalized guidance, innovative professional development resources, strong industry connections, and soft skills training. It prepares students for the workplace and supports a smooth transition from student life to professional careers.

The Career Hub advances AUB's institutional mission of graduating "individuals committed to creative and critical thinking, lifelong learning, personal integrity, civic responsibility, and leadership."

The Career Hub strives to promote:

Career exploration and decision-making by helping students navigate career options and develop effective planning skills through large-scale events and individual career guidance meetings.

Skill development by equipping students with competencies valued by employers and industry professionals, enhancing their professional image through in-house and industry-led career workshops, as well as one-on-one sessions.

Experiential learning by partnering with industry to offer students internships, job shadowing opportunities, and corporate visits that allow them to 'learn through doing.' This hands-on approach encourages discovery, exploration, and reflection, better preparing students for future careers.

Career placement by assisting AUB students and graduates in securing full-time employment, internships, and part-time jobs. We also organize on-campus and virtual events that connect students and alumni with employers for career development and placement purposes.

Employer development by fostering and maintaining long-term relationships between AUB and employers at both the local and regional levels.

Major Career events by hosting the annual Career Fair each spring, along with multiple recruitment events throughout the year. These events provide students with opportunities to network with top employers, explore career paths, and secure suitable jobs.

Contact Information
West Hall, Room 338
Tel: +961-1-374374 Ext. 3172
Fax/Direct Phone Number: +961-1-744488
Email: careerhub@aub.edu.lb
Website: www.aub.edu.lb/SAO/cps/Pages/default.aspx

Work-Study Program

The Office of Student Affairs coordinates an extensive work-study program that offers on-campus employment opportunities for eligible full-time undergraduate and graduate students in good academic standing. The program enables students to work with AUB faculty and staff, fostering stronger connections within the university community.
Students can apply through AUBsis within the deadlines announced by the Office of Student Affairs. Placements are determined based on the date of application, demand, qualifications, and job availability. Students may work up to 80 hours per month during the fall and spring terms, and up to 60 hours per month during the summer term.

Each year, more than 700 students participate in the program, gaining the opportunity to contribute to their educational expenses while also developing job skills by working with faculty, administrators, and staff across campus offices and the Medical Center.

Contact Information
West Hall, 3rd floor
Tel: +961-1-374374 Ext. 3177
Email: wsp@aub.edu.lb
Website: www.aub.edu.lb/SAO/Pages/Work-Study-Program.aspx

Counseling Center

The Counseling Center provides a supportive environment and ensures access to quality counseling services to promote mental, psychological, and emotional well-being, contributing to academic success and student self-actualization. It addresses the mental health needs of the university community while upholding students' right to mental health in an engaging and tolerant environment that fosters lifelong learning, growth, and development.

Our services include individual counseling with licensed clinical psychologists, short-term therapy and crisis intervention, group counseling that encourages peer connection and shared learning, as well as workshops designed to strengthen coping skills, well-being, and academic performance. In addition, the center offers peer counseling through a structured program that trains students to provide empathetic and nonjudgmental support to their peers. We also prioritize community capacity-building by sensitizing AUB faculty and staff through awareness and training programs that deepen their understanding of student mental health and strengthen the university's supportive network.

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

Contact Information
West Hall, 2nd floor
Email: counselingcenter@aub.edu.lb
Tel: +961-1-374444 Ext. 3196
Website: 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 is committed to fostering an accessible university community that welcomes, respects, and values individuals from diverse backgrounds and abilities. In line with this mission, the Accessible Education Office (AEO), under the Office of Student Affairs, works to ensure access for students with qualified disabilities to all academic programs at AUB.

To achieve this goal, the AEO collaborates with students, faculty, and staff to provide reasonable accommodations that remove barriers to participation in a robust and well-rounded student experience —without altering the academic and technical requirements of the program and/or activity. These accommodations are offered in accordance with AUB's commitment to these goals, its non-discrimination policy and practices, as well as relevant US federal law.

The AEO works in an individual and confidential manner with students who choose to disclose their disabilities. Upon admission to AUB, students requiring special accommodations due to a documented disability or condition must contact the AEO to ensure the necessary support is provided for their learning experience.

Beyond accommodations, the AEO also plays an active role in shaping an inclusive and accessible campus by empowering and supporting students with disabilities through club collaborations, advocacy, and awareness campaigns. In addition, the AEO provides training and works closely with accessibility partners to promote and enhance inclusive practices across the AUB community.

Contact Information
Accessible Education Office
Tel: +961-1-350000 Ext. 3151, 3144
Email: accessibility@aub.edu.lb
Website: www.aub.edu.lb/SAO/Pages/Accessible-Education.aspx

AMERICAN UNIVERSITY OF BEIRUT

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 students, 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.

Contact Information
West Hall, 3rd floor, Room 313
Tel: +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 support and visa assistance (following admission to AUB).
- On-site orientation, mentoring, and intercultural activities as well as explanations of public government services, processes, and on-campus procedures.
- Support in obtaining student residence permits and/or following up on transactions at immigration authorities.
- Support in 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-seeking students, 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 if they 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 is available on the OIP website.
Once registered at AUB, all students who do not hold Lebanese passports and wish to remain in Lebanon beyond the validity of their entry visas are required to obtain a residence permit before their visa expires. Students must apply for this permit within one month of arriving in Beirut—and only after registering and paying their AUB tuition fees.
The Office of International Programs (OIP), in coordination with the Office of the Registrar, assists registered non-Lebanese students in obtaining the necessary certificates required for securing residence permits from the Lebanese authorities. Information regarding the residence permit process is communicated at the beginning and throughout each academic term and is also available 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/school, and clearance from The Office of International Programs (OIP) are required. In cases where students will be taking courses at a host university that are prerequisite 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 are a vital part the overall 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 standard AUB tuition rate, based on a 9-credit course load.

Study Abroad Students

Students on study abroad programs at universities with which AUB does not have a bilateral exchange agreement are required to 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 exempted from the AUB miscellaneous fees.
Students wishing to go on exchange or study abroad programs must complete both 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 a study abroad program lasting up to one academic year, unless applying for a summer abroad program.
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 residency requirements as stipulated in the General University Academic Information section.
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 GPA of 3.3.

Students will receive credit for all course work completed abroad provided that the following conditions are met:

a. The relevant academic departments at AUB have pre-approved the courses through the Study Abroad Online Petition System.
b. Students achieve a minimum passing grade equivalent to the required AUB grade in each of the courses as accepted by the students' faculty/school. Credits received on study abroad and exchange programs are considered to be transfer credits and will appear 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. None of the courses taken is online but up to 25 percent of them may be hybrid.
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. Failure to do so may result in denial of course transfer upon return to AUB.

Registration Process at AUB for Students 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 two years, that is four regular terms or three regular terms and one summer. All requirements for the master's degree must be completed within eight regular terms for full-time students and 10 regular terms for part-time students, starting from admission to graduate study.
- PhD students must register for at least six terms beyond the completion of the master's degree. All requirements for the degree of doctor of philosophy must be completed within ten regular terms of 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's thesis registration may be permitted, upon approval of appropriate faculty/school committees, while studying abroad. The thesis defense must take place at AUB according to the requirements stipulated in the General University Academic Information section.
- **PhD students:** PhD thesis credit registration can only be done once the proposal has been accepted, must be continuous and sequential, and must be approved by the department concerned.

Once students complete all of the steps above, their registration status will appear as either 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 eligible for early advising and early online registration for the term following their study abroad program. Study abroad and exchange students will enjoy the same privileges as continuing students on campus.

Credit Transfer for Students Upon Return from Their Term or Year Abroad

To ensure successful credit transfer upon returning to AUB, students must:

- Obtain an official transcript from the host university and request that it be sent directly to the Office of International Programs (OIP):
  - Hardcopy official transcripts should be mailed to the following address:
    AUB / Office of International Programs
    West Hall, 3rd Floor, Room 313
    1107 2020, Beirut, Lebanon
  - Electronic official transcripts: If the host university issues only electronic transcripts, they must be:
    - Certified by a university official with a certificate provided by a recognized security vendor, or
    - Encrypted and accessible only to the recipient. These should be emailed to: aubabroad@aub.edu.lb
- Submit an Exchange or Study Abroad Testimonial Survey.

For a complete list of exchange and study abroad opportunities at AUB, or to review the study abroad guidelines, please visit www.aub.edu.lb/oip or go to Room 313, West Hall.

Study Away – AUB and AUB Mediterraneo

Eligible AUB and AUB Mediterraneo graduate students must complete at least 2/3 of the program at the home campus (i.e., a maximum of 3 courses out of 10 can be taken at AUB). The following condition must be met to establish eligibility:

> Graduate students must have completed six (6) credits or eighteen (18) ECTS at their home campus.

For AUB students, this mobility program offers the opportunity for taking part in graduate programs at AUB Mediterraneo that can enhance their academic, personal, and professional development.

Credit Transfer

AUB and AUB – Mediterraneo students participating in this mobility program will receive the credits and grades associated with the course work completed at the host campus provided that the relevant academic departments/programs at the home campus have pre-approved the courses. All academic rules and regulations will apply at the "home campus" once the students return from the Study Away program, as per the study guide for AUB Mediterraneo students and the University Catalogue for AUB students.

OIP facilitates several study abroad and exchange programs including Erasmus+ for graduate students. AUB's growing number of international partner institutions are listed on the following website: https://www.aub.edu.lb/oip/pages/search.aspx.

OIP Resources for Faculty

The Office of International Programs (OIP) serves as a central resource for faculty engaged in international education, mobility, and global collaboration. OIP supports faculty by providing guidance on international standards and best practices related to credit and grade transfer, when applicable. OIP maintains an up-to-date list of institutions, consortia, and universities with which AUB has formal agreements for student, staff, and faculty mobility. OIP also advises faculty on the development of new student exchange agreements and institutional partnerships. All exchange agreements require provost approval prior to implementation. Faculty interested in exploring new international collaborations are encouraged to consult with the director of OIP at an early stage of the process.

AMERICAN UNIVERSITY OF BEIRUT

General University Academic Information

Graduate

Academic Rules and Regulations

The general policies, procedures, and minimum requirements for advanced graduate 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 or PhD degree.

Academic Advisers

For the master's degree level, refer to Supervision of Master's Thesis or Project section. For the PhD degree level, refer to Supervision of Doctoral Thesis section.

RCR Requirement

The Responsible Conduct of Research (RCR) requirement must be met by all newly admitted degree seeking graduate students, both at the master's and PhD levels. The requirement applies to 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/school and department/program. RCR online 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

Students who fail to credit properly ideas or materials drawn from another person's work commit plagiarism. Putting your name on a piece of work—any part of which is not your own— constitutes plagiarism unless that section is clearly marked, and the work from which you have borrowed is fully identified. Plagiarism, falsification of data, resubmitting the same material to different courses, 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 (https://aub.policytech.eu/dotNet/documents/?docid=147&public=true) and in the University Policy and Procedures concerning Research Misconduct (https://aub.policytech.eu/dotNet/documents/?docid=159&app=pt&source=browse).

Language of Instruction

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 Policy

- 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 who are withdrawn for excessive absence from a course receive a grade of "W."
- An instructor who withdraws students 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 within 72 hours of the missed quiz or exam. Makeup 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 students, the matter should be referred to the appropriate faculty/school committee. Instructors will not schedule an exam at the time when any other regularly scheduled course is offered.

Leave of Absence

Requesting a leave of absence

All graduate students are expected to make steady and satisfactory progress towards 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.

Leaves of absences are approved based on documentation of a justified reason and the time of submission. Reasons deemed acceptable prevent students from carrying out their graduate studies. Students are strongly advised to consult with their advisers 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. Refer to the Continuous Thesis Registration section.

Reactivation

Students with an approved leave of absence or with an unauthorized leave of absence of less than a year are not required to submit a reactivation form. Students should be granted an automatic reactivation of their academic status through the Graduate Council.

Reapplication and Readmission

Students who seek to return to AUB without having secured approval for a leave of absence 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 readmitted into the same graduate program, their previous residency as a graduate student will count towards maximum residency.

Category of Students

Full-Time Status

Graduate students are considered to be in full-time status if any of the following apply: Enrolled in 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 (as defined in Admission to Candidacy section), or
- PhD students on PhD fellowships that provide monthly stipends and tuition coverage.

Part-Time Status

Students who do not fulfill any of the above full-time mentioned conditions are considered to be part-time.

Course Audit

Students who wish to attend individual classes without receiving credit may apply for course audit.

- AUB students may apply for a course audit through the online petition system.
- Non-AUB students must fill out the following form, which is available on the Office of the Registrar's website, have it signed by the concerned instructor, and email it to: regist@aub.edu.lb to obtain approval. https://www.aub.edu.lb/Registrar/Documents/auditcourse-form.pdf

To be eligible for a course audit, applicants must:

- Hold either a baccalaureate II or its equivalent, or a bachelor's degree or its equivalent from a recognized academic institution.
- Obtain approval from the instructor of the course.
- Register for the course audit at the Office of the Registrar.
- Pay the required tuition fee at the Students Section of the Office of Comptroller.

Course audit is not available for laboratory, studio, or seminar courses.
Course audit is allowed based on available seats, so registration takes place after that for regular students.
The university does not grant academic credit for course audit.

The Graduate Fellowship and Assistantship Program (GFAP)

The Graduate Fellowship and Assistantship Program (GFAP) 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 by faculties 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/school to which students belong and should be filled out prior to the deadline set by the faculty/school.

Students who are admitted on probation are not eligible for GFAP. Remedial undergraduate courses are not covered by GFAP.

Students benefitting from the GFAP policy can also participate in paid work as graduate research assistant, graduate teaching assistant, or as graduate administrative assistant, as detailed in the GFAP policy.

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 in Lebanon 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; they 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 the Registrar.
- 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.

Graduate Level Courses

- The minimum passing grade for a graduate course is C+ for master's students and B for PhD students.
- The minimum grade for graduate students 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 for Prospective Graduate Students

Prerequisite courses are undergraduate courses taken to make up for deficiencies in the students' 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 or set limitations on how many times students can repeat a prerequisite course that they have failed.

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 term. 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, students must discuss the issue with the chair of the department. If students are still not satisfied, they must submit a petition to the faculty/school 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. Students must submit a petition within 72 hours of determining they wish to request an incomplete, for instance, when a final exam is missed, along with evidence of a valid excuse. Medical reports and/or qualified professional opinions issued by an AUBMC doctor or by the University Health Services are considered.

Incomplete coursework is initially reported as "I" followed by a grade that reflects the evaluation criteria outlined in the course syllabus. A grade of zero is computed for all missed work. If the coursework is not completed within the specified period, the "I" is removed, and the attached grade becomes final. If the student completes the work, the instructor submits the final grade.

In exceptional cases, a grade of "I" may be assigned by the appropriate faculty/school committee if the incomplete period is extended beyond the normal reporting period, based on an approved petition in the online petition system.

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 towards master's degree requirements if the applicants attained a cumulative GPA of at least 3.3 in the undergraduate courses taken in the major or related field of study. Only graduate courses in which the student 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 of more than 33 credits, the maximum number of transferable credits is 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 applicants earned an equivalent grade of B+ or above, may be transferred to another master's degree at AUB. For programs with 33 credits or fewer, 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 towards 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.

Transfer of Credits from a Graduate Diploma Program

The number of course credits that can be transferred from graduate diploma to a master's degree program is up to 12 for graduate academic diplomas and up to six for graduate professional diplomas. In addition, only credits from graduate-level courses in which the applicants 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.
Transfer of credits from master's degree programs to online graduate diplomas is not allowed.

Policy on Course Exemption

Exemption from a graduate course may only be considered when the students have proof that they have satisfactorily completed a comparable graduate level course in a recognized university, normally with a minimum grade of B+ or the equivalent taken in a period not exceeding the last 5 years. Graduate students are allowed to be exempted from courses for a maximum of 9 graduate credits. The requirement of the exempted course is waived but not its credits. The candidates have 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.

Transfer of Credits into a PhD Degree Program

Graduate courses taken beyond the master's degree requirements at AUB or other recognized institutions, are only transferable for credit towards PhD degree requirements if the applicants attained a cumulative average of at least A- in the graduate courses taken in the major field of study. 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.

PhD students registered under an approved cotutelle agreement may count up to 12 credits completed at the host institution toward AUB doctoral credit requirements, in substitution for credits that would otherwise be taken at AUB, subject to prior approval by the thesis adviser(s), department, and Graduate Studies Committee. The same conditions stipulated above apply.

Change of Program 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 program within the same faculty/school: students may apply, following the set deadlines for the graduate admissions process, for change of program within the same faculty/school by petitioning the department to which they are planning to join and securing its approval and the approval of the faculty/school 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 program.
- Transfer within an interfaculty program: students should apply to the relevant interfaculty program committee seeking its approval and the approval of the faculty/school Graduate Studies Committee of the faculty/school to which the students wish to transfer.

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). Transfer 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 requires the recommendation of the department chair and approval of the faculty/school Graduate Studies Committee.

Academic Standing of Students Working for a Master's Degree

The academic performance of students is first evaluated after their completion of at least 20 percent of the total credits of the graduate program in which they are enrolled and is then evaluated every term thereafter. Master's students are in good standing when their graduate cumulative average is B+ or above. Students must be in good standing in order to be awarded a degree.

Students Admitted on Probation

The academic performance of students admitted on probation should be evaluated after their completion of at least 20 percent of the total credits of the graduate program in which they are enrolled. For master's programs of 30 credits, that would be 6 credits. For master's programs of 40- 42 credits, that would be 8 credits. These must be credits from at least two courses that are not remedial English language courses, are a minimum of 6 credits and are required by their graduate program. Students admitted on probation must pass and attain a minimum cumulative GPA of 3.3 in these courses 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 students is first evaluated by the department upon completion of 20 percent of the total credits of the graduate program in which they are enrolled (see above) and then is evaluated every term thereafter:

- Students are placed on probation if they attain a cumulative GPA 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 GPA 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 C+. In case the course will not be offered during the student's residency, the student, in consultation with the adviser, must petition the faculty/school Graduate Studies Committee to substitute a course that will be treated as equivalent for the purpose of GPA calculation.

The department or program in which the students are enrolled may recommend probation to the faculty/school Graduate Studies Committee even though the students have attained an adequate cumulative GPA. In such cases, evidence must be provided for discussion and voting at the faculty Graduate Studies Committee.

Changes in probationary status of enrolled graduate students are reviewed at their respective faculties/schools 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 students with copies to the department chair, student adviser, and Office of the Registrar.

Dismissal

The faculty/school Graduate Studies Committee may dismiss master's students, in consultation with the department/program, from graduate study if any of the following conditions arise:

- Probation status based on cumulative average is not removed in the term following the first probation, excluding students admitted on probation (refer to the previous section on probation and removal of probation).
- Students are placed on probation for a second time.
- Students have a cumulative GPA of less than 2.3 after completion of coursework constituting 20 percent of the total credits of the graduate program in which they are enrolled (see above).
- Students fail to achieve a passing grade in two courses in one term.
- Outside the first term of study, students achieve a cumulative GPA 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 to the tutorial course limitation for individual students will require approval of the department chair and the faculty/school 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/school 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.

Additional Language Requirements

Individual departments and programs may set their own requirements for languages other than English. Examination procedures for these languages should be approved by the faculty/school Graduate Studies Committee.

Residency Requirements

To meet the minimum residency requirements for the master's degree, students must be registered and in residence as graduate students for at least:

1. Two academic years (i.e., four regular terms) for thesis-based programs.
2. Three regular terms and one summer term for project-based programs.
3. Three regular terms for executive or strictly course-based programs.
4. Two regular terms for students holding a bachelor of engineering as their undergraduate degree.

An exception allows two summer terms to be counted as one regular term for residency, but this allowance may be used only once.

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/school Graduate Studies Committee and is subject to acceptance by the Ministry of Education and Higher Education.

The period of an approved leave of absence does not count towards residency. Refer to the Leave of Absence section.

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

Residency Requirements for Dual Master's Degrees

To meet the minimum residency requirement for dual master's degrees, students must register and be in residence as graduate students for at least six regular terms.
All requirements for the dual degrees must be completed within a period of maximum five years after admission to the dual master's degrees. Extension beyond the maximum allowed period of study requires approval from the faculties/schools Graduate Studies Committee/s and is subject to acceptance by the Ministry of Education and Higher Education.

Comprehensive Examination

Most master's programs require that students 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). For details about faculty/school specific requirements, refer to each faculty/school section.

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."

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 adviser. Normally, the thesis adviser 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 adviser is from one of the concerned programs.

Students are expected to select a research topic in consultation with the thesis adviser and prepare a thesis proposal by the end of their second regular term in the program. 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 adviser 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 adviser.
- There must be a main thesis advisor for all theses. In case a co-adviser 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 adviser.

- 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 adviser is from another department at AUB, the chairperson will consult with the chairperson of the department to which the thesis adviser belongs.
- In interdisciplinary programs, the members of the Thesis Committee should be drawn from full-time faculty members at AUB. Normally at least one member of professorial rank must be from each department involved in the program.

The Thesis Committee must be approved by the chairperson/director of the student's department/program. The students must submit the thesis proposal to the committee and secure its approval. The committee members will evaluate the proposal in consultation with the thesis adviser.

Students need to submit the thesis proposal with a completed Thesis Proposal Form as required by faculty/school or program (see website) to the chairperson of the department, signed by the thesis adviser 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.

The thesis proposal submission and approval process by the faculty GSC is managed via the online petition system.

Details about relevant deadlines can be found on the Graduate Council Website:
https://www.aub.edu.lb/graduatecouncil/Pages/thesisdeadlines.aspx.
The thesis proposal and thesis title/committee should be approved by the faculty/school Graduate Studies Committee at least four months before the thesis defense.

It is the students' responsibility, in coordination with the thesis adviser, to keep members of the Thesis Committee informed on the progress of their work and to seek their input.

Continuous Thesis Registration

Once students register for their thesis, they pay a thesis fee that covers that term and also allows them to register up to three additional terms without paying further tuition. 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. Approved leaves of absence during the thesis period do not affect payment for the thesis. However, unapproved leaves of absence have implications for the time students have to finish their thesis and for payment. Students returning from an unapproved absence who register for the thesis effectively lose one term of paid thesis tuition. If they return after two terms of unapproved absence, there is only one term of thesis tuition remaining that is already paid, and if they return after three terms of unapproved absence, they will need to pay for the thesis, as shown in the table below.

	1st Thesis Term	3 Additional Terms			Additional Paid Term 1
Number of Unapproved 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	Unapproved Absence	Register & No Payment	Register & No Payment	Pay & Register
2	Pay & Register	Unapproved Absence	Unapproved Absence	Register & No Payment	Pay & Register
3	Pay & Register	Unapproved Absence	Unapproved Absence	Unapproved Absence	Pay & Register

Thesis Format

An AUB-approved and required thesis template is available on the University Libraries' website. All students are strongly advised to start using the template at an early stage of their thesis writing. More information on thesis formatting is available in the Thesis Manual as a downloadable pdf. The manual provides the style guide for all theses prepared by AUB students, and following the provided instructions is mandatory for all thesis degrees. Theses not conforming to the publication style outlined in the thesis manual are not accepted by the university. Students are advised to consult the Thesis Writing Hub which has resources and relevant material about preparing a thesis (https://aub.edu.lb.libguides.com/Thesis).
Students are also welcome to visit the Research and Instruction department, Jafet Library, any time during the term.
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.

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 term in which they expect to graduate.

Students graduating in the summer term must be registered during that term (refer to the section 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.

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 adviser, and the students 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 combined grade for both the thesis and thesis defense. If No Pass (NP) is reported, students may resubmit the thesis and defend it no earlier than the next term. 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 adviser who serves as the project adviser. The master's project topic proposal and selection of the adviser and Project Committee members should be approved by the faculty/school 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 adviser. The project topic proposal, selection of the adviser, 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 term 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.

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 in the next term at the earliest. 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 in AUB thesis template (refer to the section on thesis format) saved as PDF (Portable Document Format) file into the library (ScholarWorks). The PDF of the thesis must be the final version revised and approved by the Library prior to submission, and that no changes will be accepted to the approved PDF submitted to 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 relevant deadlines, 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, graduate students must:

- Apply for graduation.
- Have attained a minimum cumulative course GPA of 3.3 or above.
- Not be on probation by the time the coursework is completed.
- Have completed the minimum credit hours of coursework designated by the specific program.
- Have passed the comprehensive exam.
- Have completed thesis requirements for the thesis option degrees.
- Have completed project requirements for the non-thesis option degrees.
- Have met the residency requirements specified for the master's degree.

Academic Standing of Students Working for PhD Degree

Good Standing

PhD students are in good standing when their graduate grade cumulative GPA 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 students 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 GPA of 3.0 or more, but less than 3.7, 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 attaining a cumulative GPA 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 the course will not be offered during the student's residency, the student, in consultation with the adviser, must petition the faculty/school Graduate Studies Committee to substitute a course that will be treated as equivalent for the purpose of GPA calculation.

The department or program in which the students are enrolled may recommend probation to the faculty/school Graduate Studies Committee even though the students have attained an adequate cumulative average. In such cases, evidence must be provided for discussion and voting at the faculty Graduate Studies Committee.

Changes in probationary status of enrolled graduate students are reviewed by their respective faculty/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 students with copies to the department chair, student adviser, and Office of the Registrar.

Dismissal

The Graduate Council, upon recommendation from the faculty/school Graduate Studies Committee and the chair of department, may discontinue PhD students 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 GPA 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 GPA 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 students 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.

PhD Course Requirements

Students, in consultation with their advisers, are expected to finalize a program of study and submit it to the department within two terms of starting the PhD degree. The following requirements apply:

- Students must complete 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/school Graduate Studies Committee.

- Students must complete a 0-credit comprehensive examination preparation course and a 0-credit thesis proposal preparation course.

All PhD students who joined their program from AY 2020-21, must complete the Certificate on Teaching in Higher Education (Refer to the section below for Certificate on Teaching in Higher Education).

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/school 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. Requirements for the PhD degree must be completed within ten regular terms of starting graduate work beyond the master's degree. Extension requires Graduate Council approval upon recommendation by the faculty/school Graduate Studies Committee.

Interruption of studies, consecutive or intermittent, shall not exceed two 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.

Cotutelle de Thèse

A cotutelle is an arrangement whereby doctoral students fulfill the graduation requirements of two universities, benefit from co-supervision on their thesis, and spend time in both universities. Students with a cotutelle obtain a PhD from both universities. At AUB, cotutelle agreements are facilitated by the Graduate Council on a case-by-case basis.

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 No Pass 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. The comprehensive exam should normally be taken by the fourth term of the PhD student's enrollment in the regular PhD program.

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 grade changed from "NP" to "PR."

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's 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 adviser 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
- Attained a cumulative GPA of at least 3.7
- Completed all English language requirements

Supervision of Doctoral Thesis

During the first term of graduate study, the department or program assigns an academic adviser to the student. The adviser 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 adviser 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 adviser is from another department at AUB, the chairperson will consult with the chairperson of the department to which the thesis adviser belongs. A thesis co-adviser may be from outside AUB, but in that case a further member needs to be added to the thesis committee, for a total of 6 members.

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/school 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 must be from outside the university. A maximum of one member with the title of Professor Emeritus can serve on each committee as a member.

- The thesis adviser and at least three of the Thesis Committee members must be of professorial rank.
- There must be a main thesis adviser for all theses. In case a co-adviser is also a member of the thesis committee, then the thesis committee should consist of at least six members 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 adviser.
- Members of the doctoral Thesis Committee are recommended by the student's thesis adviser in consultation with the student.
- The committee is approved by the department, the faculty/school 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/school, chair of the department, and adviser 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 adviser.

Students are expected to select a research topic in consultation with the thesis adviser and prepare a thesis proposal. The proposal should be prepared by the end of the fourth regular term. 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, concisely, of the candidate's research plan. It should state the thesis objectives, scope of work with reference to relevant literature, the research methodology and expected results. The proposal must provide sufficient citations to the literature 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 secure 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 fail 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 No Pass) 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 adheres to 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 all human subject research conducted at AUB (including AUBMC) and/or by AUB faculty students, and staff, regardless of the funding source or the site 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 AUB IRB review includes any research involving human subjects or their identifiable private information that is:

- Conducted by AUB faculty, staff, or students, or
- Performed on the premises of AUB (including AUBMC), or
- 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 follows:

- 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 two to 14 days for review and approval.
- Expedited review requires approximately two to six weeks for review and approval.
- Full Committee review should be submitted at least six weeks before the IRB meeting date posted on the HRPP/IRB website; review and approval by the IRB may require one or more months after the initial IRB review at a convened meeting.

Training Requirement

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 (https://www.citiprogram.org).

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: https://www.aub.edu.lb/irb/Pages/default.aspx. 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:
   - 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 percent 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. Guidance and resources about preparing a thesis are provided on the Thesis Writers' Hub: https://aub.edu.lb.libguides.com/Thesis.

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.

Thesis Format

An AUB-approved and required thesis template is available on the University Libraries' website. All students are strongly advised to start using the template at an early stage of their thesis writing. More information on thesis formatting is available in the Thesis Manual as a downloadable pdf. The manual provides the official style guide for all theses prepared by AUB students, and following the provided instructions is mandatory for all thesis degrees. Theses not conforming to the publication style outlined in the thesis manual are not accepted by the university. Students are advised to consult the Thesis Writing Hub which has resources and relevant material about preparing a thesis (https://aub.edu.lb.libguides.com/Thesis).

Students are welcome to visit the Research and Instruction department, Jafet Library, any time during the term. 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.

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 term in which they expect to graduate.

Final doctoral thesis defenses need to 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 term. 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 in AUB thesis template (refer to the section on thesis format) saved as PDF (Portable Document Format) file into the Library (ScholarWorks). The PDF of the thesis must be the final version revised and approved by the Library prior to submission, and that no changes will be accepted to the approved PDF submitted to 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 relevant deadlines, 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 GPA of 3.7, excluding courses taken prior to admission into the program.
- Attain a minimum grade of 3.0 (B) for courses taken at the PhD level except for MSFEA where it is 3.3 (B+).
- 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, or 2) 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 and continue in the spring term for the second course.

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 diploma, students must have attained a cumulative course GPA 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+. Graduation with a graduate professional diploma requires completion of the diploma's minimum credit hours of coursework with a course passing grade of C+ with no required cumulative course GPA.

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 disclosure of student records and 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.

AMERICAN UNIVERSITY OF BEIRUT

Faculty of Agricultural and Food Sciences (FAFS)

Graduate

Officers of the Faculty

Fadlo R. Khuri	President of the University
Zaher Dawy	Provost
Ammar Olabi	Dean
Lara Nasreddine	Associate Dean for Academic and Student Affairs
Hadi Jaafar	Associate Dean for Research and Innovation
Bradley Jon Tucker	Vice-Provost and Registrar
Antoine Sabbagh	Director of Admissions
Lokman Meho	University Librarian

Faculty Administrative Support

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

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 Programs

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).

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) sections.

By the end of the first year, students would have had ample time to know the various specialties within their program and to become familiar with the professors and their concentrations. In addition, students would have taken the needed foundational courses necessary to make an informed decision about their research focus. Rules and regulations for graduate programs are given in the General University Academic Information section of this catalogue, and the Admissions section 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 advisers. FAFS also offers a non-degree food security graduate diploma – online. Details of this program are provided below.

Graduate Research Requirements

Research Plan

- Graduate students are expected to present their 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 term. This course will guide them in their research proposal write-up and plan.
- The proposal defense will allow students (by the start of the third term at the latest):
  - To have a clear plan for their research journey.
  - To vet the research objectives and methodology with their 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 term 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 students deliver 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

Each 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, students need to ensure that the manuscript is at least submitted to a peer-reviewed journal of relevance to the research topic/field of studies.

Food Security Program

Director	Chalak, Ali
Food Security Program Executive Committee	Chalak, Ali (Chair); Habib, Rima; Hamadeh, Shady; Iskandar, Christelle; Keulertz, Martin; Ouaijan, Krystel; Tell, Tariq; Zurayk, Rami, Jaafar, Hadi

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

Credit 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 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/NFSC 301	Statistical Methods in Agriculture/Statistical Methods for Nutrition and Food Sciences	3
FSEC 396	Comprehensive Exam	0
FSEC 397 or FSEC 399	Project Or MS Thesis	3 or 6
Total		**18 or 21**

Approved Electives:

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 for enrolled students on a term-by-term basis. The listing and availability of elective courses is subject to change based on course offerings.

Rural Development Specialization
AGSC 384, Political Economy of Middle East Development
NFSC 306, Community Nutrition: Research and Intervention
NFSC 306B, Community and Public Health Nutrition
NFSC 383, Nutrition Communication and Education
RCOD 341, Rural Community Development: Theories, Debates, and Challenges
RCOD 342, Qualitative Methods (4 cr.)

Economics and Policies Specialization
AGSC 376, Resource and Environmental Economics
AGSC 389, Research Methods in Applied Economics
ENSC/LDEM 630, Natural Resource Management
FSEC 306, Indicators and Tools for Measuring Food Security
FSEC 307, Integrated Food Security Phase Classification: Overview and analysis
PPIA 301, Public Policy and Practice
PPIA 306 Political Economy
PPIA 309, Evidence, Policy, and Communication

PSPA 316, International Environmental Policy
PSPA 317, International Political Economy
MKTG 306, Marketing Management
MNGT 306, Leadership and Behavior in Organizations
ECON 332, Political Economy of Development
ECON 338, Economics of Natural Resources and the Environment
PBHL 304, Public Health Policy and Advocacy

Food Production and Consumption Specialization
AGSC 389, Research Methods in Applied Economics
CIVE 648, Climate Change and Water Resources
LDEM/ENSC 635/PSPA 346A, Political Ecology of Water
NFSC 351, Food Safety: Contaminants and Toxins
ENHL 307, Food Safety and Health
CIVE 688, Engineering Sustainability

Course Descriptions

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.

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 307 Integrated Food Security Phase Classification: Overview and analysis 3.0; 3 cr.
This course introduces graduate students to the Integrated Food Security Phase Classification (IPC) approach to acute food insecurity analysis. The course combines FAO IPC teaching materials with guest lectures from practicing IPC analysts and partner organizations. Through weekly in-depth country case studies and real-life scenario analyses, students develop a solid understanding of the conceptual foundations of IPC analysis. This includes the central principle of reaching technical consensus through collaborative teamwork, the distinction and complementarity between IPC Acute Food Insecurity, indicator selection and interpretation, evidence appraisal, and analytical procedures. Emphasis is also placed on developing technical writing skills for IPC reporting and communication to support effective situation descriptions and advocacy, quality assurance processes, and the application of special protocols, including famine classification and analysis conducted under conditions of limited or no humanitarian access. Successful completion prepares students for the IPC Level 1 certification online test and participation in a full IPC analysis.

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 and 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.

Required Courses

The food security graduate diploma – online requires completion of a total of 12 credits, divided across four required courses: FSEC 300D, FSEC 305D, FSEC 310D, FSEC 315D.

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, Chalak, Ali

The Faculty of Agricultural and Food Sciences offers an interdepartmental graduate program, 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 to conduct 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.

Mission

The MS in rural community development is an interdisciplinary program, which explores the social, political, economic and ecological dynamics of rural development in the Global South with specific reference to the Middle East and North Africa regions. By combining insights from political economy, sociology and ecology, it aims to provide students with adequate analytical and practical tools to: understand the key challenges facing rural societies such as poverty, malnutrition, health, management of key natural resources (land and water), deterioration of eco-system, food insecurity, climate change; design research in rural settings through both qualitative and quantitative methods; and design adequate forms of policy interventions and development practices to address existing and emerging socio-ecological challenges in the rural milieu.

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 chosen major.

Thesis and Non-Thesis Options

The degree offers both thesis and non-thesis options. The program has five 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.

Credit Requirements

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 24 credits (for non-thesis students). Six credits (for thesis students) and nine 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 table below:

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

Course Descriptions

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/NFSC 301 Statistical Methods in Agriculture/Statistical Methods for Nutrition and Food Sciences 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. 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 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 the 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 300 Graduate Tutorial 1-3 cr.
Directed study in rural community development

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 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.

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 students with an intensive introduction to the qualitative theory necessary for an effective analysis of resource problems.

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.

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.

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 or NFSC 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.

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; 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 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 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.

NFSC 306B Community and Public Health Nutrition 2.0, 2 cr.
The course describes the role of nutrition in improving the health and well-being of communities. The course aims to equip students with the skills required to conduct population-based nutrition research; assess the nutrition needs of a population; plan, implement, and evaluate community nutrition programs and policies.

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. Open to students majoring in PHNU.

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.

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.

Department of Agriculture (AGRI)

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

Mission

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. 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 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. Graduate students in the department may become candidates for a degree in the interfaculty program in nutrition by meeting the requirements described in the Division of University Interdisciplinary section of the catalogue.

Credits requirements

Requirements for the degree of master of science in agricultural economics, irrigation, plant science, plant protection, animal science, and poultry science are tabulated below:

Course Group	Thesis Option Credits	Non-Thesis Option Credits
Core	12	12
Electives	9	15-18
Thesis	9	0
Tutorial	0	6-3
Total number of credits required for graduation	**30**	**33**

Course Descriptions

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.

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 socioeconomic 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 students 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 or NFSC 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 should 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 a free graduate elective with the adviser'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.

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 noninfectious 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, AVSC 395, and AVSC 399 for thesis and AVSC 300C for non-thesis), 9 cr. as electives from any of the courses listed below, plus 3 cr. as a free graduate elective with the adviser's approval.

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 the 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.

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 should 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 adviser.

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.

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 should 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 adviser.

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.

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 should 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 adviser.

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.

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.

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, AVSC 395, and AVSC 399 for thesis and AVSC 300C for non-thesis), 9 cr. as electives from any of the courses listed below, plus 3 cr. as a free graduate elective with the adviser's approval.

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 animals 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)

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

Mission

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.
Ecosystem management involves not only an 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.

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.

Core and elective courses are structured to provide students with a diversified and multidisciplinary 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 (three core courses from LDEM in addition to two core courses from ENVT, ENVH or ENVP). The three 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 three elective courses equivalent to 9 credits (to be determined after consultation with their adviser). 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 2023-24, ECOM students will have to register for LDEM 320 (Graduate Seminar in Ecosystem Management; 0cr.) as a mandatory seminar every term until graduation.

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 Academic Information section in this catalogue.

MSES (Major: Ecosystem Management)

Credit Requirements

Course Group	Thesis Option Credits	Non-Thesis Option Credits
Core	15 (out of which 9 are from LDEM)	15 (out of which 9 are from LDEM)
Electives	9	12
Thesis	6	0
Project	0	3
Total number of credits required for graduation	**30**	**30**

Course Descriptions

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 standing (senior undergraduate standing upon consent of instructor).

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 standing (senior undergraduate standing upon consent of instructor).

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 adviser 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 the project option instead of the 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; 3 cr.
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)

Chairperson/ Associate Dean of Student Affairs	Kharroubi, Samer
Professors	Abiad, Mohammad; Hwalla, Nahla; Kharroubi, Samer; Nasreddine, Lara; Obeid, Omar; Olabi, Ammar; Toufeili, Imad
Adjunct Associate Professor	Jomaa, Lamis
Assistant Professors	Fares, Elie Jacques; Iskandar, Christelle; Ouaijan, Krystel
Assistant Professor of Practice	Chamieh, Marie Claire
Assistant Research Professor	Habib Mourad, Carla

Mission

The Department of Nutrition and Food Sciences is committed to creative and high-quality education, innovative research, and effective outreach programs in nutrition, dietetics, and food science. The department strives to produce skilled graduates poised to assume leadership in professional settings and dedicated to the welfare and advancement of the quality of life of citizens in Lebanon, the Middle East, and the World.

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, nutrition and dietetics coordinated program, and a joint MS degree in public health nutrition with the Faculty of Health Sciences (FHS). For more detailed information, see the interdisciplinary section of the graduate catalogue. 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: https://www.aub.edu.lb/fafs/nfsc/Pages/Default.aspx.

Master of Science (Thesis Track)

Students in the thesis track are expected to complete a 9-credit thesis under the supervision of a thesis adviser and to defend their thesis as per AUB policies concerning graduate programs. Students should complete a comprehensive exam prior to the thesis defense. After the 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 (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.

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 require a total of 33 credit hours.

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**

Course Descriptions

Core Courses (for Thesis and 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. Prerequisites: STAT 210 or EDUC 227 and CMPS 209. Spring.

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 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 months internship in the food industry that allows students to broaden their experience in the field. Weekly reports and work progress assessments should be presented to the adviser to follow up with the students and ensure diversity in their work.

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

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.

NFSC 398 Project 3 cr.
Project.

ENHL 311 Human Health Risk Assessment 3 cr.
Human health risk assessment.

Elective Courses

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 students 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 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, 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 healthcare 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 and 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 term.

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 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.

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.

Credit Requirements

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**

Course Descriptions

Core Courses (for Thesis and 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. Prerequisites: STAT 210 or EDUC 227 and CMPS 209. Spring.

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.

NFSC 398 Project 3 cr.
Project.

NFSC 300C Graduate Tutorial 3 cr.
Directed study.

Elective Courses

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 students 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 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, 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 healthcare 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 and 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 term.

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 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. Prerequisite: MKTG 306.

MS in Nutrition

The MS in nutrition program offers both thesis and non-thesis 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.

Credit Requirements

Master of Science in Nutrition		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 (Students can substitute Elective courses by taking additional Graduate Tutorial credits)		**12-15**	**6-9**
NFSC 396	Comprehensive Exam	0	0
NFSC 300	Graduate Tutorial	3-6	0-3
NFSC 399	MS Thesis	-	9
Total year credits		**31**	**31**

Course Descriptions

Core Courses (for Thesis and 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.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. (only for thesis)
MS thesis.

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

Elective Courses

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, 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 Nutrition and Non-Communicable Diseases 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 Nutrition and Dietetics Coordinated Program

The master of science in nutrition and dietetics coordinated program (MS-NDCP) is mainly designed for students who wish to obtain the Registered Dietitian Nutritionist (RDN) credential and work as professionals in the various fields of nutrition and dietetics. The MS-NDCP is a two-year program that integrates the practicum and didactic courses during each term. It consists of 40 Credits: 29 credits of didactic coursework; and 11 credits of integrated supervised practice (1035 hours of supervised practice) at affiliated hospital sites, community centers, and NGOs.

The mission of the master of science in nutrition and dietetics coordinated program (MS-NDCP) is to prepare graduates with the knowledge, expanded skills, and intellectual maturity to become progressive, innovative, and inter-professional dietetic practitioners. Graduates will be capable of applying ethical research practices when reviewing, evaluating, and conducting research. They will utilize evidence-based practice effectively to manage diet-related diseases and promote optimal nutritional status and well-being of culturally diverse individuals and groups. Graduates of the program are expected to serve the profession and larger community through public service and leadership.

The MS-NDCP graduate program is US-accredited, under the International Coordinated Program (ICP) 2022 standards, by the Accreditation Council for Education in Nutrition and Dietetics (ACEND) of the Academy of Nutrition and Dietetics (AND), 120 South Riverside Plaza, Suite 2190, Chicago, IL 60606-6995, (312) 899-0040 ext. 5400.

To be eligible for graduation with the degree of MS-NDCP, students must:

- Successfully complete a minimum of 40 credits hours.
- Complete 1035 hours of supervised practice at an affiliated site and fulfill all rotation requirements including assignments, activities, and relevant forms (student rotation log, clinical experience form, rotations checklists, etc.) within the specified time frames.
- Achieve a minimum grade of 80 percent (3.3) in each of the MS-NDCP core courses.
- Achieve an overall GPA of 3.3 in each of the two AY years of MS-NDCP.
- Achieve an overall GPA of 3.3 in the supervised practicum.
- Successfully complete the program within three and a half years (150 percent) of enrollment.

Failure to meet the above MS-NDCP graduation requirements will result in dismissal from the program.

Lebanese citizens who hold a bachelor of science in nutrition and dietetics, or a second degree in nutrition and dietetics, are eligible to become licensed dietitians upon completing the Lebanese colloquium exam for dietitians.

Curriculum Plan

Term	Course	Credits

	Course	Credits
Year 1 Fall 1	NFSC 392 Medical Nutrition Therapy I	3
	NFSC 375 Quantity Food Production	2
	NFSC 308 Nutrition and Non-Communicable Diseases	3
	NFSC 397 FA - Dietetic Practicum	2
	Total credits per term	10 credits

	Course	Credits
Year 1 Spring 1	NFSC 301 Statistical Methods for Nutrition and Food Sciences	3
	NFSC 324 Advanced Nutrition Principles and Practices	1
	NFSC 383 Nutrition Communication and Education	3
	NFSC 328 Applied Clinical Dietetics	3
	NFSC 397 SA - Dietetic Practicum	2
	Total credits per term	12 credits

	Course	Credits
Year 1 Summer 1	NFSC 397 R - Dietetic Practicum	3
	Total credits per term	3 credits

	Course	Credits
Year 2 Fall 2	NFSC 393 Medical Nutrition Therapy II	3
	NFSC 306B Community and Public Health Nutrition	2
	NFSC 384 Seminar in Clinical Dietetics	1
	NFSC 397 FB - Dietetic Practicum	2
	Total credits per term	8 credits

	Course	Credits
Year 2 Spring 2	NFSC 390 Capstone project	3
	NFSC 319 Ethics, Leadership, and Entrepreneurship in Dietetics	2
	NFSC 326 Inter-professional Seminar	0
	NFSC 397 SB - Dietetic Practicum	2
	Total credits per term	7 credits

Total Credits	**40**

Course Descriptions

Core Courses

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: NFSC 210, STAT 210 or EDUC 227 and CMPS 209. Spring.

NFSC 306B Community and Public Health Nutrition 2.0, 2 cr.
The course describes the role of nutrition in improving the health and well-being of communities. The course aims to equip students with the skills required to conduct population-based nutrition research; assess the nutrition needs of a population; plan, implement, and evaluate community nutrition programs and policies.

NFSC 308 Nutrition and Non-Communicable Diseases 3.0, 3 cr.
There is increasing evidence about the role of nutrition in modulating the risk of non-communicable diseases, which are highly prevalent in developed countries and are following an escalating secular trend in countries undergoing the nutrition transition. Nutrition and non-Communicable diseases course discusses the epidemiology and etiology of the major diet-related diseases including obesity, cardiovascular diseases, type 2 diabetes, and cancer, while focusing on the role of dietary factors in modulating the risk of these diseases. The course will also focus on the intersection between diet, physical activity, obesity and chronic disease from a life-course and global perspective and the potential for policy-level and individual-level approaches to address the key diet-related diseases and the main nutrition interventions and recommendations for their prevention and management. Fall.

NFSC 319 Ethics, Leadership, and Entrepreneurship in Dietetics 2.0, 2 cr.
Including nutrition laws; the nature and scope of nutrition practice, drug usage, the role of various government agencies; potential bases for discipline or other liability; and licensure requirements. Students will learn the governmental framework within which nutrition is practiced, as well as acquire an understanding of the laws, regulations, and ethical responsibilities applicable to nutritionists so that they will be able to protect the public and ensure patients' wellbeing. This course provides a broad overview of leadership theory and skills that students can use in their personal, academic, and professional worlds. Students will develop advanced competencies relevant to the innovative and entrepreneurial practice of nutrition and dietetics. Students will be able to demonstrate ethical dilemmas as they relate to nutrition and dietetics practice, standards of professional performance, and the principles and standards of the 2018 code of ethics. Spring.

NFSC 324 Advanced Nutrition Principles and Practices 1.0, 1 cr.
The course is designed to provide the principles essential for being a successful Registered Dietitian (RD) including code of ethics, scope of dietetics practice, standards of dietetics practice, and medical coding. Additionally, the nutrition practices discussed will allow students to implement the Nutrition Care Process (NCP) in advanced MNT topics, which will be beneficial during their CP practicum experience and future career. Topics to be discussed will include, but are not limited to, nutrition-focused physical examination, heart failure, solid organ transplantation, advanced ICU principles such as vasopressors and EN use, end of life nutrition, and advanced nutrition support practices. Through the use of real-life clinical case study scenarios and role-playing, students will use the NCP in developing their nutrition care plans and practice counseling techniques to improve their effectiveness in providing nutrition education and working with an interdisciplinary team. Spring.

NFSC 326 Inter-professional Seminar 0 cr.
The course introduces students to the principles of Interprofessional Education (IPE) and Interprofessional Collaborative Practice (IPCP) in which multiple health workers from different backgrounds provide comprehensive health services to patients and communities. The course features guest speakers, discussions, and applied assignments to enhance the student's knowledge and skills related to professional practice, communications, and healthcare collaboration. It includes instructor-led sessions (often involving guests from the dietetics/paramedical profession), campus-based inter-professional education, and student-led sessions designed to promote reflection and engagement on professional practice topics. Spring.

NFSC 328 Applied Clinical Dietetics 2.2.5, 3 cr.
The course includes discussions of advanced nutrition principles and practices and the provision of nutrition care using the NCP clinical workflow elements at various settings. scope of practice, Standards of Professional Performance for the Registered Dietitians Nutritionist (RDN), and the code of ethics are further discussed. Students will self-assess their knowledge and training needs for advancement to a higher level of practice, as well as their autonomy, responsibility, and accountability in the management of several nutrition-related diseases. Spring.

NFSC 375 Quantity Food Production 1.3, 2 cr.
The course will allow students to apply the theoretical principles learned in NFSC 290-Food Service Management. This course is designed to introduce students to the basic principles of food preparation including understanding of food and kitchen safety and sanitation practices, basics of nutrition and healthy menus, cooking processes, recipe costing and budgeting, basic culinary techniques, proper use of kitchen tools and equipment, elements of food preservation, and food quality. Students will apply these principles to quantity food production. Fall.

NFSC 383 Nutrition Communication and Education 3.0, 3 cr.
The course addresses nutrition communication and education theories applied to individuals and groups. It deals with fostering students' counseling techniques and educational program development as they relate to increasing positive nutritional behaviors. The course aims at developing students' knowledge and understanding of health behavior and learning theories and practices to plan and produce nutrition education programs or communication messages, tools, and techniques that will contribute to preventing diet-related diseases and promoting health. Spring.

NFSC 384 Seminar in Clinical Dietetics 1.0, 1 cr.
The course focuses on developing communication and research skills as well as strengthening the critical thinking capacities of CP students undergoing an intensive internship program, by providing them the opportunity to present and discuss all interesting nutritional issues arising during their CP practicum. Students will be asked to present topics covering the medical nutrition therapy and the food service sections. The course provides the students with the chance to share with their colleagues their experiences in any controversial nutritional issue faced during their internship rotations. Emphasis will be put on the displayed thorough scientific background about the topic in question, the originality and interest of the case/topic being presented as well as on the analysis and interpretation skills used to deliver recommendations for future consideration. The students should work closely with the CP coordinator and director throughout the preparation for the seminar. Fall.

NFSC 392 Medical Nutrition Therapy I 3.0, 3 cr.
A 3-credit lecture-based course that involves lectures and discussion. The course will cover the most commonly encountered inborn errors of metabolism as well as other clinical conditions like cancer, HIV, cystic fibrosis, and celiac disease. The course will give insight about nutrition in critical care. Lectures will highlight clinical presentation, diagnosis, and treatment -mainly, medical nutrition therapy based on evidence previous and current research. Fall.

NFSC 393 Medical Nutrition Therapy II 3.0, 3 cr.
The course covers the nutritional care process in the treatment of diet-related diseases, and how dietary intervention can control or prevent diseases. It will help students: 1) understand the pathophysiology of selected diseases in which nutritional intervention plays a major role; 2) identify the nutritional needs of patients with disease; and 3) develop an appropriate patient nutrition care plan. The course prepares students to implement the nutrition care process for various conditions, including but not limited to overweight and obesity, diabetes, cardiovascular, gastrointestinal, and renal diseases as adapted to various population groups, including infants, children, adolescents, adults, pregnant/lactating females and the elderly. Spring.

NFSC 397(FA, SA, R, FB, SB) Dietetic Practicum 11 cr.
This is an integrated dietetic practicum where students spend a total of 1035 hours in medical and community facilities to carry out their supervised practice in clinical, food service, and community settings. These practicum experiences are designed to provide a balanced opportunity to become competent in all areas of dietetics with a concentration in medical nutrition therapy (MNT). In the clinical setting, supervised practice experiences emphasize nutrition management of patients in specialty nutrition practice areas. Students will develop skills in the assessment, planning, implementation of nutrition care plans for patients with varying disease states and monitor and evaluate patients' progress. In the food service rotations, supervised practice experiences emphasize increasing independence in planning, delivering, and managing all food service activities. The community rotations are designed to give the student exposure to the role of the community dietitian in a variety of community programs.

NFSC 390 Capstone Project 3 cr.

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, 39 credits out of the required 40 credits should be earned as core program courses, including a culminating experience and a practicum. One credit must be earned by completing an elective course within either of the two 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:

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
EPHD 300	Principles of Epidemiology	2	2
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		**23**	**23**
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	-
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 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. 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 wellbeing of individuals within select communities. Spring.

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.

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. 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. 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). 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. 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. 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. 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. Fall.

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.

PHNU 399 MS Thesis 6 cr. (For thesis track)

PHNU 390 Practicum 2.0; 2 cr. (For non-thesis track)
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.

The Environment and Sustainable Development Unit (ESDU)

Director	Hamadeh, Shady

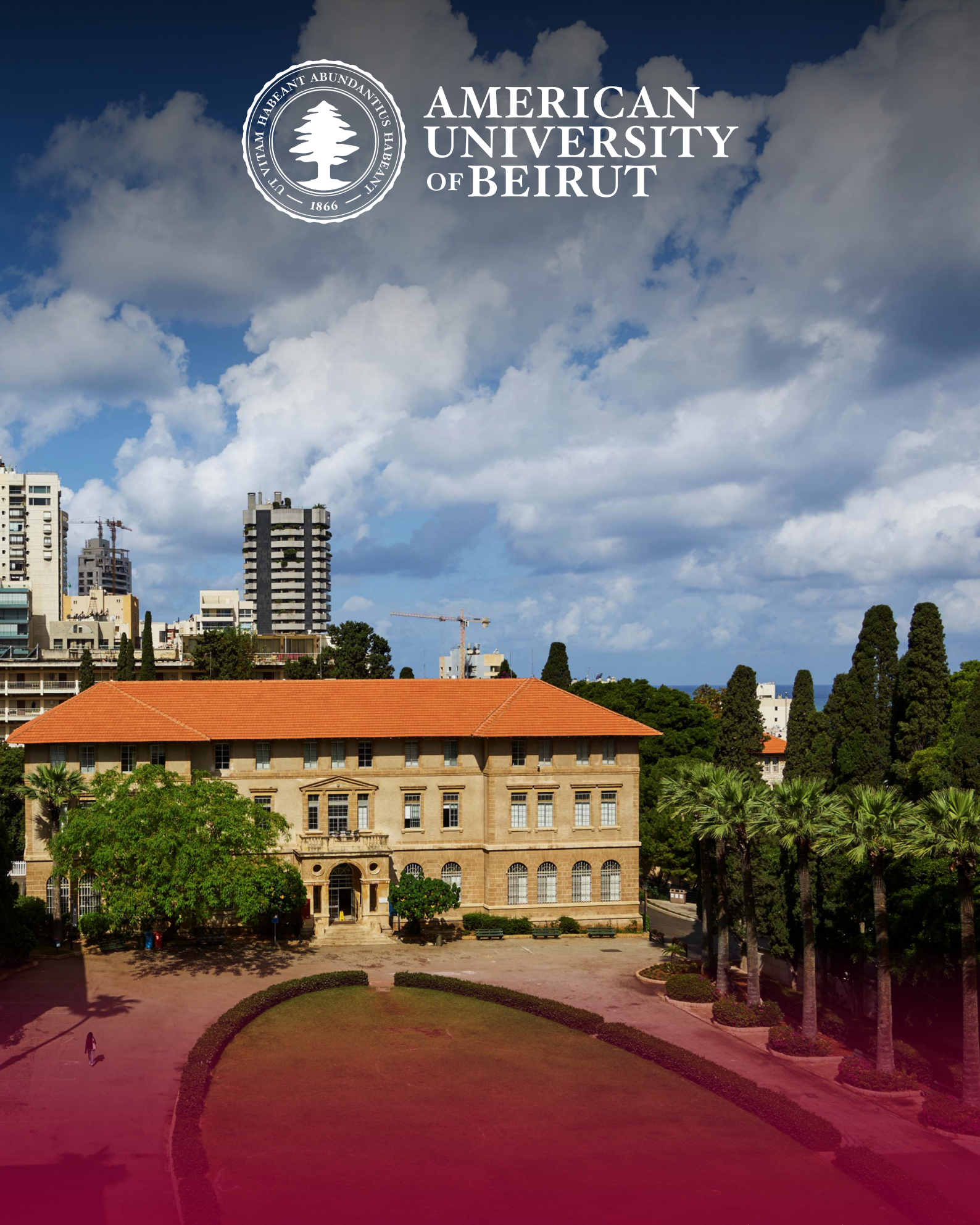
ESDU is an interdisciplinary research and development unit specializing in sustainable rural livelihoods. It was established at the Faculty of Agricultural and Food Sciences to promote collaboration on sustainable development initiatives among departments at AUB and with a variety of other institutions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

AMERICAN UNIVERSITY OF BEIRUT



Faculty of Arts and Sciences (FAS)

Graduate

Officers of the Faculty

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Zaher Dawy	Provost
Farès Dahdah	Dean
Saouma BouJaoude	Special Advisor to the Dean for Faculty Affairs
Khouzama Knio	Associate Dean for Advancement and Impact
Wissam Raji	Associate Dean for Research and Innovation
Pierre Karam	Associate Dean for Faculty Development and Outreach
Hoda Baytieh	Associate Dean for Online Education
Ahmad Sabra	Director of Freshman Program
Bradley Jon Tucker	Vice-Provost and Registrar
Antoine Sabbagh	Director of Admissions
Lokman Meho	University Librarian

Faculty Administrative Support

Deema Akl	Freshman Program Officer
Bassel Baker	IT Service Desk Manager
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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 for engaging with 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) scores and/ or interview. 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 Admissions section in this catalogue.

Admission as a Regular Graduate Student

Applicants are considered for admission as regular students to a graduate program if they meet the following minimum admission requirements:

An undergraduate GPA of at least 3.3 (or standardized equivalent from other institutions of higher learning) 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 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 a GPA 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 Admissions section in this catalogue.

Admission as a Graduate Student on Probation

Applicants are considered for admission on probation if they meet the following minimum admission requirements:

An undergraduate GPA of at least 3.0 (or standardized equivalent from other institutions of higher learning) 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 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 a GPA 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 Admissions section 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 prospective graduate students, the applicants must have attained an undergraduate GPA 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 Admissions section in this catalogue. For the purpose of change of status (admission after completion of requirements) to regular graduate student, a minimum GPA of 3.3 will be required in all the undergraduate courses requested from the student upon admission. If a GPA of 3.0-3.3 is attained, students may have their 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.

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 adviser. 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.

Transfer of Credits

Transfer of Credits into a Master's Degree Program
Refer to the General University Academic Information, section pertaining to "Credit Transfer."

Transfer of Credits from One Master's Degree to Another
Refer to the General University Academic Information, section pertaining to "Credit Transfer."

Professional Studies

The Faculty of Arts of Sciences (FAS) stands at the forefront of extending the university's resources to the wider community by providing high-quality education for diverse learners and organizations seeking excellence, innovation, and real-world impact.

FAS offers a dynamic portfolio of courses, workshops, certificates, and programs through flexible delivery modes, including face-to-face, hybrid, and fully online formats. It also collaborates with corporate and institutional clients across Lebanon and the region to deliver programs that respond to evolving market and workforce needs.

Through these initiatives, FAS actively contributes to societal advancement in alignment with the mission of the American University of Beirut (AUB) to foster knowledge, leadership, and civic responsibility.

Department of Arabic and Near Eastern Languages

Chairperson	Armstrong, Lyall (Acting)
Professors	Baalbaki, Ramzi M. (Margaret Weyerhaeuser Jewett Professor of Arabic); Jarrar, Maher Z.; Orfali, Bilal W. (Sheikh Zayed Chair for Arabic & Islamic Studies)
Assistant Professor	Khansa, Enass
Lecturers	Abboud, Hosn; Atiyyah, Najah (Hawwa); Bazzi, Tarif; Bou Fadel, Najm; El Ali, Mariam; El Daif, Rachid; El Mallah, Jihad; Fakhreddine, Jawdat; Ghaddar, Hussein; Moukaled, Sina; Nahas El-Zein, Raghda
Instructor	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.
- 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 the Admissions section. 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).
- Proven unimpaired Arabic.
- English proficiency. For the required level of proficiency, see the section entitled English Language Proficiency Requirement under the Office of 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 are required: a 3-credit tutorial to be conducted by the candidate's adviser, 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.
- **Residency Requirements:** See Residency 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 students and to follow up on their progress. At a later stage, the department, in consultation with the student, will assign the student an academic adviser.
- **Candidacy Status:** See Admission to Candidacy under General University Academic Information. The students 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, students 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, students shall appear before the proto-examining committee to defend their 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 adviser 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 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 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. May be repeated for credits.

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

ARAB 395A Comprehensive Exam 0 cr.
Prerequisite: Consent of adviser.

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.
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
Professors	Bariche, Michel; Baydoun, Elias; Knio, Khouzama; Kuraydiyyah, Sawsan; Muhtasib, Hala; Osta, Mike; Saoud, Imad; Smith, Colin Andrew; Talhouk, Rabih
Associate Professors	Ghanem, Noel; Jaalouk, Diana; Kambris, Zakaria
Lecturers	Dunya Rizkallah, Hind; El Hallani, Hiba; Sadek, Riyad; Sinnu, Nada; Wehbe, Rim; Zeineddine, Suheir
Instructors	Abdallah, Emane; Al Bahri, Ghosoon; Al-Zein, Mohammad; Daher, Ahmad; Farhat, Julia; Hajjar, Layane; Jaber, Hwaida; Kalout, Zainab Al Hawraa; Rizk, Zeinab; Sayar, Nancy

MS in Biology

Mission Statement

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 a GPA 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 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).
- Be recommended for admission by the Department of Biology.

Program Requirements

The program requirements 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, students will be assisted by the department head who will act as an academic adviser and help them in the selection of courses. Students' course of study is designed individually in light of their interests and career goals. All duties of the head are transferred to the thesis adviser 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 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 students' research work and field of specialty. These courses may be chosen from the Department of Biology, graduate course offerings or from course offerings of other departments that fall within the students' 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 Department of Biology 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 under 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.

Residency Requirements

For residency requirements, refer to Residency 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, students write 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 adviser.

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. Prerequisite: BIOL 480.

BIOL 484 PhD Thesis 30 cr.
Every term. 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 491 Tutorial 2 cr.
Every term. Prerequisite: consent of instructor. Cannot be repeated for credit. Graded: Pass/No Pass (or Fail).

BIOL 492 Tutorial 3 cr.
Every term. Prerequisite: consent of instructor. 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 Department of Biology. The supervisor should ensure that the students receive 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).

Department of Chemistry

Chairperson	El Rassy, Houssam
Professors	Bouhadir, Kamal; El Rassy, Houssam; Ghaddar, Tarek; Ghauch, Antoine; Ghoul, Mazen; Halaoui, Lara; Hasanayn, Faraj; Kaafarani, Bilal; Patra, Digambara; Sultan, Rabih
Associate Professors	Hmadeh, Mohamad; Karam, Pierre
Assistant Professor	Iali, Wissam
Research Associate	Hamze, Khalil
Instructors	Abi Rafi', Randa; Abou Matar, Tamara; Bou Karroum, Weam; Chapoutian, Nayiri; Cheaytou, Mariane; Deeb, Hana; El Kurdi, Riham; Ghazali, Sarah; Hannouche, Karen; Jaafar, Amer; Mouawad, Issaaf; Obeid, Hind; Sadek, Samar; Sarieddine, Haitham

MS in Chemistry

Mission Statement

The MS program in the Department of Chemistry is dedicated to advancing scientific knowledge through rigorous education and cutting-edge research. The MS program's mission is to prepare graduate students to become skilled and creative scientists capable of addressing complex challenges in academia and industry. Through a combination of foundational coursework in different chemistry disciplines and independent research, the program enables students to communicate findings through presentations in scientific meetings and through publications.

Degree Requirements

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 students' field of specialization. CHEM 361 is a requirement for all graduate students. A 9-credit thesis, CHEM 399, is required.

PhD in Chemistry

Mission Statement

The doctoral program in the Department of Chemistry provides graduate students with scientific knowledge, training and skills to eventually develop their own research work thus becoming independent teachers and scholars or joining renowned industrial firms. This will be met through providing students with the essential theoretical background within different chemistry disciplines, and the practical foundation to conduct experimental and theoretical research. In addition, the program will enable students to communicate findings through presentations in scientific meetings and through publications.

Program Goals

The central goals of the PhD program in chemistry are: excellence in research with strong chemistry background. In addition, the program realizes the importance of the practice of teaching and thus requires graduate students to engage in work as teaching assistants of undergraduate courses.
These goals will be achieved via providing students with a strong background to pursue postdoctoral research position, a career in teaching science, or work in various industries. The faculty is dedicated to shaping young scientists with inquisitive minds, and responsible characters. Scientists, who will, with all the practical and intellectual tools and powers they have, always seek to know things anew and serve the truth.

Program Learning Outcomes

Chemistry Ph.D. graduates will be able to:

1. Analyze fundamental concepts and theoretical principles, demonstrating mastery of relevant experimental techniques in their specific field.
2. Synthesize a coherent thesis dissertation by identifying a research project, conducting relevant experiments, analyzing data, and interpreting results.
3. Communicate fundamental knowledge of their field of research, as well as details of their own research in both written and oral form to expert and non-expert audience.
4. Employ modern library search tools to find, retrieve, and assess scientific information.
5. Demonstrate excellent teamwork and leadership skills by supervising and leading research projects.
6. Apply the proper procedures for safe handling of chemicals.
7. Demonstrate skills in grant proposal writing in an authentic chemistry arena.

Admission Requirements

Students entering the program are expected to demonstrate the ability to develop into independent scientists by several measures:

1. Evidence for ability to sustain long-term intellectual effort will be assessed by the history of success in undergraduate and graduate coursework:
   - Applicants should hold a master's (MS) degree with normally an average of 3.7 in major and overall cumulative average from an institution recognized by AUB.

2. Evidence for ability to reason effectively on demand will be judged by performance on the Quantitative Reasoning section of the Graduate Record Examination (GRE). Scores on the Verbal Reasoning section will be discounted as most applicants are expected to be non-native English speakers.
   - Applicants should take the general part of the Graduate Record Examination (GRE).
   - Applicants must demonstrate proficiency in the English language by meeting the Readiness for University Study in English (RUSE) requirements as stated in the "Admissions" section of the catalogue.
3. Academic aptitude for doctoral studies in chemistry will be assessed by student performance in Chemistry coursework.
4. Motivation, intellectual maturity and commitment will be assessed by recommendation letters (minimum of three letters) or personal communication of former supervisors, and a statement of purpose.
5. Finally, interviews (in person, by phone or other) will allow assessment of the individual's qualities and match to departmental interests.
   - An interview with a departmental committee. The committee may require the student to give a presentation.

Admission to the PhD program, upon recommendations of the department and the FAS Graduate Studies Committee, will require approval of the faculty dean. Applications received by the university Office of Admissions are first reviewed by the Chemistry Graduate Committee (CGC). This committee consists of the chairperson of the department and four full-time faculty members from the four chemistry divisions. Recommendations for admission into the program are then transmitted to the FAS GSC.

Enrollment and General Advising

After admission into the department, the CGC assigns a general advisor (CGA) to PhD students to guide them with the initial selection of courses and to introduce them to the various research areas in the department. Students will have to select a thesis advisor by the end of the first term after admission to the program. Students must seek the faculty members that are in the students' area of interest and discuss with them possible research topics for the PhD thesis.

Program Requirements

The number of credits for the PhD program is 48 credits. The course of study includes 18 credits of graduate level courses beyond the requirements of the MS degree, a 0-credit comprehensive examination (Qualifying Exam Part I – CHEM 480), a 0-credit defense of the thesis proposal (CHEM 481), and a 30-credit PhD thesis (CHEM 484).

The graduate level courses beyond the requirements of the MS degree are divided as follows:

1. A minimum of 3 credits (1 course) outside the division (where division refers to the area of main specialization: analytical, organic, inorganic, or physical chemistry).
2. A maximum of 3 credits of tutorial.
3. A minimum of 15 credits of graduate level electives, within or outside the department.

The comprehensive exam (CHEM 480) is a written exam taken after completing a minimum of 15 credits of course requirements. Timing of the examination is set by the department/program no later than the fourth term of the PhD students' enrollment in the PhD program. A student who does 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.

The defense of the thesis proposal (CHEM 481) is taken at least two terms prior to the thesis defense and is conducted by the student Thesis Committee.

Thesis Advising and Defense

Once a thesis advisor is identified, the student will develop a proposed program of study that lists the courses that the student intends to take, in addition to the proposed dates for the written and oral doctoral qualifying examinations. The proposed program of study must then be submitted to the CGC for approval. The Doctoral Thesis Committee includes the primary adviser(s), other chemistry faculty members, and expert(s) of professorial rank from outside the department, faculty or other institutions of higher learning in Lebanon or abroad. The committee must have at least five members. The doctoral committee is usually chaired by the thesis adviser. The chair of the thesis committee must be a full professor who is not the PhD thesis adviser (requirement of the Lebanese Ministry of Higher Education). At least one of the committee members must be from outside the Department of Chemistry (i.e. geology, computer science, physics, biology, or other related department, etc.). Candidates may also invite qualified people from outside the AUB faculty to serve as additional members of their committee. An external examiner of high standing from abroad is nominated by the chair of the department in consultation with the thesis adviser, subject to approval of the GSC, to review the thesis before the defense and send comments to the thesis committee on the scholarly level of the work. The external examiner may choose to attend the thesis defense and participate in the deliberations. The doctoral thesis committee approves the thesis topic, research plan, conducts the thesis proposal defense and conducts the thesis defense. The PhD thesis topic, examining committee, and admission to candidacy require Graduate Council approval.

Graduation Requirements

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

1. Completed 48 credits of course and thesis work according to PhD program requirements.
2. Attained a minimum cumulative course average of 3.7 excluding courses taken prior to admission to the program.
3. Passed the Doctoral Qualifying Exam Parts I and II (Comprehensive and Thesis Proposal Defense Examinations).
4. Met program specific requirements for publication of thesis work by the time of graduation.
5. Successfully defended a thesis of original scholarly work.
6. Published at least one first author paper/abstract in a regional/international workshop or conference.
7. Published (or in press) at least one first author manuscript in a peer-reviewed journal.
8. Met the residence requirements and all pertinent AUB regulations.

Research Interests

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, curcumin 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, reticular chemistry (e.g. MOFs, COFs, ZIFs) and applications, hyperpolarization in magnetic resonance by SABRE (Signal Amplification By Reversible Exchange), developing new bio probes for Magnetic Resonance Imaging (MRI), advanced NMR technique for real-time reaction monitoring, NMR spectroscopy as a tool for environmental and industrial applications.

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 302 Solid-State and Materials Chemistry 3.0; 3 cr.
Fundamentals of materials and solid-state chemistry. This course covers the structure of solids; bonding in crystals; defects in crystals and solid solutions; crystallography and X-ray diffraction; phase diagrams and transformations; synthesis techniques and strategies; structure-property relations; reactivity of solids; ceramics, composites and inorganic polymers; nanostructured microporous and mesoporous materials; transition metal oxides; heterogeneous catalysts and surface reactions.

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 305 Bioinorganic Chemistry 3.0; 3 cr.
Fundamentals of biological inorganic chemistry. An overview of essential elements for life and geochemical cycles; metal ions and metalloproteins; transport and storage of metal ions in biological systems; biomineralization; transferrin and ferritin; metal-dependent lyase and hydrolase enzymes; catalytic nucleic acids; electron transfer proteins; respiration and photosynthesis; oxygen metabolism; cytochrome c and multi-copper oxidases; hydrogen metabolism and hydrogenase; biological nitrogen fixation; nitrification and denitrification mechanisms; metalloenzymes; metal-ion receptors and signaling.

CHEM 306 Applied Quantum Chemistry 3.0; 3 cr.
The course gives at first a brief background on the theory of modern ab initio and density functional electronic structure methods in chemistry. It then provides training in applying these methods as tools of investigation in chemistry using computational algorithms available at AUB such as Gaussian. Students learn how to locate and characterize minima and transition states on the ground and excited potential energy surfaces, and how to evaluate activation and reaction energies and how to calculate spectroscopic properties. A set of contemporary problems with available experimental data from the different disciplines of chemistry will be considered to demonstrate the scope and limitations of different theoretical methods to make accurate predictions. The course is project-based. The emphasis of the projects will be on designing structure-reactivity and mechanistic studies in organic and transition metal chemistry, but students can still select projects from their own research areas. The course is open to senior undergraduates. Prerequisite: The equivalent of either CHEM 217 or CHEM 218.

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 318 Organic Chemistry Spectroscopy 3.0; 3 cr.
The course covers modern and advanced spectroscopic techniques used for structure elucidation of organic molecules. Techniques include mass spectrometry, infrared, 1-D and 2-D NMR spectroscopy. Emphasis is on structure determination by systematic experiment planning, data acquisition and meticulous data analysis of combined techniques. The laboratory component serves as rigorous training in all covered spectroscopic techniques as explored in the structure elucidation of an organic unknown. This course is open to senior chemistry students in good standing (cumulative and chemistry average above 3.3).

CHEM 319 Organic Optoelectronics 3.0; 3 cr.
The course investigates optoelectronic devices at the molecular level. The design and function of these devices will be explained and analyzed based on literature examples at the molecular and bulk material levels. Emphasis will be on molecular switches, molecular motors, organic field-effect transistors, organic light-emitting diodes, organic solar cell, discotic liquid crystals, chemosensors, memories and logic gates.

CHEM 320 Nonlinear Dynamics and Pattern Formation 3.0; 3 cr.
Introduction to self-organization and pattern formation in science and engineering. The course will explore reaction-diffusion systems, hydrodynamical systems, bistable media, excitable and oscillatory media. It will introduce the appropriate mathematical techniques necessary to understand and describe the mathematical models for such phenomena such as linear stability, bifurcations, Ginzburg-Landau equations, Newell-Whitehead-Segel equation, multiple scales, square and hexagonal patterns, defects. Examples from interdisciplinary areas will be covered. Most of the concepts and examples will be illustrated with MATLAB-based codes. 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 Mechanics 3.0; 3 cr.
This is a course on statistical mechanics that is divided into four parts of assorted topics. It starts from an overview of some basic concepts in thermodynamics and exposes the formal structure of equilibrium statistical mechanics with applications to ideal noninteracting and interacting systems. Then the course dwells on more advanced topics such as the liquid state, critical phenomena, Ising model and the renormalization group. In the third part, kinetic theory is presented through a thorough discussion of the Boltzmann equation and the derivations of the continuum equations. Transport processes are then discussed and transport coefficients are calculated. The theory of Brownian motion is also described as another approach to describe nonequilibrium processes. In the last section, Monte Carlo methods are applied to calculate various macroscopic properties for some lattice models. 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 326 Nanomaterial Science: Theory and Applications 3.0; 3 cr.
This course covers the fundamentals of material properties at the nanoscale, preparation methods, characterization techniques, and applications stemming from their unique optical, electrical, and catalytic properties. Nanomaterials covered include quantum dots, plasmonic nanoparticles, nanowires, and photonic crystals. Nanomaterials in energy conversion, nanocatalysis, and medicine will be discussed with examples drawn from the recent primary literature. Prerequisites: Chem 201, in addition to consent of instructor for any graduate student with a BS other than in Chemistry, Physics, or BE in Engineering. Can be open to seniors with consent of instructor.

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 328 Biophysical Chemistry 3.0; 3 cr.
Brief survey on biophysical methods, binding and protein-drug association by absorption spectroscopy, secondary structure determination of protein and nucleic acids by circular dichroism spectroscopy, interaction of biomolecules by fluorescence quenching method, membrane polarity, protein-membrane interaction, distance measurement by FRET, estimation of rotational diffusion by fluorescence anisotropy, characterization of biomolecules by IR and Raman spectroscopy, structure of biomolecules by 2D-NMR, probing bio-molecular interaction by ESR, optical microscopy and cell imaging, single molecule studies and estimation of torque during chemo-mechanical coupling in molecular motors, measuring diffusion and sedimentation coefficients by sedimentation and ultracentrifugation, DLS, relation of partition coefficient to the properties of macromolecules in size exclusion chromatography, electrophoresis, protein crystallization and X-ray crystallography, protein folding and unfolding, Calorimetry, ligand interaction and energetics. Alternative years.

CHEM 329 Introduction to Nanoscience with Applications 3.0; 3 cr.
This course is intended to introduce science and engineering students to the emerging fields of nanoscience and nanotechnology. It aims at introducing the necessary and basic concepts as well as the experimental tools and techniques that are needed to understand structure and phenomena at the nanoscale. It then exposes the students to various applications in materials science, electronic devices, and nanobiology. Alternate years.

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 333 Water and Soil Depollution 3.0; 3 cr.
This course is designed for chemistry, engineering and life science students interested in water and soil depollution. It covers the basic of physical and chemical techniques used for the degradation of classical as well as emergent water contaminants. Emphasis will be done on advanced oxidation processes (AOPs) and their application to hospital, industrial and agroindustrial effluents, underground water, and contaminated soils. AOPs include photo-induced processes, UV/Photolysis of H2O2, UV/O3 process, Vacuum/UV photolysis, ozonation, Fenton processes, sensitized AOPs, ultrasound processes (homogeneous and heterogeneous) and persulfate oxidation (thermal, solar, and chemical activation). AOPs are useful for in-situ chemical oxidation (ISCO) and in-situ thermal remediation (ISTR). This course will also cover spectroscopic and spectrometric approaches to monitor trace levels of water micro-contaminants and their metabolites and transformation products upon treatment. This course requires prior knowledge in chemistry, instrumental analysis and environmental science and engineering. Annually.

CHEM 334 Atmospheric Chemistry 3.0; 3 cr.
This course is designed for engineering and life sciences students interested in the chemical processes in the atmosphere. The course addresses the basics of chemistry of the stratosphere, including ozone loss; and the chemistry of the troposphere, including formation of ozone by homogeneous gas phase reactions. It explains the fundamentals of atmospheric chemistry (photochemistry, spectroscopy, kinetics, and rates of reactions of gas phase chemistry) and their relation to the modern understanding of climate change, air quality, and ozone depletion. The course also looks at the chemistry of inorganic and organic compounds as well as the physical and chemical properties of primary and secondary particles. The course describes the analytical methods used for the measurements of ambient gas and particle concentrations and gives the chance for the students to present one of the current topics related to atmospheric chemistry. The course prerequisites are undergraduate physics, chemistry, calculus (especially differential equations), probability and statistics, and physical chemistry (especially kinetic theory).

CHEM 335 Biosensors: Fundamentals, Design, and Applications 3.0; 3 cr.
This course is designed for students studying in the field of life sciences, medicine, and engineering interested in learning the fundamentals of bio-sensing techniques. The course covers sensing systems that are mainly based on optical and electrochemical methods. It will introduce students to fundamentals in optical spectroscopy applied to sensing (Absorbance, FRET, Fluorescent enhancement, Fluorescent quenching Anisotropy, Metal Enhancement Fluorescence, Surface Plasmon Resonance…) and electrochemical detection techniques based on Cyclic voltammetry, Amperometry, and Potentiometry. Strategies to construct biosensors will be covered in details. Topics will emphasize recent applications in the field of immunoassays and sensors applied to DNA, bacteria, cell and pesticides detection, and food analysis. By the end of this course, graduate students will gain the ability to understand the functionality of biosensors and will be able to deliberately design new sensors.

CHEM 336 Renewable Energy 3.0; 3 cr.
This course is designed to introduce students of different backgrounds to the latest innovations in renewable energy research. The students will learn through a series of interactive and modern techniques the fundamentals and hurdles of Hydrogen fuel cells, Water splitting, CO2 reduction, Solar cells, Thermoelectric devices, Microbial fuel cell, Biofuel, and recent technologies in energy storage. The course also touches on the international climate change policies.

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 term. Students taking CHEM 361 are required to submit written reports to their advisers and to present a seminar to the students and faculty of the department. CHEM 361 is required of all graduate students in the department. May not be repeated for credit.

CHEM 395A Comprehensive Exam 0 cr.
Prerequisite: consent of adviser.

CHEM 399 Thesis 9 cr.
Thesis.

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

CHEM 481 Qualifying Exam Part II: Defense of Thesis Proposal 0 cr.
Every term. Prerequisite: CHEM 480.

CHEM 484 PhD Thesis 30 cr.
Every term. Taken at first thesis registration, then registered for every subsequent term with sequential letter annotations (A-L; 0 credits) until completion of thesis work.

Department of Computer Science

Chairperson	Elbassuoni, Shady
Professors	Abu Salem, Fatima; El Hajj, Wassim; Safa, Haidar
Associate Professors	Elbassuoni, Shady; Khabbaz, Maurice
Research Associate	Baydoun, Mohammed H.
Assistant Professors	Abdo Mouawad, Amer; Assaf, Rida; El Hajj, Izzat; Harkous, Hasanin; Mardanbegi, Diako; Sakr, Mohamad
Senior Lecturer	Jureidini, Wadi' N.
Lecturers	Abdallah, Maher; Kobeissi, Mohamed A.; Kobeissi, Nadim; Lakkis, Sari; Noureddine, Moustafa; Raheel, Saeed; Yasseen, Zahraa; Zalghout, Mohamad
Instructors	Aoude, Loa; El Hajj, Mohamed; Farroukh, Duaa; Fatairi, Nour; Ghannam, Hiyam; Hamandi, Ahmad; Khalil, AlAbbass; Ramlaoui, Hussam; Sobh, Amine

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 networking and security, machine learning and data science, high-performance computing, data mining and information retrieval, 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 9-credit thesis (thesis option), (2) 27 credits of coursework and a 3-credit project (project option), or (3) 30 credits of coursework (course-based option). For all options, the courses are normally CMPS courses numbered 310 and above to be taken in coordination with the student's adviser. Students may take up to 6 credits of coursework from the following list: EECE 631, EECE 635, EECE 621, EECE 623, EECE 625, EECE 626, EECE 653, EECE 657. Students must also satisfy a breadth requirement by taking at least 3 credits per area from three different areas of the following eight areas:

1. **Theory:** CMPS 314, CMPS 315, CMPS 316, CMPS 317, EECE 631, EECE 635, or a special topics course in this area.
2. **Computer Architecture and Parallel Computing:** CMPS 323, CMPS 324, EECE 621, EECE 623, EECE 625, EECE 626, or a special topics course in this area
3. **Programming Languages and Compilers:** CMPS 332 or a special topics course in this area
4. **Systems and Networking:** CMPS 342, CMPS 343, CMPS 345, EECE 653, EECE 657, or a special topics course in this area
5. **Computational Science:** CMPS 350, CMPS 351, CMPS 354, CMPS 355, CMPS 358, CMPS 359, or a special topics course in this area
6. **Artificial Intelligence and Data Science:** CMPS 364, CMPS 365, or a special topics course in this area
7. **Software Engineering:** CMPS 371 or a special topics course in this area
8. **Graphics and Gaming:** CMPS 385, CMPS 386, CMPS 388, or a special topics course in this area

For more information about the program, visit: https://website.aub.edu.lb/fas/cs/Pages/index.aspx.

Course Descriptions

Introductory Courses

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.

Theory Courses

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.

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: graduate standing.

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: graduate standing.

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: graduate standing.

Computer Architecture and Parallel Computing Courses

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.

CMPS 324 GPU Computing 3.0; 3 cr.
This course covers parallel computing in the context of processors with many computational cores, with particular emphasis on data parallelism and general purpose GPU programming. The course introduces the CUDA programming model as well as the GPU architecture and memory organization. The course then covers how to map algorithms to parallel hardware and common optimizations for parallel code using numerous parallel patterns and applications case studies, such as: vector addition, matrix multiplication, convolution, stencil computation, histogram, reduction, prefix-sum, ordered merge, sorting, sparse matrix computation, graph traversal, and others. The course also covers a selection of advanced parallel programming practices. Same as CMPS 224. Graduate students may be required to do extra reading, a term paper, and/or an additional project.

Programming Languages and Compilers Courses

CMPS 332 Compiler Construction 3.0; 3 cr.
This course covers the design and implementation of optimizing compilers starting from source code representation down to machine code. Topics include intermediate representations, linkage and storage conventions, intermediate code generation for imperative and object-oriented languages with polymorphism, global dataflow analysis and the iterative dataflow algorithm, local and global optimizations, backend code generation, and register allocation. 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.

Systems and Networking Courses

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. This course is equivalent to EECE 651.

CMPS 343 Advanced Cybersecurity 3.0; 3 cr.
This course provides an in-depth study of advanced cybersecurity principles, algorithms, and mechanisms across computing and emerging technology systems. Topics include cryptography, user authentication, access control, operating system, database, and software security, malicious software, network and Internet security, denial-of- service attacks, intrusion detection and prevention systems, cloud and web security, wireless security, and blockchain-based security frameworks. Emphasis is placed on understanding the algorithmic foundations of security mechanisms, the causes of vulnerabilities, and strategies for prevention and mitigation. Through case studies, analytical assignments, and a research-oriented term project, students develop the skills to conduct independent, advanced research and to design secure and resilient computing systems.

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.

Computational Science Courses

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: Math 218 and Math 251; or graduate standing. Same as MATH 350.

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. This course can also be counted towards fulfilling the theory breadth requirement. Same as MATH 351.

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.

CMPS 355 Bioinformatics Algorithms 3.0; 3 cr.
How do we find potentially harmful mutations in your genome? How can we reconstruct the evolutionary Tree of Life? How do we compare related genes from different species? These are just three of the major questions in modern biology that can only be answered using computational approaches. This course will explore a variety of fundamental topics in computational biology. It will delve into computational ideas used in biology as well as let students apply existing resources that are used in practice every day by bioinformatics professionals. The course offers an opportunity for students who possess a programming background to become more experienced coders in a biological setting.

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.

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.

Artificial Intelligence and Data Science Courses

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. This course is equivalent to EECE 693.

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.

Software Engineering Courses

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.

Graphics and Gaming Courses

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.

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.

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.

Special Courses

CMPS 395A Comprehensive Exam 0 cr.

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: graduate standing. May be repeated for credits.

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
Professor	Abdel-Rahman, Abdel-Fattah
Associate Professor	Doummar, Joanna
Assistant Professor	Nemer, Tony
Lecturer	Bahnan, Alexy; Haidar, Ali, Khadra, Wisam
Instructor	Antoine Kallab

Mission Statement

The graduate program in geology at AUB provides students with advanced, interdisciplinary training in fundamental and applied geosciences. The program integrates core knowledge across key Earth science fields and systems with elective coursework aligned with tracks in general geosciences, sustainable resources, environmental applications, and natural hazards.
It aims to equip graduates with innovative analytical, computational, and field-based skills essential for addressing complex Earth-system challenges, developing sustainable solutions, and anticipating future environmental risks. Through a research-driven thesis, students undertake cutting-edge investigations in various areas of geosciences including natural resources (minerals, water, and soil), environmental geosciences, natural hazards, and climate.
Grounded in the mission of the Department of Earth Sciences, the program prepares students to become scientists, researchers, and professionals capable of advancing geoscientific knowledge, informing evidence-based environmental decision-making, and contributing to sustainable development of the region and beyond.

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 and a maximum of 9 credits of electives can be from outside 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 216.

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/corequisites: GEOL 221 and GEOL 223.

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 216.

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 216 and GEOL 223; 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 216 and GEOL 223; 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 Comprehensive Exam 0 cr.
Prerequisite: consent of adviser.

GEOL 399 MS in Thesis 9 cr.

Department of Economics

Chairperson	Neaime, Simon
Professor Emeritus	Makdisi, Samir
Professor	Neaime, Simon
Professor of Practice	Diwan, Ishac
Associate Professor	Salti, Nisreen
Assistant Professors	Abboud, Ali; Samad, Zeeshan; Yamout, Nadine; Zalghout, Abdallah
Lecturer	Ramadan, Usamah Husni
Instructors	Abdallah, Leen Chaudhry, Rabia Elias Rubeiz, Sylvia; Hamdan, Dana; Hijazi, Ryan; Kanaan, Maya; Karam, Ramzi; Makki, Malak; Mansour, Hassan; Nader, Pamela; Nakhle, Najla; Nassar, Rawan; Sabra, Raja

Mission Statement

The Department of Economics at the American University of Beirut (AUB) is a cornerstone of the Faculty of Arts and Sciences (FAS) and a long-standing influence on the region's intellectual and policy landscape. The department advances rigorous and grounded economic education, high-quality research, and public-interest engagement to serve Lebanon, the MENA region, and the global academic community. Rooted in AUB's tradition of independent inquiry, the department trains students to think critically and analytically across theory, econometrics, and applied policy, while fostering ethical leadership and evidence-based decision-making. Through internationally oriented faculty, interdisciplinary teaching, and active research linkages—including its long-standing partnership with the Institute of Financial Economics—the department prepares graduates to contribute meaningfully to financial economic analysis, policy design, and institution building in an increasingly interconnected world.

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 21 credits, all of which should be at the graduate level, including ECON 305, ECON 306, ECON 317 and ECON 327, plus a 9-credit thesis. Of the remaining 9 graduate credits, 6 credits should be chosen from the available graduate courses in the department, and up to 3 credits may be chosen from available graduate courses at the university with the adviser's approval. In case of deficiencies in the students' undergraduate records, 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.

Course Descriptions

Economics Courses

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.
This course introduces advanced econometric methods, building on the theoretical and practical foundations established in Econometrics I. Topics include time series analysis, panel data models, and generalized method of moments (GMM). Additional topics, which may vary by term, are selected from the following: regression discontinuity design, treatment effects models, censored data models, duration models, machine learning techniques, and simulation-based inference methods. 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 390 Special Topics in Economics 3.0; 3 cr.
May be repeated for credit. Occasionally.

ECON 395A Comprehensive Exam 0 cr.
Prerequisite: consent of adviser.

ECON 399 Thesis 9 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 students' undergraduate records, 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.

Course Descriptions

Financial Economics Courses

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 306 Econometrics II 3.0; 3 cr.
This course introduces advanced econometric methods, building on the theoretical and practical foundations established in Econometrics I. Topics include time series analysis, panel data models, and generalized method of moments (GMM). Additional topics, which may vary by term, are selected from the following: regression discontinuity design, treatment effects models, censored data models, duration models, machine learning techniques, and simulation-based inference methods. Prerequisite: ECON 305. 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 0 cr.
Prerequisite: consent of adviser.

Electives (one course: 3 credits)

One elective course is chosen from the following list in consultation with the faculty adviser. Other electives may alternatively be chosen from available graduate courses at the university with the adviser'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 306, ECON 317, ECON 327 and ECON 328 if completed prior to the transfer. The five 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 12 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 adviser.

Students enrolled in the MAFE program who wish to transfer to the MAE program must complete ECON 306, ECON 317, ECON 327 and ECON 305. If completed prior to the transfer, these classes constitute part of the course requirements towards the MAE. With the completion of these four courses, the transferring students need to complete an additional 9 credits of coursework, plus the thesis.

Department of Education

Chairperson	Karami-Akkary, Rima R.
Professors	Al-Hroub, Anies; Amin, Tamer; Boujaoude, Saouma; Ghaith, Ghazi; Khamis, Vivian; Khishfe, Rola
Professors Emeritus	Bashshur, Munir; Jurdak, Murad
Associate Professors	Baytiyeh, Hoda; El Mouhayar, Rabih (Science and Mathematics Education Center, Director); El-Hassan, Karma; Karami Akkary, Rima
Assistant Professor	Khalil, Lina
Lecturers	Bou Zeineddine, Amal; El Khatib, Lara; Hout, Hanine; Karameh, Jinan; Nashabe Mouawad, Rim; Osman, Enja; Shukri Balaa, Rola
Instructors	El Hout, Rim; Jouni, Nidal; Misk, Zeina; Moussa, Rola; Sarieddine, Diana; Yordi, Serene

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 offers in-person MA programs that lead to a master of arts degree in education; and online programs that lead to an online graduate diploma in online education; and an online MA in computing in education.

MA in Education (In person)

Mission Statement

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 towards 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 advisers. 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 supervisors as they work 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 in 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. May be repeated for credits.

EDUC 395A Comprehensive Exam 0 cr.

EDUC 398 Project 3 cr.
Project.

EDUC 399 Thesis 9 cr.
Thesis.

Graduate Diploma in Online Education (Online)

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.

MA in Computing in Education (Online)

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 a 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.

EDUC 395A Comprehensive Exam 0 cr.

EDUC 398 Project 3 cr.
Project.

EDUC 399 Thesis 9 cr.
Thesis.

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 PhD 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. Prerequisite: EDUC 401.

Department of English

Chairperson	Avant, Doyle Rexford
Professors	Choueiri, Lina; Hout, Syrine; Mejcher-Atassi, Sonja; Myers, Robert; Shaaban, Kassim
Associate Professors	Ali, Tariq Mehmood; Avant, Doyle Rexford; Gonsalves, Joshua David; Khayyat, Yasmine
Assistant Professors	Ard-Keyser, Devan; Dasgupta, Sreemoyee; Neiderman, Halle Michelle; Sfeir, Maya; Moughabghab, Emma (visiting)
Senior Lecturers	Harb, Sirene; Nassar, Christopher
Lecturers	Ard-Keyser, Emily; Ezzeddine, Maya; Itani, Layla; Johnson, Stacey Anne; Raad, Joanna; Rantisi, Rima; Salame, Eliane; Shweiry, Zein; Shweiry, Zinnia
Instructors	Abouchala, Nour; Adra, May; Al Ayash, Randa; Al-Sayyed, Amany; Andary, Layl; Awad, Frida; Awwad, Ilsa; Ayoubi, Rola; Baalbaki, Rula; Bohsali, Rana; Chehade, Jinane; Danaoghlian, Gacia; Deeb, Rima; Elias, Charline; El-Sakalaoui, Dima; Fleszar, Dorota; Hafez, Maria; Hemadeh, Ruba; Hodeib, Heba; Ibrahim, Rita Maria; Iskandarani, Rima; Issa, Leila; Jaber, Nagham; Jannoun, Jihan; Karakazian, Helena; Kassem Moussa, Fatima; Khoury, Malaki; Kodeih, Rabab; Maalouf, Maya Berta; Maktabi, Sawsan; Matta, Elie; Mikati, May; Morcos, Hiba; Moujaes, Omar; Moutchoyan, Anita; Nasr, Jana; Obeid, Doaa; Riman, Souha; Shadid, Rima; Shaer, Farah; Sleiman, Tamara; Tabet, Jad; Zreik, Hassan
Artist in Residence	Bou Rjeily, Lucien

The Department of English offers one writing course, ENGL 300, to all graduate students in the university who did not meet the RUSE.

The Department of English offers two graduate degree programs: the MA in English literature and the MA in English language.

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.

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 towards 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 courses 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.

Course Descriptions

Literature Course

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 Courses

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 Courses

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 rewriting. 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 Courses

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. May not be repeated for credit, Occasionally.

ENGL 395A Comprehensive Exam 0 cr.
Prerequisite: consent of adviser.

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.

Course Descriptions

Language Courses

ENGL 301B Introduction to Bibliography and Research Methods 3.0; 3 cr.
An introduction to research methodologies in language studies and writing studies. The course provides students with a foundation in designing, conducting, and evaluating methods across sub-fields. 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 students 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 356 Cultural Rhetorics 3.0; 3 cr.
A course exploring rhetoric, ideology, power, and social justice, examining critical race, queer, decolonial, and feminist traditions as tools for critique and transformation. Students analyze discourse and counter-rhetorics across cultural contexts, using theory to understand power and envision new futures.

ENGL 395A Comprehensive Exam 0 cr.
Prerequisite: consent of adviser.

ENGL 399 Thesis 9 cr.
Thesis.

Department of Fine Arts and Art History

Chairperson	Sadek, Walid
Professors	Dahdah, Farès; Sadek, Walid
Associate Professors	Esanu, Octavian; Hammond, Joseph Richard
Assistant Professors	Al-Bahloly, Saleem; Saadawi, Ghalya; Youssef, Jad
Lecturers	Garro El Khoury, Joelle; Schell, Sarah Elizabeth
Instructors	Abela, Joe-Pietro; Abou Samra, Nidal; Al-Amine, Gheith; Khcheich, Rima; Maalouf, Maya Berta; Ouayda, Nour; Sabbah, Yasmina
Artist-in-Residence	Kahwagi, Bassam

Mission Statement

FAAH educates students in the arts in all their dimensions, believing that an understanding and appreciation of this area of human endeavor is an essential element in the formation of well-rounded individuals. To that end, the department offers courses in the studio arts, art history and music. In the case of the courses aimed at training practitioners, the goal is to produce students with the skills to create meaningful statements in art. In the case of the department's historical and theoretical courses, it introduces students to great works of art of different cultures, and aims to equip them to deal with artworks critically, and with scholarship.

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 students' choosing.

Course Descriptions

AHIS 301 Practices of Art History (Research Methods, Theories, Historiography) 3.0; 3 cr.
The seminar acquaints students with the foundational methods, theories, and practices of art historical research. Bi-annually.

AHIS 302 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 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 Modern Art of the Middle East: Twentieth Century 3.0; 3 cr.
The seminar offers a topical treatment of issues related to modern and contemporary art of the twentieth century in the Middle East and the Arab World. Occasionally.

AHIS 315 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 nineteenth and twentieth 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 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 Art Writing and Cultural Criticism 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. May be repeated for credit.

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 Enlightenment to the present. Concepts and aesthetic theories are examined in the context of specific debates and controversies in the artworld. May be repeated for credit.

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. May be repeated for credit.

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 students' advisers and the graduate program director.

AHIS 395A Comprehensive Exam 0 cr.
Prerequisite: consent of adviser.

AHIS 399 Thesis 6 cr.
Thesis

Department of History and Archaeology

Chairperson	Armstrong, Lyall
Professor Emerita	Seeden, Helga
Professor Emeritus	Seikaly, Samir
Professors	Cheikh, Nadia; Genz, Hermann; Sader, Helene
Associate Professors	Armstrong, Lyall Richard; Malleson, Claire Joanna; Newson, Paul Graham
Assistant Professors	Abou Hussein, Tarek; Ketsamanian, Varak; Kitlas, Peter Francis; Rabah, Makram
Lecturers	Kaidbey Takieddine, Naila; Nurpetlian, Jack

The department offers programs leading to the BA and MA in history and a 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 GPA of 3.3 or its equivalent) and the potential to conduct scholarly research. 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. 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 Descriptions

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 adviser.

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. 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 adviser to ensure that the total number of PhD thesis credits and PhD course credits are met as per AUB rules and regulations.

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 Descriptions

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. May not be repeated for credits.

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 adviser.

AROL 399 Thesis 9 cr.
Thesis.

Department of Mathematics

Chairperson	Nassif, Nabil
Professor Emeritus	Muwafı, Amin
Professors	Abi Khuzam, Farouk; Abu Khuzam, Hazar; Khuri Makdisi, Kamal; Nassif, Nabil; Raji, Wissam; Shayya, Bassam
Associate Professors	Alhakim, Abbas; Bertrand, Florian Jacques; Della Sala, Giuseppe; Kachmar, Ayman; Moufawad, Sophie; Roy, Tristan Cyrus; Sabra, Ahmad A; Tlas, Tamer
Assistant Professors	Abdo, Elie; Chen, Chien-Hua; Jahel, Colin; Monni, Stefano; Taati, Siamak
Lecturers	Azar, Therese; Darwich, Mohamad; Menhem, Mohamad; Mroue, Fatima; Riman, Manar; Yamani, Hassan
Instructors	Abu Diab, Sara; Ashkar, Alice; Berjaoui, Razane; Bou Eid, Michella; Chalhoub, Christopher; Fuleihan, Najwa; Itani, Maha; Karakazian, Hagop; Khachadourian, Zadour; Khayatt Saade, Ban; Nashef, Fida; Nassif, Rana; Rahhal, Lina; Tannous, Joumana

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.

Mission Statement

The mission of the graduate program in mathematics is to provide graduate education through rigorous academic training and innovative research. Currently, MS tracks are offered in both pure and applied Mathematics. Each track combines a strong theoretical core with specialized elective study and a thesis project. The department is dedicated to mentoring students to become independent thinkers and problem-solvers, prepared for advanced careers in academia, industry, and research.

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.

PhD in Mathematics

The PhD program in mathematics is dedicated to producing highly qualified and independent researchers capable of making original and significant contributions to mathematical sciences and of contributing to further developments through successful careers in academia or industry. The program supports the AUB mission of promoting excellence in research and education, participating in the advancement of knowledge through research and serving the people of the Middle East and beyond.

Admission Requirements

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 mathematics and applied mathematics. The following items are required for an application:

- Degrees: A master of science (MS) degree in mathematics, applied mathematics or related fields from an institution recognized by AUB is required.
- A cumulative average of at least 3.7 or the standardized equivalent shown on the official transcript of the applicant.
- Three letters of recommendation.
- GRE General Test as per AUB requirements. Subject GRE is required as per the Mathematics Department requirements.
- For English, Readiness for University Studies in English (RUSE) as per AUB regulations.
- A statement of purpose.
- A recommendation for admission from the AUB Mathematics Department.
- A departmental committee may require an interview with the applicant before giving a recommendation.

Program Requirements

Students who are admitted to the program must complete 24 credits of graduate mathematics courses beyond the master's degree. At most three credits out of these 24 credits can be tutorial courses. Students are required to complete 9 credits of graduate courses in their first term, 6 in their second term, 6 in their third term, and 3 in their fourth term.

The 24 credits of post-master's graduate mathematics courses must include at least 9 credits of core courses taken from the following list: MATH 305 or MATH 312, MATH 306 or MATH 314, MATH 344, MATH 340, MATH 330, MATH 351.

Although these core courses must be completed by the fourth term, students are strongly encouraged to complete them by their second term.

For further information on the requirements of the program, including among others exams, thesis, and publication requirements, please refer to the General Academic Information section of the graduate catalogue.

MA or MS in Statistics (Frozen)

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.

Course Descriptions

Mathematics courses

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. Biennially.

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. Biennially.

MATH 334 Advanced Topics in Statistical Learning 3.0; 3 cr.
Annually.

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. Biennially.

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. Biennially.

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 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: Math 218 and Math 251; or graduate standing. 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 Mathematics 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 359. Occasionally.

MATH 395A Comprehensive Exam 0 cr.
Prerequisite: consent of adviser.

MATH 399 MS Thesis 6 cr.
MS Thesis.

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

MATH 481 Qualifying Exam Part II: Defense of Thesis Proposal 0 cr.
Every term. Prerequisite: MATH 480.

MATH 484 PhD Thesis 24 cr.
Every term. Taken at first thesis registration, then registered for every subsequent term with sequential letter annotations (A-L; 0 credits) until completion of thesis work.

Course Descriptions

Statistics courses

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 Statistical Learning 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 adviser.

STAT 399 Thesis 6 cr.
MA or MS Thesis.

Department of Philosophy

Chairperson	Gannagé, Emma
Professors	Brassier, Raymond; Haydar, Bashshar; Johns, Christopher
Associate Professors	Bashour, Bana; Gannagé, Emma; Muller, Hans D.
Assistant Professors	Mohammadian, Mousa; Turan, Caner
Lecturers	Agha, Saleh; Baassiri, Mahmoud; Barakat, Karim; Chehayeb, Fidaa; Talhouk, Omar
Instructors	El Hassanieh, Mahmoud; Kasab, Jana; Salloum, Rabih, Sabra, Zainab; Samaha, Raid; Wahab, Karam

Mission Statement

People study philosophy for its enormous and enduring interest, for its disciplined inquiry into questions of fundamental importance, such as the nature of reality, mind, knowledge, and ethics. In this sense, philosophy is the most “useless” field of inquiry, as it serves only to satisfy and inspire our natural desire to know and to learn. But for these same reasons, philosophy is also the most useful of disciplines, since it emphasizes intellectual skills (critical thinking, reading, and writing) that are indispensable to any particular field of inquiry, such as psychology, sociology, history, political science, and physics. All fields of knowledge employ reasoning and operate according to standards of evidence, but only philosophy examines the very foundations of reasoning and evidence, thus providing an added dimension of understanding to these fields.

The MA program in philosophy aims to provide students with in-depth training in the discipline of philosophy, while involving them in the research programs of individual faculty members. The graduate program in philosophy exposes students in a more intensive manner to a wide range of philosophical questions, through coursework in a variety of topics largely determined by the faculty’s broad research interests.

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.

The program is designed to prepare students for a PhD program in philosophy, for developing writing and thinking skills useful for careers outside of philosophy, or simply for personal enrichment.

Curriculum

The philosophy department endeavors to offer a balance among historical and contemporary courses as well as courses in a variety of philosophical areas. The graduate adviser oversees the students' progress from the time they enter the program until students choose a thesis adviser. Students typically register in two courses each term for the first three terms. In their fourth term, students register in their seventh course as well as in PHIL 395A to prepare a thesis proposal. Students will defend their proposal no later than the end of the first month of the following term. Students may then register in thesis (PHIL 399) in their fifth term in the program, and proceed to the MA thesis stage, under close supervision of their thesis adviser. Typically, students will write and defend the thesis no later than the end of the students' sixth term in the program. The defense is conducted orally, before the thesis adviser and two other faculty members who will serve as readers. The evaluation of the written thesis and oral defense will emphasize clarity of writing, cogency of argument, and critical engagement.

Philosophy Courses

PHIL 300 Special Topics in Logic 3.0; 3 cr.
May be repeated for credit. Occasionally.

PHIL 301 Special Topics in Ethics 3.0; 3 cr.
May be repeated for credit. Occasionally.

PHIL 302 Special Topics in Political Philosophy 3.0; 3 cr.
May be repeated for credit. Occasionally.

PHIL 303 Special Topics in Aesthetics 3.0; 3 cr.
May be repeated for credit. Occasionally.

PHIL 304 Special Topics in Metaphysics 3.0; 3 cr.
May be repeated for credit. Occasionally.

PHIL 305 Special Topics in Epistemology 3.0; 3 cr.
May be repeated for credit. Occasionally.

PHIL 306 Special Topics in the Philosophy of Science 3.0; 3 cr.
May be repeated for credit. Occasionally.

PHIL 307 Special Topics in the Philosophy of Language 3.0; 3 cr.
May be repeated for credit. Occasionally.

PHIL 308 Special Topics in the Philosophy of Mind 3.0; 3 cr.
May be repeated for credit. Occasionally.

PHIL 310/311 Special Topics in the History of Philosophy 3.0; 3 cr.
May be repeated for credit. Occasionally.

PHIL 312/313 Special Topics in Contemporary Philosophy 3.0; 3 cr.
May be repeated for credit. Occasionally.

PHIL 320 Graduate Tutorials 3.0; 3 cr.
May not be repeated for credit. Occasionally.

PHIL 395A Comprehensive Exam 0 cr.
Prerequisite: consent of adviser. Thesis Proposal and Defense.

PHIL 399 Thesis 9 cr.
Thesis

Department of Physics

Chairperson	Kazan, Michel
Professor Emeritus	Mavromatis, Harry A.
Professors	Antar, Ghassan; Chamseddine, Ali; Isber, Samih; Kazan, Michel; Klushin, Leonid; Sabra, Wafic Ali; Tabbal, Malek; Touma, Jihad
Assistant Professors	Haidar, Mohamad J.; Najem, Sara A.
Lecturers	Al Sayegh, Amara; Barakat, Nourhan; Cheaib, Racha; Harajli, Zeinab; Hosseiky Malaeb, Ola; Saad, Cynthia
Instructors	Abou Daher, Hanin; Ayyash, Rosa; Hachem, Marielle

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.

Mission Statement

The program leading to the bachelor of science emphasizes the fundamental concepts and principles of physics and their roles in a variety of disciplines with a liberal arts setting. The Department of Physics educational focus is to provide students with high-quality instruction in theoretical and experimental physics. Consequently, theoretical courses, together with computer modeling experience and a comprehensive set of laboratory experiments, introduce the students to various methods of inquiry and research in physics. The emphasis is not only on subject instruction but also on the development of communication and teamwork skills, as well as critical and analytical thinking. The program is designed to graduate well-rounded, free-thinking individuals with inquisitive minds who are well-prepared for further study in basic and applied research and can pursue professional careers in a variety of fields.

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 students must pass the GRE subject test, considered by the Department of Physics 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: A master of science (MS) 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 a minimum of 18 credit hours of course work.

The required courses 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.

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, students should sit for PhD Qualification Exam Part I (written comprehensive examination) to determine whether they have acquired the background necessary to continue in the PhD program.

After choosing a thesis adviser, the students should pass the PhD Qualification Exam Part II; the students 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

Students are 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 Department of Physics 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

Students are expected to abide by the following timetable:

- Finish the graduate course work within eight terms of starting the graduate study program.
- Pass the qualifying exam upon completion of 15 credits, within three terms of starting the graduate study program.
- Defend the PhD thesis proposal within six terms and advance to candidacy within seven terms of starting the graduate study program.
- Present research work by submitting their thesis to the thesis committee and defending it in a public session. The total length of the PhD should not exceed five years.

Financial Support

The Department of Physics 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 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 amphiphylic 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/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/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/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 adviser.

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. Taken at first thesis registration, then registered for every subsequent term with sequential letter annotations (A-L; 0 credits) until completion of thesis work.

Department of Political Studies and Public Administration (PSPA)

Chairperson	Haddad, Tania (Interim)
Professor	Khashan, Hilal
Associate Professors	Frangie, Samer; Geukjian, Ohannes; Haddad, Tania; Khodr, Hiba; Kosmatopoulos, Nikolas; Makdisi, Karim; Tell, Tariq
Assistant Professors	Jallad, Zaina; Mouawad, Jamil (Director of Public Policy and International Affairs)
Distinguished Practitioner of Public Policy	Nahas, Charbel
Senior Lecturer	Bayrakdarian, Nora
Lecturers	Awada, Ghada; El Debek, Amer; Mohanna, Zeina; Shaar, Rima; Smaira, Dima
Instructors	Akoum, Walid; Choulhadjian, Vera; Hankir, Samer; Maalouf, Rabih C

Mission Statement

The mission of the PSPA Department is to train students to research, understand, contextualize, and analyze concepts and practices in the fields of politics and public administration. The department employs multidisciplinary and critical approaches, focusing its research, public engagement, and teaching to produce and debate knowledge relevant to the people of Lebanon, the Arab region, the Global South, and beyond. It offers courses spanning across the social sciences and humanities and supports AUB's liberal arts core and general education requirements.

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 21 credit hours of courses (of which no more than 6 credit hours can be taken outside the major) and defend a thesis (worth 9 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 term. 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).

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 Studies 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.

MA in Public Administration (Frozen – Program under Review)

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.

Course Descriptions

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 adviser.

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 policy and international 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, students 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 research methods course (PPIA 308 or approved equivalent*), plus five elective courses including at least two PPIA courses that are relevant to the students' program of study.

* Upon approval of the PPIA director, students may substitute a relevant methods course for PPIA 308 Research Methods

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. Students are assigned a committee consisting of an adviser (first reader) and a second reader who jointly supervise and guide the student throughout. It is the responsibility of the students to select a topic and submit a project proposal to be approved by their 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. Students who are unable to finish the project within the allotted time period can petition to be allowed an additional term subject to consent of their 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 students must have their supervisor confirm to the PPIA program in writing at the beginning of the internships that the internships meet these guidelines. At the end of the internship, the supervisor must confirm in writing that these guidelines have been met. Upon completion, the students 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 a 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 to the prevailing context. 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.
This course 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 social, 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 knowledge, 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 change can 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 term, 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 term, 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 History of 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. 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 goes on to unpack the contradictions of the global order including class, race, and gender discrepancies; power imbalances and other particularities within the Global South and between it and the developed countries of the capitalist core. 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 adviser.

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
Professor Emeritus	Kazarian, Shahe
Adjunct Professor	Harb, Charles
Professor	Dietrich, Arne
Associate Professor	Bosqui, Tania
Assistant Professors	Agopian, Sarine; Ayoub, Mona; Badaan, Vivienne; Basma, Badriah; Saade, Sabine
Assistant Professor of Clinical Specialty	Ismail, Ghina
Lecturers	Awaida, May; Fisher, Jennifer; Oueidat, Hala
Instructors	Barhouch, Angela; Bassil, Margaret; El Majzoub, Hana; Ghanem, Lama; Nasr, Jane; Salem, Samah

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 (particularly for those intending to get a license and practice in Lebanon), minor or the equivalent (15 credits) in psychology.

MA in Psychology (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.

Candidates for the MA degree in psychology are required to complete 21 graduate credit hours in addition to 9 thesis hours. The students 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 students' interest and with the consent of the adviser.

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.

A candidate for the MA degree in clinical psychology is required to complete 30 graduate credit hours in coursework, in addition to 6 credit hours of clinical practicum and 6 credit hours of Thesis, for a total of 42 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 adviser.

CPSY 398 Clinical Project 6.0; 6 cr.

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
Professor Emeritus	Dajani, Nabil
Director of Media Studies	Farah, May
Professors	Hanafi, Sari; Scheid, Kirsten; Wick, Livia Celine
Associate Professors	Atwood, Blake Robert; Bou Ali, Nadia; Majed, Rima; Perdigon, Sylvain Jean Daniel
Assistant Professors	Farah, May; Kassir, Alexandra; Kelada, Mariz; Kosmatopoulos, Nikolas; Matta Saleh, Elizabeth; Mourad, Sara; Petiwala, Ada; Sukarieh, Rana; Tarraf, Zeina
Lecturers	El Andary, Rabih; Fathallah, Zeina; Hamdar, Sarah
Instructors	Abou Chabke, Joelle; Boustany, Nora; Bzeih, Bachar; Dalloul, Ali; Ghanem, Samar; Hakim Hussein Agha, Dina; Rassi, Rima; Seroujian, Narod

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. Students may be interviewed upon application to determine their background and qualification.

MA in Anthropology

Mission Statement

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

Mission Statement

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 adviser and according to the interest of the graduate students. Students wishing to learn Arabic for purposes of fieldwork may complete up to 6 credits of Arabic language classes towards their MA degree.

The MA program in anthropology 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.

- The thesis option requires seven courses (21 credits), the comprehensive exam (0 credits) and a 9-credit thesis (SOAN 399).
- The project option requires nine courses (27credits), the comprehensive exam (0 credits) and a 3-credit project (SOAN 398).

All candidates 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 tracks wishing to learn Arabic for purposes of fieldwork may complete up to 6 credits of Arabic language classes towards their MA degree. The remaining courses may be selected from the department electives, or other graduate courses upon the adviser's consent.

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 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 305/MCOM 305 Seminar in Social and Cultural Theory 3.0; 3 cr.
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 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 students 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 3.0; 3 cr.
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 adviser.

SOAN 398 Project 3 cr.
Project.

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. Students may be interviewed upon application to determine their 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, and MCOM 395 (comprehensive exam), and at least three courses from the list of program electives. For students choosing the project track they must also complete MCOM 303 and an additional elective from within the program. The remaining courses may be selected from the department electives, or other graduate courses upon the adviser's consent.

Core Courses for thesis track: MCOM 300 and MCOM 301 or 305.

Core Courses for project track: MCOM 300, MCOM 301 or 305, and MCOM 303.

Department Electives: MCOM 302, MCOM 313, MCOM 314, MCOM 315, MCOM 316, MCOM 317, MCOM 318, MCOM 319, 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 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 303 Practice-based Research 3.0; 3 cr.
This course prepares students in the project track to design and execute research that bridges academic inquiry and public engagement. Students learn how to translate scholarly concepts into practice-based outputs such as films, podcasts, exhibitions, websites, or other media forms. Through case studies, workshops, and critical reflection, the course examines strategies for aligning rigorous research with accessible formats, identifying audiences, and situating projects within broader intellectual and cultural conversations. By the end of the term, students will have developed a detailed plan for their own practice-based MA project, including research questions, methodologies, and a dissemination strategy.

MCOM 305/SOAN 305 Seminar in Social and Cultural Theory 3.0; 3 cr.
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 318 Media and Memory 3.0; 3 cr.
This course examines the dynamic relationship that exists between media and cultural memory. Beginning with the argument that cultural memory is foremost based on communication through media, we explore various approaches to memory studies to understand the medial processes through which memories come into the public arena and shape our collective imagination of the past.

MCOM 319 Media Work and Workers 3.0; 3 cr.
This course examines the often-invisible processes, institutions, and people that make media "work" creatively, discursively, materially, and politically. Centering a Marxist-Feminist approach to industry and production studies, we will examine the various entanglements between media and labor and how socio-economic structures and neoliberal ideology shape and are being shaped by media workers as political subjects. The course aims to rethink the broader ecosystem of media and its political economy locally, regionally, and globally, and to develop and utilize a deeper understanding of media politics beyond its representational power.

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 adviser.

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.
Lecturers	El Kahwaji, Chadi; Sultani Kanawaty, Rima
Instructors	Amer, Anis; 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

Mission Statement

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 five-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.

Course Descriptions

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 Arabic as a Foreign Language I 5.0; 3 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 to Arabic and emphasizes communicative tasks and contexts. Students will learn 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, students reach High Elementary proficiency in Arabic on the ACTFL scale. Prerequisites: none.

MEST 322 Arabic as a Foreign Language II 5.0; 3 cr.
This course is designed for students who have a reached a high elementary proficiency in Arabic. The course utilizes an integrated approach that teaches Arabic based on communicative tasks and contexts. Students will learn to speak and write longer sentences about themselves, their families and their immediate environment, and read and listen to longer authentic texts. By the end of the course, students reach intermediate low proficiency in Arabic on the ACTFL scale. Prerequisites: MEST 321 or placement by a placement examination. Every term.

MEST 323 Arabic as a Foreign Language III 5.0; 3 cr.
This course is designed for students who have reached intermediate low proficiency in Arabic. The course utilizes an integrated approach to Arabic that is based on communicative tasks and contexts. The course enhances students' proficiency in the various skills by expanding their vocabulary, control of pronunciation and grammatical structures, and cultural knowledge. Students will give short oral presentations and do short writing projects. By the end of this course, students reach intermediate mid proficiency in Arabic on the ACTFL scale. Prerequisites: MEST 322 or placement by a placement examination. Every term.

MEST 324 Arabic as a Foreign Language IV 5.0; 3 cr.
This course is designed for students who have reached an Intermediate mid proficiency in Arabic. The course utilizes an integrated approach to Arabic that is based on communicative tasks and contexts. The course further enhances students' proficiency in the various skills by expanding their vocabulary, control of pronunciation and grammatical structures, and cultural knowledge. Students will give longer oral presentations and do more challenging writing projects. By the end of this course, students reach Intermediate High proficiency in Arabic on the ACTFL scale. Prerequisites: MEST 323 or placement by a placement examination. Every term.

MEST 325 Arabic as a Foreign Language V 3.0; 3 cr.
This course is designed for students who have reached intermediate high proficiency in Arabic. The course utilizes an integrated approach to Arabic that is based on communicative tasks and contexts. Students will do readings on a variety of topics and genres, and engage in debates, give oral presentations and write short research papers. By the end of this course, students reach advanced low proficiency in Arabic on the ACTFL scale. Prerequisites: MEST 324 or placement by a placement examination. Every term.

MEST 326 Arabic as a Foreign Language VI 3.0; 3 cr.
This course is designed for students who have reached advanced low proficiency in Arabic. The course utilizes an integrated approach to Arabic and is based on communicative tasks and contexts. Students will be able to comprehend lengthy authentic listening material, give long oral presentations, write extensive compositions, and read authentic Arabic texts for research purposes. By the end of this course, students reach advanced mid proficiency in Arabic on the ACTFL scale. Prerequisites: MEST 325 or placement by a placement examination. Every term.

MEST 327 Arabic as a Foreign Language VII 3.0; 3 cr.
This course is designed for students who have reached advanced mid-level of proficiency in Arabic. The course utilizes an integrated approach to Arabic and is based on communicative tasks and contexts. Students do extensive reading which span a variety of genres, and enhance their skills through work with news broadcasts, documentaries, and television shows. They extended oral presentations and writing activities. By the end of the course, students reach advanced high proficiency in Arabic on the ACTFL scale. Prerequisites: MEST 326 or placement by 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 students 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 adviser.

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 21 credit hours in courses numbered 300 and above, in addition to a 9 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 towards 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 adviser.

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 9 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 GPA 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

Arabic Language and Culture Program

Modern Standard Arabic Courses

MEST 360 Elementary Arabic (Intensive) 6 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. It utilizes an integrated approach that teaches both Standard and Lebanese Arabic based on communicative tasks and contexts. The course will familiarize students with the cultures of various Arabic speaking countries, with an emphasis on Lebanese culture and society. 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. The course will use Alif Baa: Introduction to Arabic Letters and Sounds (3rd Edition) and part of Al-Kitaab fii Ta'allum al-'Arabiyya: Part One (3rd Edition). By the end of this course, students are expected to reach High Elementary proficiency in Arabic on the (ACTFL) scale. Annually.

MEST 361 High Elementary Arabic (Intensive) 6 cr.
This course is designed for students who have studied the equivalent of one term of Arabic. It utilizes an integrated approach that teaches both Standard and Lebanese Arabic based on communicative tasks and contexts. The course will familiarize students with the cultures of various Arabic speaking countries, with an emphasis on Lebanese culture and society. Students who enroll at this level are expected to know the Arabic alphabet and have basic reading, writing and conversational skills. By the end of the course, students will be able to speak and write longer connected sentences about themselves, their families, their environment and other topics, and to read and listen to longer authentic texts. The course will use part of Al-Kitaab fii Ta'allum al-'Arabiyya: Part One (3rd Edition). By the end of the course, students are expected to reach Intermediate proficiency in Arabic following the ACTFL scale. Annually.

MEST 362 Intermediate Arabic (Intensive) 6 cr.
This course is designed for students who have studied the equivalent of two terms of Arabic. It utilizes an integrated approach that teaches both Standard and Lebanese Arabic based on communicative tasks and contexts. The course will familiarize students with the cultures of various Arabic speaking countries, with an emphasis on Lebanese culture and society. The objectives of this course are to further develop students' language 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 will use part of Al-Kitaab fii Ta'allum al-'Arabiyya: Part One (3rd Edition) and 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 proficiency in Arabic following the ACTFL scale. Annually.

MEST 363 Intermediate Mid Arabic (Intensive) 6 cr.
This course is designed for students who have studied the equivalent of three terms of Arabic. It utilizes an integrated approach that teaches both Standard and Lebanese Arabic based on communicative tasks and contexts. The course will familiarize students with the cultures of various Arabic speaking countries, with an emphasis on Lebanese culture and society. 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. Students will learn to give oral presentations and do a lengthy writing project. The course will use 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-High proficiency in Arabic following the ACTFL scale. Annually.

MEST 364 Intermediate High Arabic (Intensive) 6 cr.
This course is designed for students who have studied the equivalent of four terms of Arabic. It utilizes an integrated approach that teaches both Standard and Lebanese Arabic based on communicative tasks and contexts. The course will familiarize students with the cultures of various Arabic speaking countries, with an emphasis on Lebanese culture and society. The course aims 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. Students will be able to comprehend lengthy authentic listening material, give oral presentations, write extensive compositions, and read authentic Arabic texts for research purposes. The course will use part of Al-Kitaab fii Ta'allum al-'Arabiyya: Part Two (3rd Edition). By the end of the course, students are expected to reach Advanced proficiency in Arabic following the ACTFL scale. Annually.

MEST 365 Advanced Arabic (Intensive) 6 cr.
This course is designed for students who have studied the equivalent of five terms of Arabic. It utilizes an integrated approach that teaches both Standard and Lebanese Arabic based on communicative tasks and contexts. The course will familiarize students with the cultures of various Arabic speaking countries, with an emphasis on Lebanese culture and society. It aims to enable students to reach higher levels of proficiency in all Arabic skills. Students will do readings on a variety of topics and genres, such as literature, language and the social sciences. They will engage in debates, give oral presentations and write short research papers. The course will use part of 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 proficiency in Arabic following the ACTFL scale. Annually.

MEST 366 Advanced-MidArabic (Intensive) 6 cr.
This course is designed for students who have studied the equivalent of six terms of Arabic. It utilizes an integrated approach that teaches both Standard and Lebanese Arabic based on communicative tasks and contexts. The course will familiarize students with the cultures of various Arabic speaking countries, with an emphasis on Lebanese culture and society. Students will do readings in a variety of genres: novels, short stories, academic articles, lengthy newspaper articles, and selections from medieval texts. They will improve their listening skills through news broadcasts, documentaries, and television shows in both Standard and Lebanese Arabic. They will improve their oral skills by doing extended oral presentations in class. 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 will use part of 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-High proficiency in Arabic following the ACTFL scale. Annually.

MEST 367 Advanced High Arabic (Intensive) 6 cr.
This course is designed for students who have studied the equivalent of seven terms of Arabic. It utilizes an integrated approach that teaches both Standard and Lebanese Arabic based on communicative tasks and contexts. The course will familiarize students with the cultures of various Arabic speaking countries, with an emphasis on Lebanese culture and society. This level focuses on 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 enhanced through news broadcasts, documentaries, and television shows in both Standard and Lebanese Arabic. Oral skills are developed through extended presentations in class. 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. By the end of the course, students are expected to reach a near native proficiency in all the Arabic skills. The course will use Al-Kitaab fii Ta'allum al-'Arabiyya: Part Three, to be supplemented by extra material as needed. Annually.

Colloquial Lebanese Arabic Program

Lebanese Colloquial Arabic Courses

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 terms 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	Scheid, Kirsten
Professor	Myers, Robert
Program Coordinator	Baghdadi, Rana
Advisory Committee	Harb, Sirene; Ketsemanian, Varak; Sanazaro, Marie-Claire; Touma, Jihad; Makdisi, Karim

The MA Program is frozen. Please contact CASAR faculty for more details.

MA in Transnational American Studies (Frozen)

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 US 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 students petition to include additional Arabic credits in their 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 students petition to include additional Arabic credits in their program of study.

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 US 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. 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 adviser.

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.
- Engaging in research in theoretical and applied linguistics and in language teaching and language learning.

Kamal A. Shair Central Research Science Laboratory (KAS CRSL)

Director	Ghaddar, Tarek
Senior Laboratory Manager	Shatila, Rania,
Senior Laboratory Scientist	Bou Hamdan, Razan; Fares, Reina
Senior Laboratory Technologist	Salam, Sally
Laboratory Scientist	Awad, Jad

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 in advancing 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 with 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 enables 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
Executive Committee Members	Araman, Victor (Decision Science, OSB) Doummar, Joanna (Earth Sciences, 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)
Program Administrator	Kaissi, Dina

Mission Statement

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, students 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 science, 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/690 Introduction to Machine Learning
   - EECE 667 Pattern Recognition
   - EECE 693 Neural Networks
   - 12 credits of electives which the students 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 adviser, and with the approval of the GPCS Committee, define a 12-credit track that best suits their background and research interests. Editions of the program's special topics course (CMTS 390) may, with the approval of the GPCS committee, be counted towards track specific electives.
   - 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.

Course Descriptions

Advanced Numerical Methods Courses

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, students write 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 Courses

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 Courses

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.

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/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 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.

Computational Science Courses

CMTS 390 Special Topics 3 cr.
Prerequisite: consent of instructor. May be repeated for credit.

CMTS 395A Comprehensive Exam 0 cr.

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
Founding Director	Makdisi, Samir
Senior Fellow	Altug, Sumru
Steering Committee	Altug, Sumru; Chehab, Ali ; Makdisi, Samir ; Nassif, Nabil ; Saffeidine, Kassem ; Karam, Ramzi

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, Department of Computer Science
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	Amin, Tamer; BouJaude, Saouma; Khishfe, Rola
Associate Professor	El Mouhayar, Rabih
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.
- To affect 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.
- 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)

Full-time Lecturer	Harkouss, Samar
Part-time Lecturers	Rahme, Joseph; Ramadan, Najwa; Sadaka, Nadine
Full-time Instructors	El-Harake, Rima; Peltekian, Katia
Part-time Instructors	Almekkawi, Rola; Nehme, Samira
Part-time Assistant Instructors	Nabbouh, Salam; Rafeh, Hala
Director of UPP Full-time Lecturer	Harkouss, Samar
Part-time Lecturers	Harkouss, Samar; Rahme, Joseph; Ramadan Jreidini, Najwa
Full-time Instructors	Almekkawi, Rola; El-Harake, Rima; Faraj, Rochana; Farhat, Zeina; Hamzeh, Sahar; Peltikian, 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.

Course Descriptions

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

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:

- 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.
- Reinstating and sustaining courses and programs in musical studies and practice at AUB, in both the Continuing Education Center and the department of Fine Arts and Arts History.
- Recruiting quality musicians, and scholars to initiate and run those music courses and programs.

The Center for Arts and Humanities (Mellon Grant)

Director	Mejcher-Atassi, Sonja
Program Manager	Bassil, Rita
Steering Committee	Abu Saada, Nadi; Frangie, Samer; Mourad, Sara; Sadek, Walid; Scheid, Kirsten

The Center for Arts and Humanities (CAH) at the American University of Beirut is a space for interdisciplinary research and teaching, which fosters new creative and scholarly initiatives. Drawing on its location in the Arab region, CAH is dedicated to nurturing and building academic and cultural exchange and collaboration between academics, writers, artists, and students. Through participating in the construction of a vibrant intellectual community that crosses disciplinary as well as geographical borders, CAH foregrounds the crucial importance of the arts and humanities for the imagination of more equitable, just and sustainable futures, at a time of increasingly narrowing horizons.

CAH is a member of the Consortium of Humanities Centers and Institutes (CHCI) and the Global Humanities Network (GHN).

CAH has organized – and co-organized in collaboration with other academic units across AUB and beyond – numerous academic events, ranging from international conferences to workshops, lectures, book talks, literary salons, exhibitions, performances, and film screenings. CAH is also developing training programs and opportunities for academic development in the arts and humanities.

Mission

The Center for Arts and Humanities (CAH) at the American University of Beirut aims to foster interdisciplinary exchange and collaboration across the arts and humanities as well as with other fields of knowledge, be they housed in the social or natural sciences, engineering and architecture, medicine, or law. It advances a nuanced understanding of the fields of artistic and humanistic inquiry and the creative and critical roles they have played across time and space as well as in the specific communities and societies we live in across the Arab region today.

CAH's mission has three core components:

- Research, promoting interdisciplinary projects across the arts and humanities.
- Teaching, supporting collaboration and innovation in arts and humanities curricula.
- Outreach, engaging colleagues and students in other academic fields, cultural practitioners, political activists, and broader publics both locally and globally.

AMERICAN UNIVERSITY OF BEIRUT

Suliman S. Olayan School of Business (OSB)

Graduate

Officers of the School

Fadlo Khuri	President of the University
Zaher Dawy	Provost
Yusuf Sidani	Dean
Fouad Zablith	Associate Dean for Online Learning and Program Development
Lama Moussawi	Associate Dean for Research and Faculty Development
Victor Araman	Associate Dean for Programs
Bradley Jon Tucker	Vice-Provost and 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
Amal Shbaro	Administrative Assistant to the Dean
Dania El-Ashi	Senior Service Delivery Manager
David Matta	Director of Career Management Services
Layan Sarkis	Academic Affairs Manager
Mohammad Hasan Senan	Accreditation Officer
Nada Khalidy Kouzi	Facilities and Events Manager
Yara Haddad	Digital Media Manager
Zeina Succar	Financial Officer

Program Directors and Coordinators

Ahmad El Hajj	Director of the MSBA Program
Assem Safieddine	Director of the MFIN Program
Hagop Panossian	Director of the International Case Competition Program
Ibrahim Jamali	Director of the Executive MBA Program
Leila Khauli	Director of the MBA Program
Maya El Helou	Director of Graduate Programs
Said Elfakhani	Interim Director of Executive Education
Wassim Dbouk	Director of the Investment Management Program
Yasmeen Makarem	Director of the MHRM Program
Zeina Harfoush Nsouli	Executive Director of the Undergraduate Program

Centers and Initiatives Directors

Bijan Azad	Director of the Darwazah Center for Innovation Management and Entrepreneurship
Mostafa Harakeh	Research Director of the Rami Fouad Makhzoumi Initiative in Corporate Governance
Nada Khaddage	Director of the Center for Women in Business
Nada Naufal	Director of the Rami Fouad Makhzoumi Initiative in Corporate Governance
Neveen Ahmed	Director of the Business Practice and Policy Initiative
Randa Salamoun	Director of the Case Hub Initiative

International Advisory Board

Abdel Salam Bdeir	Chief Executive Officer | SACO
Abdulraouf Mannaa	Board Member, Former MD and CEO, Business Consultant | ARM CONSULTING
Benjamin Stevenin	Business Education Specialist, International Partnerships
Dania Haffar Bazzy	Strategic Leader in Brand, Marketing, Communication, and Crisis Management
Fadi Adra	Partner | Strategy&
Fawzi Farah	Chief Executive Officer | Corporate Finance House Group.
Khalid Al Sayer	Senior General Manager | Al Sayer International Real Estate
Leila Serhan	General Manager | North Africa, Levant, and Pakistan at Visa
Mohamed Jaber	Senior Financial Sector Expert | Resident Representative – International Monetary Fund (IMF)
Nora Al Jindi	Marketing Program Chair | Dar Al-Hekma University
Raja V Assili	Senior Advisor | Royal Academy of Management
Razan Tabbara	Vice President & Chief Operating Officer | J.P. Morgan Saudi Arabia
Ricardo Hosri	Chief Executive Officer | Sacotel – Fernand Hosri Group
Rima Assi	Senior Partner | McKinsey & Company
Salman Al Jishi	Founder, Owner, President, and Chairman | Salman Group.
Samia Bouazza	Group Chief Executive Officer and Managing Director | Multiply Group
Tarek Daouk	Chief Executive Officer | Dentsu Aegis Network

The Finance, Accounting, and Managerial Economics Track

Convener	Ismail, Ahmad
Professors	Elfakhani, Said; Safieddine, Assem
Associate Professors	Dagher, Jihad; Dbouk, Wassim; Harakeh, Mostafa; Ismail, Ahmad; Jamali, Ibrahim; Mazboudi, Mohamad
Assistant Professors	Abou Tanos, Barbara; Faour, Mohamad
Visiting Assistant Professor	Ahmed, Neveen
Senior Lecturers	Azzam, Henry; Ghanem, Abdel Jalil; Hamade, Malak; Hout, Bassima; Tannir-Fawaz, Lina; Uwaydah-Mardini, Rania

The Management, Marketing, and Entrepreneurship Track

Convener	Afiouni, Fida
Professors	Afiouni, Fida; Sidani, Yusuf
Associate Professor	Samara, Georges
Assistant Professors	Abi Aad, Amine; Al Chami, Rola; Centeno, Alejandro; Desjardins, Camille; El Awad, Ziad; El Kebbi, Amr; Itani, Mona; Joseph, Jay; Makarem, Yasmeen; Merhabi, Mohamad-Amir; Saade, Nathalie
Senior Lecturers	Dimechkie, Riad; Gerges, Roula; Khauli, Leila; Kfoury, Jessy; Panossian, Hagop; Wahbi, Marwan
Research Fellow	Cooper, Holly
Instructor	Kfouri, Michael

The Business Information and Decision Systems Track

Convener	Fleszar, Krzysztof
Professors	Araman, Victor; Azad, Bijan; Fleszar, Krzysztof; Moussawi, Lama; Osman, Ibrahim
Associate Professors	Bou Hamad, Imad; Nasr, Walid; Zablith, Fouad
Assistant Professors	Khreich, Wael; Salamoun, Randa
Visiting Assistant Professors	Abou Mjahed, Mirna; Taleb, Sirine
Senior Lecturers	El Hajj, Ahmad; Geutcherian, Rita
Lecturers	Jammal, Mahdi; Majdalani, Elie

Historical Background

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 15,000 students from its undergraduate and 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 2000-01 to 55 members today. It now graduates approximately 300 students from its undergraduate program and more than 200 students from its graduate programs.

OSB currently offers six degree programs which include an executive master of business administration (herein referred to as the executive MBA), a master of business administration, in person and online, (herein referred to as the MBA and OMBA), a master in finance (herein referred to as the MFIN), a master of arts in human resource management (herein referred to as the MHRM), a master of science in business analytics (herein referred to as the MSBA) 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 in finance and a specialized master of arts 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 and Recognitions

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 6 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, 2019, and more recently in 2025, marking 16 years of AACSB accreditation.

The Suliman S. Olayan School of Business (OSB) earned the prestigious Business School Impact System (BSIS) label in 2024 for a period of three years, recognizing its exceptional contributions in finance, education, business development, intellectual output, regional integration, societal impact, and reputation enhancement.

Mission

The mission of the Suliman S. Olayan School of Business is to enable world-class business research, learning and knowledge transfer from our authoritative anchor point within the MENA region.

Vision

The vision of the Suliman S. Olayan School of Business is to transform business thinking in the MENA region.

Values - LEADERS

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 International Advisory Board, a board composed of accomplished 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=3020&app=pt&source=unspecified&public=true

The Suliman S. Olayan School of Business (OSB) is structured into the functional equivalent of multidisciplinary departments, referred to as tracks. While each track has its unique identity and designated faculty members, the track structure differs significantly from traditional departmental models. Tracks allow for:

- Multiple Faculty Membership: Faculty members can belong to more than one track.
- Cross-Disciplinary Synergy: Tracks encourage interdisciplinary collaboration.
- Faculty Cooperation: The structure promotes teamwork and shared initiatives.

OSB has three distinct tracks, each encompassing a cluster of related academic business disciplines, led by a track convener:

1. Finance, Accounting, and Managerial Economics (FAME):
   - Two Disciplines: Accounting and Finance
2. Management, Marketing, and Entrepreneurship (MME):
   - Three Disciplines: Management and Human Resource Management (which includes strategy, leadership, organizational behavior and human resource management), Marketing, and Entrepreneurship and Innovation
3. Business Information and Decision Systems (BIDS):
   - One Discipline: Business Information and Decision Systems (which includes operations management, information systems, and business analytics)

Graduate Programs

OSB currently offers five graduate degree programs: executive MBA, MBA (in person and online), master in finance, master of arts in human resource management, and master of science 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 towards 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, students must complete at least 48 credits to fulfill dual specialized master's degree graduation requirement.

The Executive MBA Program

Mission

The OSB executive MBA program is designed for experienced business leaders and motivated professionals seeking continued growth and advancement. The program equips executives with innovative leadership and managerial skills, enabling them to maximize their impact in complex and dynamic business environments.

Admission to the Program

Admission to the Executive MBA program is highly selective. The admissions team evaluates candidates based on their overall achievements and career successes, including years of experience—particularly in management roles—along with personal drive, motivation, and leadership abilities.

The admission process consists of:

- Submission of the application and supporting documents, including letters of reference from professional referees
- Interview

Criteria for Admission

The criteria for admission are holistic and comprise:

- Undergraduate degree
- Demonstrated leadership skills
- Extensive (normally, 8 to 10 years or more) work experience particularly in management and leadership roles
- Interview performance

The Application Process

To apply for admission, applicants must submit the following before the interview:

- A complete application form
- A recent passport-sized photograph (digital format)
- Copy of government-issued identification (preferably a national identity card or passport)
- Two letters of recommendation from professional referees
- Official transcripts and copies of all undergraduate and graduate degrees
- Proof of Payment of the Application fee
- A curriculum vitae
- Once admitted to the EMBA program, the participant must establish English language proficiency (see Readiness for University Studies in English -RUSE) prior to enrollment

Program Components

Overview

The executive MBA can be completed in 21 months starting in the Fall term (i.e., September). Students must successfully complete all core and elective courses, the EMBA Capstone Project, and maintain a minimum cumulative GPA of 3.3. Failure to maintain a cumulative GPA of 3.3 or receiving a grade below C+ in any course will result in academic probation and may lead to delaying graduation until the program requirements are met.

Program Outline

The program consists of 44 credits distributed over eight general management themes, covered in business disciplines that are covered in 25 core courses and three special topics courses that address specialized or topical issues in business.

The Curriculum

Themes	Course
Strategy	Strategy Strategic analysis Managing Risk and Uncertainty
Marketing	Strategic Marketing Digital Marketing
Finance	Applied Corporate Finance Strategic Financial Management
Operations Management	Operations Management Sustainable Supply Chain 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 Managerial Accounting
Management and Organizational Behavior	Organizational Behavior Executive Communication Negotiation and Conflict Resolution Leading People and Organizations People Management Innovation Management Corporate Information Technology Management Corporate Governance

Program Delivery

The Executive MBA program follows a blended learning model that integrates in-person residencies with guided independent work. Instruction normally starts in September during which participants attend 8 modular in-person residencies at OSB (approximately 36 to 45 days out of office in total) and a one-week international residency at a global business school to deepen strategic and cross-cultural insight. These residencies provide intensive, practice-focused coursework and applied learning opportunities and networking.

In addition, participants engage in a structured Capstone Project phase, during which participants apply their required knowledge to a real organizational challenge or to the development of a new venture. This supervised project period is completed before graduation.

Online learning periods occur between each on-campus module, ensuring continuous learning and interaction among participants throughout the program.

Academic Policies

Academic Rules and Regulations

- University academic rules and regulations apply.
- The minimum passing grade for any 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 and the participant. 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 Advisers

The EMBA is a cohort-based program, meaning all participants follow the same degree plan. Participants seeking additional guidance may consult the EMBA director.

EMBA Courses and 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.
Offers 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.
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.
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 emphasis 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.
Discusses the design, planning, and 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.
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.
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.
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.
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 Organizations 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.
Explores 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.
Addresses a specific opportunity and/or challenge relevant to a company from a strategic, executive perspective, or an idea for a new business The capstone project is a practical and integrative project meant to address a specific opportunity and/or challenge relevant to the EMBA program participant's company or provide scope for the EMBA program participant to develop an idea for a new business. EMBA program participants may work individually or in small groups on the capstone project.

EMBA 591A Special Topics 1 cr.
This course covers selected specialized or emerging topics in business.

EMBA 591B Special Topics 1 cr.
This course covers selected specialized or emerging topics in business.

EMBA 591C Special Topics 1 cr.
This course covers selected specialized or emerging topics in business.

EMBA 591D International Residency Session 3 cr.
A one-week residency at a partner business school, offering exposure to international business practices and global perspectives.

The MBA Program

Mission

The master of business administration (MBA) 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 on-campus MBA program:

- March, for enrollment in the fall term.
- November, for enrollment in the spring term.

As for the online MBA program the admission deadlines are as follows:

- August, for enrollment in the fall 1 term.
- October, for enrollment in the fall 2 term.
- January, for enrollment in the spring 1 term.
- March, for enrollment in the spring 2 term.

Late applications may be considered based on candidate's qualifications and program capacity. 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 elements below are considered 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:** A 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 3.0 and 3.3 can still be considered but only for admission under probation.
- **Work experience:** Admitted applicants have typically a number of relevant years of experience. Exceptionally, outstanding applicants with less than two-year but not less than one year of experience might be considered.

- **GMAT test score:** GMAT is required from all candidates as an indicator of the candidates' analytical strengths. For more information on GMAT application, please consult https://e-gmat.com/blogs/how-to-register-for-gmat-7-steps-gmat-registration-process/. 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 earned a quantitative-based undergraduate degree, have acquired compelling work experience, and/or 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 program director may also consider additional evidence of achievement when evaluating applicants to the master's program. Such evidence may include relevant work experience, publications, professional certifications (such as CFA , CPA, PMP, SHRM, etc.) or other forms of creative and scholarly activity. Based on these considerations, the program director may, in certain cases, give serious consideration to applicants who do not meet the minimum undergraduate GPA requirement but demonstrate clear evidence of academic potential or significant professional or creative accomplishments. In such cases, the program director must submit a justification for the admission recommendation to the OSB Graduate Studies Committee. The committee will review each case individually and make a final recommendation to the dean.

The Application Process

To apply for admission, the following must be submitted before any further consideration:

- 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
- Copy of GMAT score or a request for GMAT waiver, if qualified
- 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 which was the first in Lebanon, the Middle East, and in Europe (the first European MBA program was created in France in 1957). The MBA is a general management program continuously committed to the highest standards of quality in graduate management education. It 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, the program offers 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 applicants 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 four 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 4 and 6 terms depending on student preferences and work load. 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 full-time students, the program can be completed within four terms as follows:

Four-Term Full-Time MBA Degree Plan		
Course Title	**Normal (Cr.)**	**Core/ Elective/ Remedial**
(Required for Non-BBA Holders prior to joining the regular MBA cycle)		
Preterm Course: INFP 300A Financial Accounting	0	Remedial
Preterm Course: INFP 300A Basics of Finance	0	Remedial
Preterm Course: INFP 300C Statistics and Team Building	0	Remedial

Year 1 Fall Term		
ACCT 301 Financial Reporting and Analysis	3	Core
DCSN 300 Models for Decision Making	3	Core
MNGT 306 Leadership and Behavior in Organizations	3	Core
BUSS 315 Prices, Markets, and Economic Environment	3	Core

Year 1 Spring Term		
FINA 306 Intermediate Corporate Finance	3	Core
DCSN 310 Operations Management	3	Core
MKTG 306 Marketing Management	3	Core
BUSS 349 Advanced Seminar in Strategic Management	3	Core

Year 2 Summer Term		
Elective I	3	Elective
Elective II	3	Elective
Elective III	3	Elective

Year 2 Fall Term		
BUSS 398	3	Elective

Part-time MBA-OMBA students have two years to complete the program as follows:

Six-Term Part-Time MBA/OMBA Degree Plan		
Course Title	**Normal (Cr.)**	**Core/ Elective/ Remedial**

(Required for Non-BBA Holders prior to joining the regular MBA/OMBA cycle)		
Preterm Course: INFP 300A: Financial Accounting	0	Remedial
Preterm Course: INFP 300B: Basics of Finance	0	Remedial
Preterm Course: INFP 300C: Statistics and Team Building	0	Remedial

Year 1 Fall Term (Fall I + Fall II for OMBA)		
ACCT 301 Financial Reporting and Analysis	3	Core
MNGT 306 Leadership and Behavior in Organizations	3	Core
Year 1 Spring Term (Spring I + Spring II for OMBA)		
FINA 306 Intermediate Corporate Finance	3	Core
MKTG 306 Marketing Management	3	Core
Year 2 Summer Term		
Elective I	3	Elective
Elective II	3	Elective
Year 2 Fall Term (Fall I + Fall II for OMBA)		
DCSN 300 Models for Decision Making	3	Core
BUSS 315 Prices, Markets, and Economic Environment	3	Core
Year 3 Spring Term (Spring I + Spring II for OMBA)		
DCSN 310 Operations Management	3	Core
BUSS 349 Advanced Seminar in Strategic Management	3	Core
Year 3 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 Advisers

The MBA-OMBA programs are offered according to the degree plans presented earlier, and therefore there is no need for adviser's approval of the students' schedules each term. Otherwise, the students can consult with the MBA-OMBA director for further advice. The General University Academic Information section of this catalogue provides further information on academic advisers.

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. All Students must complete two prior to graduation.

MBA courses all have a prefix indicating the specialty: 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 specialty 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 students and to allow for program's customization, students 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 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 students 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

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. Prerequisite: 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 students 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 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 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 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: DCSN 300

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 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.

BUSS 398 Project 3 cr.
The MBA project consists of a field consulting project, a case study or an extended research paper or consulting work defined in agreement with the faculty readers in question. Students are assigned a committee consisting of an adviser (first reader) and a second reader who jointly supervise and guide them throughout. It is the responsibility of the students to select a topic and submit a project proposal to be approved by their readers and then by the OSB Graduate Studies Committee. All accepted projects should be deposited at the library. Students who are unable to finish the project in one term can register an additional time subject to the consent of the readers.

MD-MBA Dual Degree

Mission

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.

Admission to the Program

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 students' 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 third 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 term, 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 towards the MBA's total credit count.

Below are the courses and requirements for the MBA with their credits:

Fall Term, 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
Spring Term, 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)

Master in Finance (MFIN) Program

Mission

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, 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, students 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 applicants must possess an undergraduate degree from an accredited university with a 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 program director may also consider additional evidence of achievement when evaluating applicants to the master's program. Such evidence may include relevant work experience, publications, professional certifications (such as CFA , CPA, PMP, SHRM, etc.) or other forms of creative and scholarly activity. Based on these considerations, the program director may, in certain cases, give serious consideration to applicants who do not meet the minimum undergraduate GPA requirement but demonstrate clear evidence of academic potential or significant professional or creative accomplishments. In such cases, the program director must submit a justification for the admission recommendation to the OSB Graduate Studies Committee. The committee will review each case individually and make a final recommendation to the dean.

The Application Process

To apply for admission to the MFIN program, an applicant must submit the following:

- An application form
- Two letters of recommendation
- An official transcript for all undergraduate and/or graduate coursework
- Proof of English proficiency (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 four terms 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. 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 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 a 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, students 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 six core courses and four 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: Accounting and Financial Analysis
- MFIN 303: Derivative Securities
- 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 Econometric to Empirical Finance
- 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 four terms in accordance with the recommended time frame suggested below for students enrolled in the program on a full-time basis.

Four Terms 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 1 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
Fall 2 Term		
MFIN 350F: Ethics in Finance*	3	Core

*:Requirement for the Ministry of Education Equivalency

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
MFIN 350F Ethics in Finance*	3	Core

*: Requirement for the Ministry of Education Equivalency

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 Advisers

Students should consult with the director of the MFIN program for academic advice.

MFIN Courses and Course 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 US 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: ACCT 301.

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 set 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).

MFIN 350F Ethics in Finance 3 cr.
This course serves to highlight the importance of maintaining trust in financial markets and upholding the highest standards of integrity and professionalism. It introduces ideas and concepts that will help students understand the importance of ethical behavior in the investment industry. Students will be introduced to various types of ethical issues within the investment profession.
The course is centered around the CFA Institute's Code of Ethics and Standards of Professional Conduct. These two pillars form the ethical framework that "MFIN Alumni" as professionals are expected to operate. The code and standards provide guidance on navigating the complexities of professional decision-making and ethical challenges that arise in financial analysis and investment management.

Elective Courses

MFIN 350 Special Topics 3 cr.
An analysis of contemporary finance issues and problems. The course may be repeated for 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. 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. Students 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 of Arts in Human Resource Management (MHRM) Program

Mission

The master of arts 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 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. Applicants are considered for admission on probation if they have attained a GPA between 3.0 and 3.3.
- A personal interview for applicants who do not have work experience and/or when needed.

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 program director may also consider additional evidence of achievement when evaluating applicants to the master's program. Such evidence may include relevant work experience, publications, professional certifications (such as CFA , CPA, PMP, SHRM, etc.) or other forms of creative and scholarly activity. Based on these considerations, the program director may, in certain cases, give serious consideration to applicants who do not meet the minimum undergraduate GPA requirement but demonstrate clear evidence of academic potential or significant professional or creative accomplishments. In such cases, the program director must submit a justification for the admission recommendation to the OSB Graduate Studies Committee. The committee will review each case individually and make a final recommendation to the dean.

The Application Process

To apply for admission to the MHRM program, applicants 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 their 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 students 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, students 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 and Change (3 credits)
- MHRM 308: Human Resource Development (3 credits)
- MHRM 309: Evidence Based HRM 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

Four Terms (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		
MHRM 301 Managing the Recruitment Process	3	Core
MHRM 305 Leadership and Behavior in Organization	3	Core
MHRM 308 Human Resource Development	3	core

Spring Term		
MHRM 304 Ethics, Inclusion, and Labor Law	3	Core
MHRM 309 Evidence Based HRM-Research Design and Methods	3	Core

Summer Term		
MHRM 303 Compensation and Performance Management	3	Core
MHRM 311 Human Resource Analytics	3	Core

Fall 2 Term		
MHRM 302 Human Capital Training and Development	3	Core
MHRM 306 Strategic HRM and Change	3	Core
MHRM 310 (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 Advisers

Each student has an academic adviser who normally approves the student's schedule each term. The General University Academic Information section of this catalogue provides further information on academic advisers.

MHRM Courses and Course 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 US 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 key concepts and approaches for understanding ethical and legal challenges in human resource management. Students learn how to make HR decisions while considering legal obligations, ethical imperatives, and complex geopolitical and business contexts. The first part of the course develops analytic tools for examining ethical issues from managerial, social justice, and critical-feminist perspectives, addressing both the business and moral case for ethical HRM. It also provides space to reflect on inclusive HR policies and how to build arguments for inclusive practices across these perspectives. The course uses the Harvard case method and is highly interactive, requiring weekly case preparation. To strengthen applied learning, a mandatory zero-credit co-requisite workshop focuses on practical skills such as managing bias in HR processes and designing inclusive HR policies through simulations, exercises, and reflective practice. The second part of the course introduces the philosophy of labor law, with particular attention to Lebanese labor law and working 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 students 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 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 and 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 Business Analytics (MSBA)

Mission

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 a year 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, students 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, applicants must possess an undergraduate university degree with a GPA of 3.3 or above. Applicants are considered for admission on probation if they have attained a GPA 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 program director may also consider additional evidence of achievement when evaluating applicants to the master's program. Such evidence may include relevant work experience, publications, professional certifications (such as CFA , CPA, PMP, SHRM, etc.) or other forms of creative and scholarly activity. Based on these considerations, the program director may, in certain cases, give serious consideration to applicants who do not meet the minimum undergraduate GPA requirement but demonstrate clear evidence of academic potential or significant professional or creative accomplishments. In such cases, the program

director must submit a justification for the admission recommendation to the OSB Graduate Studies Committee. The committee will review each case individually and make a final recommendation to the dean.

The Application Process

To apply for admission to the MSBA program, applicants 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 students are 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 16 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, students 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 six core courses, two electives and a thesis that could be replaced by an elective and a capstone project.

The core courses areas follow:

- MSBA 300: Business Understanding in Analytics
- MSBA 305: Data Processing Frameworks
- MSBA 310: Applied Statistical Analysis
- MSBA 320: Optimization & Simulation
- MSBA 315: Predictive Analytics and Machine Learning
- MSBA 325: Data Visualization & Communication

Elective courses may be chosen from the following list:

- MSBA 316: Text Analytics and Natural Language Processing
- MSBA 318: Forecasting Analytics
- MSBA 319: Big Data Processing and Blockchain Technology
- MSBA 335: Supply Chain Management
- MSBA 336: Big Data processing and Blockchain Technology
- MSBA 360: Social Media Analytics
- MSBA 366: Digital Transformation with Business Analytics
- MSBA 370A: Data Driven Digital Marketing
- MSBA 370B: Consumer Behavior Analytic in MENA
- MSBA 375: Strategic Performance Management
- MSBA 381: Venture Building Practicum
- MSBA 382: Health Care Analytics

Program Delivery

Four terms MSBA Degree Plan		
Course Title	**Normal (Cr.)**	**Core/ Elective/ Remedial**
Summer Term		
Bootcamp: Python and R	0	Remedial
Fall Term		
MSBA 300 Business Understanding in Analytics	3	Core
MSBA 305 Data Processing Frameworks	3	Core
MSBA 310 Applied Statistical Analysis	3	Core
MSBA 320 Optimization & Simulation	3	Core
Spring Term		
MSBA 315 Predictive Analytics and Machine Learning	3	Core
MSBA 325 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
Fall 2 Term		
Continuation of capstone project/thesis		

Or

Two-Year MSBA Degree Plan		
Course Title	**Normal (Cr.)**	**Core/ Elective/ Remedial**
Summer Term		
Bootcamp: Python and R	0	Remedial
Year 1 Fall Term		
MSBA 300 Business Understanding	3	Core
MSBA 310 Applied Statistical Analysis	3	Core
Year 1 Spring Term		
MSBA 305 Data Processing Frameworks	3	Core
MSBA 315 Predictive Analytics and Machine Learning	3	Core
Year 1 Summer Term		
Elective I	3	Elective
Elective II	3	Elective
Year 2 Fall Term		
MSBA 320 Optimization and Simulation	3	Core
MSBA 325 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 Advisers

Each student has an academic adviser who normally approves the student's schedule each term. The General University Academic Information section of this catalogue provides further information on academic advisers.

MSBA Courses and Course Descriptions

Prerequisite Course

MSBA 000 Boot Camp and Orientation 0 cr.
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 3 cr.
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 3 cr.
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 3 cr.
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 prerequisite 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 3 cr.
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 3 cr.
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 3 cr.
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 cr.
Capstone Project with Experiential Learning in Industry.

MSBA 395 Thesis Project 6 cr.
The purpose of this course is twofold:

- 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 life cycle 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 3 cr.
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.

MSBA 317 Forecasting Analytics 3 cr.
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 3 cr.
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 3 cr.
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 336 Big Data processing and Blockchain Technology 3 cr.
This course is an extension to MSBA305 Data Processing Frameworks and has two pillars. It first focuses on blockchain technology and its applications in business. It explores how blockchain brings profound changes to businesses and explains how it transforms business structures, functions, and roles of the organization. The course then dives into the various methods of blockchain governance that exist in the marketplace 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, nonce, 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 batch mode, retrieve big volumes of textual data, analyze streaming data, and use the ML API. Previously MSBA 350C.

MSBA 340 Supply Chain - Logistics 3 cr.
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 3 cr.
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 3 cr.
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 355 Enterprise Resource Planning 3 cr.
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 365 Customer Analytics 3 cr.
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 366 Digital Transformation with Business Analytics 3 cr.
This course focuses on how organizations can engage in the digital transformation process using data, analytics, and AI. Digital transformation is the process of companies adapting to changes in their business environment ushered in by disruptions—technological and others, e.g., AI, COVID, or economic. Companies can digitally transform themselves to overcome or capitalize on these changes to remain viable. The course focuses on managing the process of digital transformation utilizing data, analytics, and AI. The process of digital transformation consists of: (i) understanding both disruptions and the 30-percent skill rule; (ii) building digital resilience and a digital mindset is necessary to survive and thrive in adapting to disruption; (iii) rethinking how we work as well as teaming and collaborating can be performed to address the disruptions; (iv) how to rebuild disrupted customer relationships as well as how to differentiate products with data, analytics, and AI; (v) understanding and practicing experimentation as a part of the new disruption and digital transformation imperative; and (vi) leading change and transitioning to digital transformation. Previously MSBA 350A.

MSBA 370 Data Driven Digital Marketing 3 cr.
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 360 Social Media Analytics 3 cr.
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 3 cr.
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.

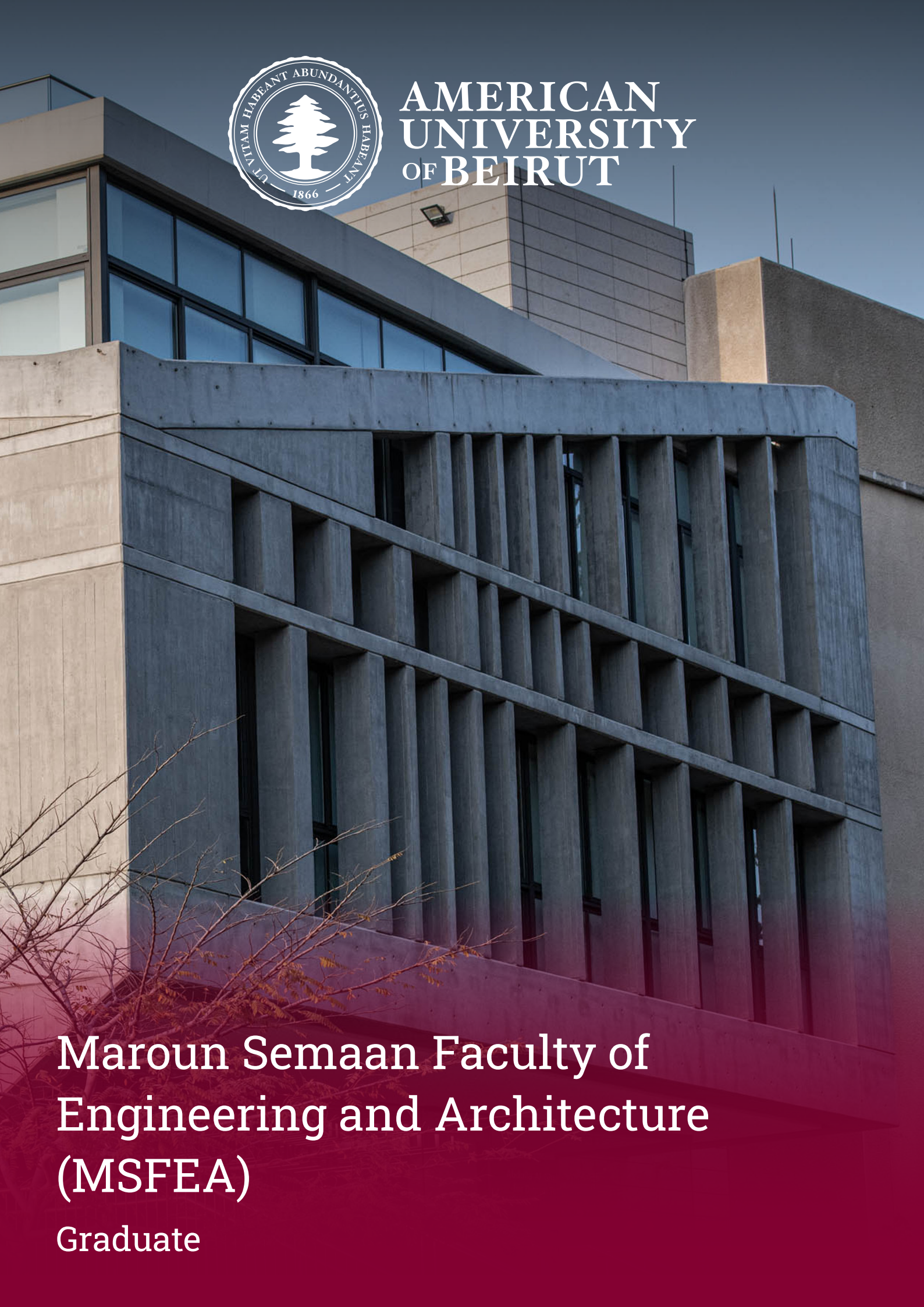
MSBA 380 Pricing and Revenue Management 3 cr.
The course focuses, at a tactical level, on how to integrate pricing, sales and product design decisions to extract maximal value from any mismatch between supply and demand. It also introduces pricing as a hedging tool in the presence of various risk factors. 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.

MSBA 381 Venture Building Practicum 3 cr.
Students will learn about the lean startup approach to new product and new venture development process as well as associated business model concepts while getting hands-on experience through the actual doing of new startup/venture idea acceleration. The structure of the course provides for current entrepreneurs to mentor students in action. The entrepreneurs understand that class participants may have skill gaps and a nascent understanding of the skills they need. Thus, they will provide students with invaluable tips, tricks, and traps of entrepreneurship as well as know-how. Previously BUSS 350D.

MSBA 382 Health Care Analytics 3 cr.

The latest technologies generate massive amounts of multidimensional health data. The magnitude and complexity of health data are overwhelming for healthcare providers and stakeholders to analyze, extract meaningful knowledge, and draw a comprehensive picture of health situations to make informed decisions. Moreover, health pandemics have unveiled profound weaknesses in the healthcare systems of most countries. Global investments in private health systems and private healthcare solutions have witnessed a 6 percent increase in Q2 2020 and are predicted to increase significantly in the upcoming years. The expected digital transformation will not be possible without data and analytics.

In this course, students will be equipped with the knowledge to work in healthcare or with a healthcare client as analysts or consultants. Students will be introduced to the pillars of healthcare systems and the main health concepts and measures. Students will learn about healthcare data types and sources, how to formulate data queries, how to effectively apply analytics to gain an in-depth understanding of the medical and health data, and inform data-driven evidence-based decisions to advance the healthcare field. Moreover, Students will delve into the geospatial mapping of health and medical problems as well as the economic evaluation and financial impact of health interventions and policies. Previously MSBA 350E.



Maroun Semaan Faculty of Engineering and Architecture (MSFEA)

Graduate

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Antoine Sabbagh	Director of Admissions
Lokman Meho	University Librarian

Faculty Administrative Support

Alia Kazma Serhal	Student Services Manager
Olga Safa	Financial and Administrative Manager
Sara Jibbaoui	Financial Officer
Arij Hamadeh	Student Services Officer
Aya Wehbe	Contracts 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.

Vision

A viable, livable, and equitable world.

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 in environmental sciences, major: environmental technology (ET) as part of the interfaculty graduate environmental sciences program.
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 adviser, chairperson and the MSFEA Graduate Studies Committee. To apply, the students 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 credits for AUB graduates and 9 credits for non-AUB graduates. This means that if students have taken a credit overload during their undergraduate BE studies, they can waive a maximum of 12 credits for AUB graduates and 9 for non-AUB graduates.

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 students 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 students fail to obtain a grade of C+ in any of these undergraduate courses, they are allowed to repeat that course only once. Failure to meet the requirements will result in the students 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 students have prior approval of both their 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 Office of Admissions. 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.

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 towards 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 section.
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) Khraiche, Massoud (Biomedical Engineering, MSFEA) Refaat, Marwan (Internal Medicine, FM) Saad, Walid (Chemical Engineering, MSFEA) Zouein, Fouad (Pharmacology and Toxicology, FM)

Graduate Programs

The biomedical engineering (BMEN) graduate program 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 BMEN program is housed in the MSFEA and administered by both MSFEA and FM via a joint program coordinating committee (JPCC).

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.

Students may select their courses to satisfy the requirements of one of the three focus areas.

Master of Science (MS) in Biomedical Engineering

The BMEN program offers a master of science (MS) degree in biomedical engineering with two options: thesis option and non-thesis option.

Program Mission

The mission of the BMEN program 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.

Program Objectives

The BMEN MS program educational objectives are to graduate master's students able to:

- Achieve their goals in postgraduate studies and industry employment in fields related to Biomedical Engineering.
- Advance in their careers through innovation, leadership, and life-long learning.

Program Learning Outcomes

By the time of graduation, master's graduates possess:

- Basic knowledge of engineering and biomedical sciences necessary to understand advanced topics in biomedical engineering.
- Advanced knowledge in selected subareas related to biomedical engineering.
- Ability to use techniques, skills, and tools useful for biomedical project design, experimental studies, and/or engineering practice.
- Ability to utilize interdisciplinary knowledge to work on projects, do studies, and/or conduct
- research in biomedical engineering.
- Understanding of the global impact of emerging new scientific findings in biomedical engineering.
- Ability to communicate project and/or research findings effectively, in both oral and written.
- formats, through technical presentations and reports.
- Skills such as teamwork and life-long learning.

Admission Requirements

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 students' 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/No Pass with a passing grade of C+.

The application procedures and admission requirements to the MS program follow AUB's General University Academic Information section 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.

Residency Requirements

Refer to the General University Academic Information section in this catalogue.

Program Requirements

Major: Biomedical Engineering

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: BIOC 321, BIOC 322, BMEN 600, BMEN 601, BMEN 672, BMEN 673L, EPHD 310, HUMR 310 (A, B, or C), HUMR 314, PHYL 346

Restricted elective graduate courses: 6 credits restricted elective courses customized per focus area and required by both thesis and non-thesis options: BIOC 303, BIOC 325, BIOC 326A, BMEN 603, BMEN 604, BMEN 605, BMEN 606, BMEN 607, BMEN 608, BMEN 609, BMEN 610, BMEN 611, EECE 601 or EECE 602, EECE 603, EECE 605, EECE 633 or EECE 663 or EECE 667 or EECE 693, EECE 690, HUMR 305, PHYL 302, PHYL 300A

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 students' adviser 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 section in the graduate catalogue.

Comprehensive Exam for Master Programs

Refer to the General University Academic Information section in this catalogue.

Supervision of Master's Thesis

For Thesis Proposal and Committee, Thesis Defense, Deposit of the Project/Thesis in the Library, refer to the General University Academic Information section in this catalogue.

Master's Degree Graduation Requirements

Refer to the General University Academic Information section in this catalogue.

PhD in Biomedical Engineering

Program Mission

The mission of the BMEN program 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.

Program Objectives

The BMEN PhD program educational objectives are to graduate PhD candidates able to:

- Achieve their employment goals in academia and/or industry in the field of biomedical engineering.
- Advance in their careers through innovation, leadership, and life-long learning.

Program Learning Outcomes

By the time of graduation, PhD graduates possess:

- Basic knowledge in engineering and biomedical sciences necessary to conduct research in biomedical engineering.
- Advanced knowledge in various subareas related to biomedical engineering.
- Ability to use techniques, skills, and tools useful for biomedical project design, experimental studies, and/or engineering practice.
- Ability to pursue independent research utilizing interdisciplinary knowledge from various fields, and generate novel contributions in biomedical engineering.

- Understanding of the global impact of emerging new scientific findings in biomedical engineering
- Ability to communicate research findings effectively, in both oral and written formats, through presentations and reports including presentations at technical meetings and peer reviewed publications
- Skills such as teamwork and lifelong learning, and understanding of ethical responsibility and the role of integrity in the advancement of knowledge through research

Admission Requirements

The application procedures and admission requirements to the PhD program follow AUB's General University Academic Information section in the graduate catalogue. To be considered for admission, applicants must hold a 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.

Residency Requirements

Refer to the General University Academic Information section in this catalogue.

Program Requirements

Major: Biomedical Engineering

General requirements: 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.

Core graduate courses: 21 credits of core courses from biomedical sciences and engineering: BIOC 321, BIOC 322, BIOM 385, BMEN 600, BMEN 601, BMEN 671, BMEN 672, BMEN 673L, BMEN 675, EPHD 310, HUMR 310 (A, B, or C), HUMR 314, PHYL 346.

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.

Restricted elective graduate courses: 9 credits restricted elective courses customized per focus area and required by both thesis and non-thesis options: BIOC 303, BIOC 325, BIOC 326A, BMEN 603, BMEN 604, BMEN 605, BMEN 606, BMEN 607, BMEN 608, BMEN 609, BMEN 610, BMEN 611, EECE 601 or EECE 602, EECE 603, EECE 605, EECE 633 or EECE 663 or EECE 667 or EECE 693, EECE 690, HUMR 305, PHYL 302, PHYL 300A.

Free elective graduate courses: 6 credits additional elective courses. These courses should be taken based on the students' specific area of research as approved by their adviser.

PhD Qualifying Exam

For Qualifying Exam Part I: Comprehensive Exam and for Qualifying Exam Part II: Defense of Thesis Proposal, refer to the General University Academic Information section in this catalogue.

Admission to Candidacy

Refer to the General University Academic Information section in this catalogue.

Supervision of Doctoral Thesis

For PhD Thesis Committee, PhD Thesis Proposal, PhD Thesis Defense, and Deposit of the Thesis in the Library, refer to the General University Academic Information section in this catalogue.

PhD Degree Graduation Requirements

Refer to the General University Academic Information section in this catalogue.

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. Prerequisite: consent of instructor.

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. Prerequisite: MATH 201 and consent of instructor.

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. Prerequisite: 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 303A 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 303B 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 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 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. Prerequisite: EECE 490/690; or consent of instructor.

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 students 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 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

If the students have 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. Students 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 students have achieved two or all of the core competencies through undergraduate courses, only one course can be waived, and the students 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 a GPA of at least 3.0 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.

Couse Descriptions

HEHI 301 - “Foundations of Humanitarian Engineering and Public Health Innovations”; 3 cr.
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 cr.
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 terms. 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.

Certificate in Innovation Management in Contexts of Uncertainty

Program Overview

The certificate is a 7-credit program offered to Master Card Foundation scholarship program students from all majors. It aims to introduce students to critical thinking, collaboration across various fields, project management, and the cultivation of resilience skills that are essential for professional growth. Through course work, and the experiential learning course, the certificate will build their capacity to create practical and innovative solutions in their jobs, particularly in contexts of uncertainty. By focusing on real-world applications and hands-on experiences, the program ensures that Scholars are not only prepared to face professional challenges but also capable of making transformative contributions to society in times of need.

Program Competencies

Students who complete the certificate will be able to:
PLO1: Identify assets, resources, and problems of population groups in fragile, low-resourced and/or settings of uncertainty using participatory approaches.
PLO2: Demonstrate design techniques and entrepreneurial skills to develop, implement, and scale-up appropriate innovations.
PLO3: Incorporate multidisciplinary perspectives to manage complexity while adhering to ethical standards.
PLO4: Reflect critically on how crises impede effective action and, on the skills, and attitudes needed to mitigate challenges.

The certificate is composed of 7 credits that include:

1. **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.

2. **HEHI 303 - “Experiential Learning”; 4 cr.**

A service-learning graduate course that revolves around managing complex projects while working in multidisciplinary teams and collaborating closely with community partners within fragile low-resourced settings. Multidisciplinary teams will conduct background research, develop needs assessments with relevant stakeholders, design and create solutions/interventions that are tested and refined with community partners, and develop a business plan; all under joint supervision of two mentors from two different disciplines. The course will be offered in the winter term. Prerequisites: HEHI 301.

School of Architecture and Design

Founding Director of the School of Architecture and Design	Al-Harithy, Howayda
Graduate Programs Coordinator	Harb, Mona
Architecture Track Convener	Patt, Trevor Ryan
Graphic Design Track Convener	El-Gharbie', 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; El- Gharbie', Ahmad; Najjar, Karim
Assistant Professors	Acikgoz, Umit Firat; Al-Akl, Nayla; Dreksler, Beata; Khoury, Yara; Patt, Trevor Ryan; Traboulsi, Jana
Assistant Professors of Practice	Fayad, Nicolas; Frem, Sandra
Adjunct Professors	Tabet, Jad; Makhzoumi, Jala
Adjunct Associate Professor	Trovato, Maria Gabriella
Senior Lecturers	Abboud, Rania; Abdulhay 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; Al-Hage, Carla; Bacha, Karim; Bacho, Omar; Badran, Noura; Basbous, Monica; Baz, Joan; Apelian, Khajag; Denris, Alicia; 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

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

The School of Architecture and Design offers the following:

- Master of Urban Design (MUD)
- Master of Urban Planning and Policy (MUPP)

Master of Urban Design (MUD) & Master of Urban Planning and Policy (MUPP)

Programs Mission

The master of urban planning and policy program (MUPP) and the master of urban design program (MUD) aim 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 MUD 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 professions of the city. 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.

The MUPP 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 professions of the city. 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 Objectives

MUD

- Develop command of urban design tools and the ability to integrate them with policy strategies and institutional development, grounded in a multidisciplinary understanding of contemporary urban challenges.
- Prepare graduates for leadership positions in design and planning firms through a studio-based professional education that positions urban design within the broader ecosystem of city-focused professions.

MUPP

- Develop multidisciplinary analytical competencies and practical expertise to address contemporary urbanization challenges through the tools, approaches, and practices of urban planning and policymaking.
- Prepare graduates for leadership roles in the public, private, and non-profit sectors by enabling them to define and position a specialized area of expertise within the broader field of urban planning and in relation to other city-focused professions.

Program Learning Outcomes

MUD

- **PLO1: Command of Core Principles in the Fields of Urban Planning and Design:** Demonstrate advanced knowledge of core concepts, values, tools, and theories in city and regional planning and urban design and the ability to apply the knowledge critically to analyze urban and regional transformations.
- **PLO2 (Research Track): Research Methods:** Formulate a research problem grounded in real-world urban or regional design challenges, select and implement an appropriate research methodology, and apply qualitative and/or quantitative methods to collect, analyze, and interpret data that inform urban design interventions at multiple scales.
- **PLO2 (Professional Track): Analytical and Technical Skills:** Develop analytical abilities and proficiency with urban design methods and tools, including learning to collect and analyze data, utilize GIS and other spatial analysis techniques, and apply research methodologies to diagnose real-world urban problems rooted in specific institutional, cultural, social, and economic contexts.
- **PLO3 (Research Track): Research to Practice:** Translate qualitative and quantitative research findings into evidence-based policy proposals or project interventions to advance urban design interventions at multiple scales.
- **PLO3 (Professional Track): Plan-Making and Policy Development:** Develop the ability to prepare plans and designs, articulate urban policy responses for urban challenges, and integrate context-specific social, economic and ecological considerations in the formulation of these proposals.
- **PLO4: Communication and Collaborative Skills:** Demonstrate strong communication, teamwork, and engagement skills tailored to academic, professional, and public audiences.
- **PLO5: Professionalism and Ethical Conduct:** Demonstrate ethical reasoning and professional integrity in conducting research and engaging in design practice, including adherence to disciplinary norms, responsibilities to stakeholders, and sensitivity to social and environmental justice.

MUPP

- **PLO1: Command of Core Principles in the Fields of Urban and Regional Planning:** Demonstrate advanced knowledge of core concepts, values, tools, and theories in city and regional planning and urban studies and the ability to apply the knowledge critically to analyze urban and regional transformations.
- **PLO2 (Research Track): Research Methods:** Formulate a research problem grounded in real-world urban or regional planning challenges, select and implement an appropriate research methodology, and apply qualitative and/or quantitative methods to collect, analyze, and interpret data that inform planning or policy interventions.
- **PLO2 (Professional Track): Analytical and Technical Skills:** Develop analytical abilities and proficiency with planning methods and tools, including learning to collect and analyze data, utilize GIS and other spatial analysis techniques, and apply research methodologies to diagnose real-world urban problems rooted in specific institutional, cultural, social, and economic contexts.
- **PLO3: Research to Practice (Research Track):** Translate qualitative and quantitative research findings into evidence-based policy proposals or project interventions in the fields of urban planning and policy.
- **PLO3 (Professional Track): Plan-Making and Policy Development:** Develop the ability to prepare plans for urban and regional developments, articulate urban policy responses for urban challenges, and integrate context-specific social, economic and ecological considerations in the formulation of these proposals.
- **PLO4: Communication and Collaborative Skills:** Demonstrate strong communication, teamwork, and engagement skills tailored to academic, professional, and public audiences.
- **PLO5: Professionalism and Ethical Conduct:** Demonstrate ethical reasoning and professional integrity in conducting research and engaging in planning or policy practice, including adherence to disciplinary norms, responsibilities to stakeholders, and sensitivity to social and environmental justice.

Admission Requirements

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) in the Admissions section), 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, politics, anthropology 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) in the Admissions section), 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 School 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, director, and the MSFEA Graduate Studies Committee. To apply, the students must have completed the advanced courses with a grade of at least B+ or equivalent.

Residency Requirements

The two graduate programs span over two years of full-time enrollment. For more information, refer to the General University Academic Information section of this catalogue.

Program Requirements

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 two core courses (Planning Theory and Policy, and Urbanism), Research Methods (or equivalent for students on the Professional Track), 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 term of enrollment, MUPP and MUD students will be admitted into research (thesis) or a professional (non-thesis) track. The track selection is made on the basis of the students’ 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 practice. Students on the professional track take an additional advanced planning and design workshop or urban and landscape design studio (6cr.) where they expand their command of professional tools, including the write-up of a professional report.

Common Core MUPP/MUD

Core Courses

Common core courses: URPL 630 Research Methods, URPL 631 Introduction to Planning Theory and Policy, URPL 632 Urbanism, URPL 660 City Debates (to be registered twice), URPL 661 or URDS 601 Planning and Design Workshop.

Research Track

One of: URPL 663 or URDS 604 Urban Planning/Design Thesis
One of: URPL 662 or URDS 603 Comprehensive Exam

Professional Track

One of: URPL 661A or URDS 601A Advanced Planning Workshop/Urban and Landscape Design Studio
One of: URPL662 or URDS 603 Comprehensive Exam

MUPP Courses

MUPP students are required to take three courses (9 credits) in a field of applied social science or engineering leading towards a concentration area such as urban policy, development studies, transportation, housing, or ecosystems management. Other options may be agreed upon with the MUPP/MUD academic adviser.

MUD Courses

MUD students are required to take one additional core course (URDS 632 Practices and Theories of Urban Design), one design studio (URDS 601) and one approved elective (Total of 12 credits).

Sample Study Program

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 adviser.

Year	Term	MUPP	MUD
First Year	Fall Term	URPL 631 (3 cr.) Intro to Planning Theory One Concentration Area Elective (3 cr.)	URPL 661 (6 cr.) Planning Workshop URDS 632 (3 cr.) Practices and Theories of Urban Design
	Spring Term	URPL 632 (3 cr.) Urbanism URPL 630 (3 cr.) Research Methods One Concentration Area Elective (3 cr.) URPL 660 (0 cr.) City Debates	URDS 601 (6 cr.) Urban and Landscape design Studio URPL 630 (3 cr.) Research Methods or eq. if Professional Track URPL 660 (0 cr.) City Debates

Second Year	Fall Term	URPL 661 (6 cr.) Planning Workshop One Concentration Area Elective (3 cr.) URPL 662 (0 cr.) Comprehensive Exam if Research Track	URPL 631 (3 cr.) Intro to Planning Theory One Approved Elective (3 cr.) URDS 603 (0 cr.) Comprehensive Exam if Research Track
	Spring Term	URPL 661A OR URPL 663 Advanced Planning Workshop OR Thesis (6 cr.) URPL 662 (0 cr.) Comprehensive Exam if Professional Track URPL 660 (0 cr.) City Debates	URDS 601A (6 cr.) OR URDS 604 (6 cr.) Advanced Urban and Landscape Design Studio OR Thesis URPL 632 (3 cr.) Urbanism URDS 603 (0 cr.) Comprehensive Exam if Professional Track URPL 660 (0 cr.) City Debates

Course Descriptions

Mandatory Courses

Each of the following courses is required for MUPP/MUD students. Studio courses and thesis are restricted to MUPP/MUD students, while other courses are open to senior students in architecture, landscape architecture and related social science and professional disciplines.

URDS 601 Urban and Landscape 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 interventions. 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 Urban and Landscape 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 final professional report emphasizing design problematic, methodology, recommendations, and implementation framework. Prerequisites: Must have completed at least 24 credits, including URDS 601 and URPL661.

URDS 632 Practices and Theories of Urban Design 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 appeals 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.

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 are 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 thesis 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.

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. The outcome consists of scale drawings and visual representations with an explicative written final professional report emphasizing planning problematic, methodology, recommendations, and implementation framework. Prerequisites: MUPP students enrolled in this course must have completed at least 21 credits, including URPL 661.

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 thesis 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.

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. Offered occasionally.

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. Offered occasionally.

URPL 638/ARDS 030 Politics of Design 3 cr.
This course is about the ways design participates to the production and distribution of political power and resources in cities, territories, and societies. Although many designers (including architects, urban designers, graphic designers, product designers, engineers) often understand “good design” as divorced from the political processes that affect its production and use, design efforts are informed by politics in at least two ways: (i) design proposals are often the product of debates, controversies and negotiations that center power; (ii) political values are embedded in the design output, covertly or overtly. The course investigates how design enables humans, non-humans and landscapes gain or lose agency? What dominant forces and structures include/exclude from design processes, and how? How can designers uphold values of equity, livability and viability in their practice?

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. Offered occasionally.

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. Offered occasionally.

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. Offered occasionally.

Department of Civil and Environmental Engineering

Chairperson	Najjar, Shadi
Professors	Abou Zeid, Maya; Basha, Habib; Hamad, Bilal; Harajli, Muhamad; Mabsout, Mounir; Najjar, Shadi; Sadek, Salah; Srour, Issam
Associate Professors	Dabaghi, Mayssa; Hantouche, Elie; Khoury, Hiam; Salam, Darine
Assistant Professors	Gharzouzi, Paul; Yehya, Alissar
Part-time Professor	Ayoub, George
Adjunct Professors	El Fadel, Mutasem; Kaysi, Isam
Visiting Professor	Abdul Malak, Mohamed-Asem
Senior Lecturer	Basha, Hisham
Part-time Senior Lecturer	Fawwaz, Youssef
Part-time Lecturers	Awad, Elie; Demachkieh, Farah; El Chiti, Imad; El Meski, Fatima; Elsouri, Amer; Hatem-Mousallem, Manal; Malaeb, Lilian; Nader, Halim; Yousef Abdul Massih, Dalia
Part-time Instructors	El Chartouni, Joseph; El Khatib, Helmi; Hage Ali, Nadine
Laboratories	Al Hassanieh, Dima; El Zein, Leticia; Zayyat, Ramez

Graduate Programs

Master of Engineering 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 or Water Resources Engineering

Master of Science Programs

Also offered is a program leading to the degree of master of science (MS) in environmental sciences 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, Structural and Transportation
- Major: Environmental and Water Resources Engineering (EWRE)
  Concentration: Environmental Engineering or Water Resources Engineering

Master Programs

Master of Engineering (ME)

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.

Program Mission

The mission of the master's program in civil engineering is to prepare students through teaching and research for in-depth knowledge in the various fields of civil and environmental engineering. The program provides graduates with the necessary tools for professional practice and the pursuit of higher education.

Program Objectives

The objectives of the CEE programs are to:

- Convey state-of-the-art knowledge in the specialized field of choice.
- Develop sophisticated scientific computational and experimental research skills.
- Encourage independent and creative thinking.

Program Learning Outcomes

- Research Methods: Analyze qualitative and/or quantitative information while conducting research related to their graduate program. (thesis option)
- Applying Research to Practice: Analyze qualitative and/or quantitative research information, in creative projects related to their graduate program. (non-thesis option)
- Advanced Core Knowledge in the Discipline: Analyze core concepts, research and theories in different areas of study in their discipline.
- Scholarly Communication Skills: Demonstrate scholarly communication skills in clear, detailed and well-structured scientific written and oral formats consistent with high standards of their discipline.
- Scholarly Oral Communication Skills: Demonstrate scholarly communication skills in clear, detailed and well-structured scientific oral format consistent with high standards of their discipline.
- Scholarly Written Communication Skills: Demonstrate scholarly communication skills in clear, detailed and well-structured scientific written format consistent with high standards of their discipline.
- Professionalism and Ethical Research Conduct: Apply professionalism and ethical research conduct in their discipline.

Admission Requirements

To be eligible for admission to the graduate program, students 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 towards the graduate degree is given for these courses.
A minimum of one calendar year of residence is required for graduation. The students must also satisfy all relevant Maroun Semaan Faculty of Engineering and Architecture (MSFEA) and AUB requirements.

Residency Requirements

Refer to the Residency Requirements under the General University Academic Information section

Master of Engineering (ME) Major: Civil Engineering (CE)

Master's Thesis (30 cr.)

In order to fulfill the graduation requirements in the CE thesis program, students must complete a minimum of 24 credit hours of graduate courses and a thesis-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 three senior level civil engineering courses (CIVE 600 series), taken at the undergraduate level, can be counted towards the master's degree.

Master's Non-Thesis (33 cr.)

In order to fulfill the graduation requirements in the Non-Thesis Program, students 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.

Master of Engineering (ME) Major: Environmental and Water Resources Engineering (EWRE)

Master's Thesis (30 cr.)

In order to fulfill the graduation requirements in the EWRE thesis program, students must complete a minimum of 24 credit hours of graduate courses and a thesis 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 three senior level civil engineering courses (CIVE 600 series), taken at the undergraduate level, can be counted towards the master's degree.

Master's Non-Thesis (33 cr.)

In order to fulfill the graduation requirements in the EWRE 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.

Concentration: 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

Concentration: 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)

Program Mission

The interfaculty graduate environmental sciences program (IGESP) aims to building up 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 socio-economic 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.

Program Objectives

The aim of the MS-ENVT combines the key elements of the environment: water, air and land for environmental pollution control. Students understand the fate and transport of pollutants in the environment (air, water, soil), and acquire an environmental engineering perspective on the treatment, mitigation, and management of pollutants at source as well as in the environment. They also learn about the emerging environmental technologies developed for environmental quality evaluation, monitoring, and remediation.

Program Learning Outcomes

- **Research Methods (Thesis Option):** Analyze qualitative and/or quantitative information while conducting research related to their graduate program.
- **Applying Research to Practice (Non-Thesis Option):** Analyze qualitative and/or quantitative research information, in creative projects related to their graduate program.
- **Advanced Core Knowledge in the Discipline:** Analyze core concepts, theories and practices in different areas of study in their discipline.
- **Scholarly Communication Skills:** Demonstrate scholarly communication skills in clear, detailed and well-structured scientific written and oral formats consistent with high standards of their discipline.
- **Scholarly Oral Communication Skills:** Demonstrate scholarly communication skills in clear, detailed and well-structured scientific oral format consistent with high standards of their discipline.
- **Scholarly Written Communication Skills:** Demonstrate scholarly communication skills in clear, detailed and well-structured scientific written format consistent with high standards of their discipline.
- **Professionalism and Ethical Research Conduct (Thesis Option):** Apply professionalism and ethical research conduct in their discipline.
- **Professionalism and Ethical Conduct (Non-Thesis Option):** Apply professionalism and ethical conduct in their discipline.

Admission Requirements

The Department of Civil and Environmental Engineering offers a graduate program leading to the degree of master of science in environmental sciences, major: 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.

Residency Requirements

Refer to the Residency Requirements under General University Academic Information section.

Master of Science (MS) in Environmental Sciences, Major: Environmental Technology (ET)

Master's Thesis (30 cr.)

In order to fulfill the graduation requirements in the MS program, students must complete a minimum of 24 credit hours of graduate courses and a thesis equivalent to six 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/LDEM 630, 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)
- Seminar course (CIVE 600)

Master's Non-Thesis (30 cr.)

In order to fulfill the graduation requirements in the MS program, students must complete a minimum of 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/LDEM 630, 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)
- Project (ENSC 697)
- Seminar course (CIVE 600)

Comprehensive Exam for Master Programs

Refer to Comprehensive Exam under General University Academic Information section

Supervision of Master's Thesis

For the Thesis Proposal and Committee, Thesis Defense, and Deposit of the Project/Thesis in the Library, refer to the General University Academic Information Section of this catalogue.

Master's Degree Graduation Requirements

Refer to the Master's Degree Graduation Requirements under General University Academic Information Section

Doctor of Philosophy (PhD)

Program Mission

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.

Program Objectives

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.
- Acquire teaching expertise through assistance in class lectures and laboratory sessions.

Program Learning Outcomes

- Research Methods: Analyze qualitative and/or quantitative information while conducting research related to their graduate program.
- Advanced Core Knowledge in the Discipline: Analyze core concepts, research and theories in different areas of study in their discipline.
- Scholarly Communication Skills: Demonstrate scholarly communication skills in clear, detailed and well-structured scientific written and oral formats consistent with high standards of their discipline.
- Scholarly Oral Communication Skills: Demonstrate scholarly communication skills in clear, detailed and well-structured scientific oral format consistent with high standards of their discipline.
- Scholarly Written Communication Skills: Demonstrate scholarly communication skills in clear, detailed and well-structured scientific written format consistent with high standards of their discipline.
- Professionalism and Ethical Research Conduct: Apply professionalism and ethical research conduct in their discipline.
- Independent Research and Original Contribution to Knowledge: Produce original and independent research that contributes to knowledge in their discipline.
- Pedagogy and Teaching: Employ teaching activities focused on student learning related to their discipline.

Admission Requirements

To be eligible for admission to the PhD program, candidates 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).
- 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.

Residency Requirements

Refer to the Residency Requirements under General University Academy Information section.

Program Requirements

The 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).
- 6 credits in an area other than the candidate's field of research, which can be taken inside or outside the department (elective courses).

PhD in Civil Engineering (CE)

PhD Concentration Areas

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

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 students' knowledge in their field of specialization and related areas. The written exam will cover major topics from within the concentration area and related fields. Normally, Students 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. 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
Refer to Qualifying Exam Part II: PhD Thesis Defense under General University Academic Information section.

Admission to Candidacy

Refer to Admission to Candidacy under General University Academic Information section.

Supervision of Doctoral Thesis

For PhD Thesis Committee, PhD Thesis Proposal, PhD Thesis Defense, Deposit of the Thesis in the Library, refer to the General University Academic Information section of this catalogue.

PhD Degree Graduation Requirements

To earn a PhD degree in the Department of Civil and Environmental Engineering, students must fulfill the following graduation requirements:

- Attain a minimum cumulative GPA of 3.7 (A-) in 24 credits (regular 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 on the regular track is shown below.

Year	Term	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	Comprehensive 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

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, iso-parametric 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 421.

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.

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. Corequisite: 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: CHEM 202 and CHEM 203 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. Prerequisite: CHEM 202 and CHEM 203 or equivalent, or consent of instructor.

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. Prerequisite: CHEM 202 and CHEM 203 or equivalent, or consent of instructor.

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: CHEM 202 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: CHEM 202 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: CHEM 202 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 and EECE 231.

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 and EECE 231.

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; and privatization issues. Corequisite: CIVE 461 and INDE 301.

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: 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	Azizi, Fouad
Professor	Ahmad, Mohammad
Associate Professors	Al-Hindi, Mahmoud; Azizi, Fouad; Saad, Walid; Zeaiter, Joseph
Assistant Professors	Maalouf, Elsa; Rahal, Said
Senior Lecturer	Manneh, Rima
Instructors	Itani, Adnan; El Berjawi, Mohamad

Graduate Programs

The Baha and Walid Bassatne Department of Chemical Engineering and Advanced Energy offers the degree of master of engineering in chemical engineering (thesis/ non-thesis).

Master of Engineering (ME)

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.

Program Mission

The mission of Baha and Walid Bassatne Department of Chemical Engineering and Advanced Energy in MSFEA is to provide a stimulating and supportive environment for quality education; to prepare graduates for career opportunities in a rapidly changing world by fostering the development of professionalism, leadership qualities and ethical behavior; and to contribute to expanding the knowledge in chemical engineering and its related fields.

Program Objectives

The program will provide graduates with the necessary background and tools for handling challenges in various process industries, while emphasizing a strong technical foundation in advanced-level coursework and independent research. The program will therefore:

- Complement the existing BS and BE programs in chemical engineering by providing advanced knowledge of fundamental subjects.
- Supplement the research portfolio of AUB.
- Encourage industrial partnerships leading to research that supports the needs of the various process industries in Lebanon and the region.
- Provide the necessary resources to support research activities which will facilitate faculty retention and promotion.

Program Learning Outcomes

The program objectives are:

- Analyze qualitative and/or quantitative research information, in creative projects related to their graduate program.
- Analyze core concepts, theories and practices in different areas of study in their discipline.
- Demonstrate scholarly communication skills in clear, detailed and well-structured scientific oral format consistent with high standards of their discipline.
- Demonstrate scholarly communication skills in clear, detailed and well-structured scientific written format consistent with high standards of their discipline.
- Apply professionalism and ethical conduct in their discipline.

Admission Requirements

The ME thesis program is open to students with a bachelor of engineering (BE) in chemical engineering, bachelor of science (BS) in chemical engineering, or other related engineering disciplines. In addition, students with a bachelor of science (BS) in chemistry, biology, mathematics or physics, can also enroll in the ME program given they complete the necessary residency requirements.

The ME non-thesis program is open to students with a bachelor of engineering (BE) in chemical engineering, bachelor of science in chemical engineering, or other related engineering disciplines. In addition, students with a bachelor of science in chemistry, biology, mathematics or physics can also enroll in this program.

Based on the student's undergraduate major, the following additional admission requirements may apply:

Engineering Majors

Students who have a bachelor of engineering or bachelor of science (in an engineering major) other than chemical engineering will also have to take the following courses: CHEN 417 and CHEN 470.

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 ME 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, students must take EECE 231/CMPS 200 first, then in the next term, the students have to register MATH 251 to pass graduate courses.

Students will also have to pass the following courses with a minimum cumulative GPA of 3.3 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.

Residency Requirements

A minimum of one calendar year of residence is required for graduation from this program.

Master of Engineering (ME) Major: Chemical Engineering

Master's Thesis (30 cr.)

Holders of a Bachelor of Engineering Degree in Engineering

The students should complete a minimum of 30 credit hours in total that could be divided between 21 credit hours of courses and a 9 credit-hour thesis on a full- or part-time basis. A minimum of one calendar year of residence is required for graduation from this program.

Students who hold a bachelor of engineering in a major 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)

Holders of a Bachelor of Science Degree in Engineering

The students should complete a minimum of 46 credit hours in total divided between a minimum of 37 credit hours of courses and 9 credit hours of thesis work on a full- or part-time basis. A minimum of two calendar years of residence is required for graduation from this program.

Students who hold a bachelor of science in an engineering major other than chemical engineering will be accepted as ME in chemical engineering and should take CHEN 417 and CHEN 470 on top of the program requirements.

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)

Holders of a Bachelor of Science Degree in Sciences

Students who have a bachelor of science degree in chemistry, biology, mathematics or physics will be accepted as prospective graduate students in the ME 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, students must take EECE 231/CMPS 200 first, then in the next term, the students have to register MATH 251 to pass graduate courses.

Students will also have to pass the following courses with a minimum cumulative GPA of 3.3 before joining the ME 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.

Master's Non-Thesis (33 cr.)

Holders of a Bachelor of Engineering Degree in Engineering

Students 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:

Holders of a Bachelor of Science Degree

The ME 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 who will be accepted as prospective graduate students.

The students 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

In addition to these 46 credit hours, students holding a bachelor of science in chemistry, biology, mathematics, or physics must fulfill the same pre-requisites listed under the ME (thesis option) to change their status from prospective to regular students.

List of courses for the thesis and non-thesis option is shown below:

Applied Mathematics Course

The math course or math-oriented course offered by other departments must be approved by the graduate adviser. Additional math courses may be counted as non-chemical engineering electives. Acceptable courses include but are not limited to: CIVE 710, MATH 350 / CMPS 350, MATH 351 / CMPS 351, CMPS 354, ENMG 604, MECH 630, MECH 663.

Core Required Courses

The following core courses are required for all master level students: CHEN 611, CHEN 617.
Students holding a bachelor of science degree in engineering or sciences must also complete the following core courses: CHEN 570, CHEN 571.

Special Courses and Thesis

Students should register for the Thesis Proposal (CHEN 799T) and pass it before being allowed to register for their thesis. If they fail CHEN 799T, they must register for CHEN 799TR and take the exam during the next term (excluding summer). Once completed, the students can register for CHEN 799, then CHEN 799 (A-E) in subsequent terms until the completion of their independent research.

Except for 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, CHEN 799, CHEN 799 /B / C, CHEN 799D/E, CHEN 797.

Chemical Engineering Elective Courses

Students can choose courses from the following list: CHEN 610, CHEN 612, CHEN 613, CHEN 614, CHEN 615, CHEN 618, CHEN 619, CHEN 620, CHEN 630, CHEN 632, CHEN 633, CHEN 651, CHEN 670, CHEN 672, CHEN 673, CHEN 674, CHEN 675, CHEN 690, CHEN 696, CHEN 779, CHEN 796, CHEN 798, CHEN 798A, CHEN 798B.

Please note that students can only credit 600-level (or above) courses in the department.

Non-Chemical Engineering Elective Courses

Students can choose courses from the following list: BMEN 600, BMEN 601, BMEN 605, BMEN 606, CIVE 602, CIVE 651, CIVE 652, CIVE 654, CIVE 655, CIVE 656, CIVE 658, CIVE 710, CIVE 740, CIVE 755, CMPS 350, CMPS 351, CMPS 354, EECE 601, EECE 602, EECE 663 / MECH 656, EECE 671, EECE 672, EECE 675, ENMG 601, ENMG 602, ENMG 603, ENMG 604, ENMG 611, ENMG 612, ENMG 616, ENMG 622, ENMG 623, ENMG 633, ENMG 654, ENGM 659, ENMG 663, MATH 350, MATH 351, MECH 603, MECH 606, MECH 607, MECH 609, MECH 627, MECH 630, MECH 634, MECH 663, MECH 672, MECH 674, MECH 678, MECH 701, MECH 747, MECH 751, MECH 760, MECH 761, MECH 764, MECH 765, MECH 766, MECH 767, MECH 768, MECH 773, MECH 798A.

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).

Comprehensive Exam for Master Programs

See General University Academic Information section in this catalogue.

Supervision of Master's Thesis

For Thesis Proposal and Committee, Thesis Defense, and Deposit of the Project/Thesis in the Library, refer to the General University Academic Information section in this catalogue.

Master's Degree Graduation Requirements

See General University Academic Information section in this catalogue.

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 for the development and characterization of novel material. 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. Team-based student projects 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 632 Carbon Capture, Usage and Storage 3 cr.
This course refers to a suite of technologies and processes that enable the mitigation of carbon dioxide (CO2) emissions from large point sources such as power plants, refineries and other industrial facilities, or the removal of existing CO2 from the atmosphere. CCUS plays a crucial role in meeting global climate targets and supporting the transition to a low-carbon energy system. The latest IPCC assessment report warns that the deployment of carbon dioxide removal technologies is ‘unavoidable’ if net zero emissions are to be achieved and many ambitious net zero scenarios show carbon capture expanding to 6-8 Gt of CO2/year by 2050. This course identifies the need and key steps for CCUS and explains the associated environmental, technical, economical, and regulatory considerations, opportunities, risks, and challenges. Case studies from CCUS projects with varying geographical locations, levels of maturity, and scales will be discussed.

CHEN 633 Carbon Capture, Usage and Storage 3 cr.
This course covers the four phases of environmental life cycle assessment (LCA): i) goal and scope definition, ii) life cycle inventory, iii) life cycle impact assessment, and iv) life cycle interpretation. Primary and secondary data collection is covered with examples for different products and processes, with a focus on energy systems using renewable and non-renewable sources. Inventory analysis is performed using different mathematical approaches. The course also explores the environmental mechanisms behind different indicators such as climate change, acidification, human toxicity, and others. Contribution, sensitivity and Monte-Carlo uncertainty analyses are also performed. Tutorial sessions and a practical LCA case study on energy systems using appropriate software (SimaPro) are covered to gain a hands-on experience with environmental LCA. In addition, real life applications of LCA and its importance towards achieving sustainability in energy systems are included through scientific paper readings and/or guest speakers sessions.

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 as 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 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 students are required to participate under the supervision of a faculty member, in a research project. Prerequisite: approval of adviser.

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 adviser.

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 adviser 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 adviser.

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 waste minimization, 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 adviser 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 adviser.

CHEN 799 (A-E) Thesis 9 cr.
Every term. Prerequisite: CHEN 799Tor CHEN 799TR.

CHEN 799 (9 cr., 7.14 billing)

CHEN 799A/B/C (9 cr., 0 billing)

CHEN 799D/E (9 cr., 1 billing)

CHEN 799T/799TR Thesis Proposal 0 cr.
Every term. The master's thesis proposal grading mode is P/F. If students fail CHEN 799T, they must register for CHEN 799TR.

Department of Electrical and Computer Engineering

Chairperson	Chehab, Ali
Associate Chairperson	Costantine, Joseph
Professors	Abou-Faycal, Ibrahim; Bazzi, Louay; Chaaban, Farid; Chedid, Riad; Chehab, Ali; Costantine, Joseph; Dawy, Zaher; Elhajj, Imad; El-Hajj, Ali; Jabr, Rabih; Kabalan, Karim; Karaki, Sami; Kayssi, Ayman; Sharafeddine, Sanaa
Associate Professors	Awad, Mariette; Daher, Naseem; Saghir, Mazen; Tawk, Youssef; Zaraket, Fadi
Assistant Professors	Atallah, Jad; Chehimi, Mahdi; Fahs, Jihad; Issa, Ibrahim; Sarieddeen, Hadi; Tajeddine, Razane
Adjunct Professors	Hajj, Hazem; Mansour, Mohammad; Kanj, Rouwaida
Full-Time Lecturers	Bakri, Hussein; El Dassouki, Khaled; Jlailaty, Hussein; Mohanna, Ammar; Moukadem, Imad; Shwaykani, Hassan
Part-Time Lecturers	Alkhansa, Rasha; Bichara, Rosette Maria; El Abbasi, Mona; Hussein, Ali
Senior Instructors	Ashkar, Nicolas; Chebaro, 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 (ME)

The ME program offers the degree with 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.

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 into the thesis option are normally eligible for Graduate Fellowship and Assistantship Program (GFAP) and Graduate Research Assistant (GRA). Refer to the General University Academic Information section.

Program Mission

The ME Program in the ECE department is to:

- Educate graduate students with advanced knowledge in electrical and computer engineering, preparing them for leadership roles in academia and industry.
- Cultivate Innovation by fostering research and development in the different areas of ECE.
- Collaborate across disciplines to promote creativity and ethical responsibility in emerging technologies.
- Serve society through the application of engineering solutions that address global challenges in energy, healthcare, information technology, and sustainable development.

Program Objectives

The ME program in the ECE department prepares graduates to:

- advance their professional or academic careers and undertake leadership roles with creativity and integrity.
- pursue professional development and further education to stay at the forefront of technological advancement and contribute to knowledge creation in the field of electrical and computer engineering while upholding ethical standards.

Program Learning Outcomes

Graduates of the ME program are expected to:

- Analyze advanced core concepts and theories in areas of electrical and computer engineering.
- Produce original research or advanced engineering solutions in a specialized area of electrical and computer engineering.
- Effectively communicate scholarly work in a variety of formats with a range of audiences.
- Apply professional and ethical principles in engineering practice and research conduct.

Admission 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 program.

To be eligible for admission, students must have a bachelor's degree in engineering 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.

Residency Requirements

Refer to the General University Academic Information section.

Master of Engineering (ME) Major: Electrical and Computer Engineering

Master's Thesis (30 cr.)

- 24 course credit hours of which:
  - A minimum of 21 credits of graduate level courses.
  - A minimum of 18 credits of ECE graduate level courses.
  - A minimum of 9 credits of graduate level courses in the major area.
- The seminar course should be registered for a minimum of 2 terms (EECE 797).
- The comprehensive exam should be registered before the fourth term (EECE 799T).
- 6 credits for master's thesis (EECE 799).
- Students must declare their major area by the end of the registration period of their last term.

Note: Students may declare a minor area after registering for at least two courses in the area.

Master's Non-Thesis (33 cr.)

- 33 credit hours of graduate level courses
  - A minimum of 24 credits of ECE graduate level courses.
  - A minimum of 12 graduate credits in the major area.
- The seminar course should be registered for a minimum of 2 terms (EECE 797).
- Students must declare their major area by the end of the registration period of their last term.

Note: Students may declare a minor area after registering for at least two courses in the area.

Major and Minor Areas

Refer to the section of major and minor areas of the ME program.

Comprehensive Exam for Master Program

All master's program require that the students register and pass a 0-credit comprehensive examination course. Refer to the General University Academic Information section.

Supervision of Master's Thesis

Thesis Committee and Proposal

Students are expected to meet with faculty members in the ECE department to discuss possible thesis topics and select a thesis adviser. They must prepare a thesis proposal by the end of the second regular term.

A Thesis Committee is formed by the thesis adviser and the student in coordination with the chairperson/coordinator of the program according to several conditions. Refer to the General University Academic Information section.

Students must register for the comprehensive exam (EECE 799T) before the fourth term and then submit the thesis proposal to the committee and secure their approval.

Subsequently, Students will submit the thesis proposal, along with a completed Thesis Proposal Form by Petition, to obtain the approval of the department and Graduate Studies Committee.

Thesis Defense

Students must register the thesis defense (EECE 799), with a minimum of six month after passing the comprehensive examination. Refer to the General University Academic Information section.

Deposit of the Thesis in the Library

Refer to the General University Academic Information section.

Master's Degree Graduation Requirements

Refer to the General University Academic Information section.

Doctor of Philosophy Program (PhD)

The PhD program is designed to prepare students for advanced research, academic leadership, and innovation in the field. It provides training through coursework, seminars, and independent research, enabling candidates to contribute original knowledge and address complex challenges in engineering and technology. The program emphasizes collaboration with faculty, interdisciplinary exploration, and the development of expertise that supports both academic and industry careers.

Program 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.

Program Objectives

The PhD program in the ECE department prepares graduates to:

- Advance their professional or academic careers and undertake leadership roles with creativity and integrity.
- Pursue professional development and advance the forefront of technological innovations in the field of electrical and computer engineering through cutting-edge research and development while upholding ethical standards.

Program Learning Outcomes

Graduates of the PhD program are expected to:

- Analyze advanced core concepts and theories in different areas of electrical and computer engineering.
- Produce original, novel, and independent research that contributes to knowledge advancement in a specialized area of electrical and computer engineering.
- Demonstrate scholarly communication skills in clear, detailed, and well-structured scientific written and oral formats consistent with high standards of their discipline.
- Employ teaching activities focused on student learning related to their electrical and computer engineering.
- Apply professional and ethical principles in engineering practice and research conduct.

Applicants who have an excellent record of academic achievement and potential for creative and independent work may be admitted according to 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

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 by the ECE Graduate Committee (EGC) in person, by phone or over the Internet.
- Satisfaction of the university requirements for admission to PhD program.

Residency Requirements

Students 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.

PhD in Electrical and Computer Engineering

Program Requirements

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 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 must be in one of the ECE areas.
- Students must take at least four 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 must be from one of the ECE areas.
- The seminar course should be registered for a minimum of 4 terms (EECE 797).
- Students must complete Qualifying Exam Part I: Comprehensive Exam (EECE 980).
- Students must complete Qualifying Exam Part II: Defense of Thesis Proposal (EECE 981).
- Students must register for the PhD Thesis course every term (one of EECE 982, 983, 984, 985, and 986).

Students must register a total of 9 cr. each term combining both graduate course work and PhD thesis work. The PhD thesis course must be registered in the following sequence:

EECE 982 (3 cr.)	**EECE 983 (6 cr.)**	**EECE 984 (9 cr.)**	**EECE 985 (12 cr.)**	**EECE 986 (0 cr.)**
EECE 982	EECE 983	EECE 984	EECE 985	EECE 986
EECE 982A	EECE 983A	EECE 984A	EECE 985A	EECE 986A
EECE 982B	EECE 983B	EECE 984B	EECE 985B	EECE 986B
EECE 982C	EECE 983C	EECE 984C	EECE 985C	EECE 986C

For example, if students enroll in 1 graduate course (3 cr.), they should also enroll in the PhD Thesis EECE 983 (6 cr.). However, if they enroll in 2 graduate courses (6 cr.), then, they should enroll in the PhD Thesis EECE 982 (3 cr.). Additionally, if students have already enrolled in one of PhD Thesis courses (EECE 982, 983, 984, 985, or 986) and plan to re-enroll in it later, hence, they must ensure to maintain the course's sequence letter. (For example, if enrolled in EECE 983, the subsequent enrollment should be EECE 983A, not EECE 983B).

Students must maintain a cumulative GPA of 3.7 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 must 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).

Major and Minor Areas

Refer to the section of major and minor areas of the PhD program.

PhD Qualifying Exam

The PhD program requires that PhD students pass the qualifying exam. The PhD qualifying exam is two parts. The Qualifying Exam Part I: Comprehensive Exam & the Qualifying Exam Part II: Defense of Thesis Proposal.

Refer to General University Academic Information section.

PhD Qualifying Exam Part I: Comprehensive Exam

The first part of the Ph.D. qualifying exam is an oral exam that must be taken by the student during the third regular semester in the program. This exam is administered by a qualifying exam committee of four faculty members, including the advisor. The qualifying exam is composed of the following components:

- Stage 1: Research Proposal Report and Presentation. The PhD candidate is assigned a topic different than their main thesis topic to assess their capacity for original research, including mastery of current knowledge in the field.
- Stage 2: Fundamental Knowledge. The committee members ask questions about concepts in the major and minor areas of the student. The purpose of these questions is to test the depth and breadth of knowledge of the Ph.D. student.

Qualifying Exam Part II: Defense of Thesis Proposal

Within two terms of passing the comprehensive examination, the students must take an oral qualifying examination, administered by their 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.

Admission to Candidacy

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.
- Maintained good academic standing.

Supervision of Doctoral Thesis

PhD Thesis Committee

In accordance with the Ministry of Education and Higher Education, the thesis committee should be composed of at least five faculty members:

- Chair of the committee, adviser 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 adviser 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 adviser.

Members of the committee are recommended by the student's thesis adviser 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 adviser, 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.

PhD Thesis

Students 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 adviser, 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.

Deposit of the Thesis in the Library

Refer to PhD Thesis Defense under General University Academic Information section.

PhD Degree Graduation Requirements

To earn the PhD degree in electrical and computer engineering, students 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 residence requirement and all other pertinent AUB regulations.

ME & PhD Major or 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 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 611, EECE 612, EECE 616, EECE 617, EECE 621, EECE 622, EECE 623, EECE 624, EECE 625, EECE 626
- **Computer Software Systems:** EECE 606, EECE 631, EECE 636, EECE 637, EECE 638, EECE 642, EECE 652, EECE 696, EECE 731, EEE 732
- **Control Systems:** EECE 610, EECE 648/MECH 691/ENMG 628, 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 654, EECE 655, EECE 656, EECE 657

Course Descriptions

EECE 603 Biomedical Signal and Image Processing 3 cr.
This course introduces the fundamentals of digital signal and image processing as implemented in biomedical applications. It provides a concise treatment of the tools utilized to describe deterministic and random signals as the basis in analyzing biological signals. Such tools include data acquisition and imaging, denoising and filtering, feature extraction, and modeling. The course is very tightly coupled with a practical component as it looks at and assigns laboratory projects on the auditory system, speech generation, electrocardiogram, neuronal activity, and medical imaging. Pre/corequisites: STAT 230 and EECE 340, or STAT 233 and EECE 340; or consent of instructor.

EECE 606/435 Introduction to Quantum Computing 3 cr.
This course introduces the basics of quantum information science and quantum computing. We will cover classical vs quantum bits, quantum states, quantum gates and circuits, and foundational quantum algorithms. The course will also introduce quantum communication and quantum machine learning. No prior knowledge of quantum theory or physics is required, but a solid understanding of linear algebra is necessary. Pre/corequisite: MATH 218 or MATH 219; or consent of instructor.

EECE 607/407 Quantum Communication Networks 3 cr.
This course provides a deep dive into quantum communications, quantum networks, and the emerging quantum Internet. Starting with the basics of quantum information, the course explores the building blocks of quantum communication networks, including single-photon and entanglement generation sources, quantum channels (free-space optical and optical fiber), quantum noise, and decoherence. Advanced topics include quantum memory, quantum switches, quantum repeaters, and quantum detectors. We will also cover distributed quantum sensing and machine learning applications over the quantum Internet, along with secure quantum communication protocols like quantum key distribution and the necessary process of entanglement distribution over the quantum Internet. Finally, the course will cover advanced techniques to enable scalable quantum communications including entanglement swapping, entanglement distillation, and quantum error correction. In achieving these goals, the course will include an introduction to state-of-the-art quantum network simulators, like NetSquid, where students will get a chance to design and simulate hybrid quantum-classical communication networks and evaluate their performance. A solid understanding of linear algebra is necessary, in addition to a good understanding of communication theory. Prerequisites: MATH 218/219 and STAT 230/233; or consent of instructor.

EECE 608 Trustworthy machine learning 3 cr.
This course provides an introduction to trustworthy machine learning and AI. With the increasing use of predictive machine learning, trustworthiness of the models is becoming more of a concern. This course will cover the main aspects of trustworthy machine learning. Those are: the privacy of the user data used in the model, which could include confidential and sensitive information, the fairness of the model towards all groups/individuals, the robustness of the model to attacks, the transparency of the model, and the explainability of the model. Students will learn how to reliably build trustworthy machine learning models by understanding machine learning system vulnerabilities and possible ways to defend against them. Prerequisites: EECE 230, EECE 490 and STAT 230/233; or consent of instructor.

EECE 610/466 MECH 651/536 Intelligent Control Systems 3 cr.
This course introduces students to learning-based control methods including adaptive control, reinforcement learning, and model predictive control, with a focus on their applications in controlling uncertain systems. A fundamental concept linking these methodologies is ‘learning’, thus the course explores the role of learning in control tasks and the various approaches used to achieve effective adaptation. Additionally, students will examine the strengths and limitations of these methods in real-time control applications. The course combines theoretical lectures with problem sets and hands-on sessions to provide both conceptual understanding and practical implementation experience. Prerequisite: EECE 460 or MECH 436, senior standing or consent of the instructor.

EECE 611/411 Analog Integrated Circuits 3 cr.
Technology and limitations. IC design flow. Differential structures. Voltage regulators and converters, reference, and bias circuits. Output stages. Mixed-signal circuits overview. Noise and linearity analysis and modeling. Comparators. Sample-and-hold and translinear circuits. Discrete-time signals. Switched-capacitor circuits. Data converter fundamentals. Nyquist-rate D/A converters. Nyquist-rate A/D converters. Oversampling converters. Phase-locked loops. This course makes extensive use of EDA tools for custom IC design. Prerequisite: EECE 311 or consent of instructor.

EECE 612/412 Digital Integrated Circuits 3 cr.
This course is an introduction to digital integrated circuits. Material will cover CMOS devices and manufacturing technology, CMOS inverters and gates, propagation delay, noise margins, power dissipation, and regenerative logic circuits. Various design styles as well as issues designers face, such as technology scaling and the impact of interconnect, are investigated. The course starts with the core digital design block, the CMOS inverter, and then various CMOS implementations are discussed. The design of more complex combinational gates such as NAND, NOR, XORs will be considered, looking at optimizations for speed, area, or power The influence of interconnect parasitics on circuit performance and approaches to cope with them are treated in detail. The course concludes with an examination of design methodologies. Spice simulation will be embedded in lectures as practical application for lectures to emphasize DC and transient analysis. 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 621/421 Advanced Computer Architecture 3 cr.
A course on the principles, techniques, and trade-offs used in designing modern processor core architectures. Topics include benchmarking and performance evaluation; hardware instruction level parallelism techniques (pipelining, superscalar, out-of-order execution, branch prediction); software instruction level parallelism techniques (loop unrolling, software pipelining, predicated execution, EPIC architecture); virtual memory and high-performance memory systems; domain-specific architectures. Prerequisite: EECE 321 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 architecture. FPGA design flows and tools. Hardware/software partitioning. Host, memory, and peripheral interfaces. Hardware accelerators. Classical and emerging applications. Students work on a set of design assignments and design/research projects using appropriate FPGA development boards and tools. Prerequisite: EECE 321 or consent of instructor.

EECE 625/425 Embedded and IoT Systems 3 cr.
An introduction to the basic building blocks and technologies used to design contemporary embedded and IoT systems. Topics include microcontroller architecture and programming; peripheral device controllers (GPIO; timers/counters; interrupts); serial interfaces (UART; SPI; I2C); device networking; pulse-width modulation; analog/digital conversion; real-time operating systems; and edge intelligence. Students work on a sequence of lab assignments and a major design or research 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 term project that focuses on developing architectures for hardware ML accelerators. Prerequisites: EECE 490 and EECE 420 or EECE 421, or consent of instructor.

EECE 627/427 Embedded Machine Learning 3 cr.
An introduction to designing and deploying machine learning models on resource-constrained embedded devices. Review of ML fundamentals and embedded device hardware; embedded ML tools and frameworks; model training and conversion; model pruning, quantization, and quantization-aware training; applications in computer vision, audio/sound processing, and speech recognition; data collection and embedded datasets; over-the-air (OTA) model deployment and updates; advanced topics including federated learning, on-device training, and hardware acceleration. The course includes a lab where students learn to develop, optimize, and deploy embedded ML models on microcontrollers. Students also work on a course project to develop an embedded ML application. Prerequisites: EECE 425/625 and EECE 490/690.

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 634 Introduction to Computational Arabic 3 cr.
The course concerns basic computational methods and techniques leveraged for automating the understanding and generation of text in natural languages. The methods include representation in strings, text algorithms, distance algorithms, language models, inversed indices, vector semantics. The course will also cover applying naïve Bayes, logistic regression, hidden Markov models, and neural networks for text processing. Applications and case studies include stemming, lemmatization, part of speech tagging, information retrieval, question answering, text classification, social network models, chatbots, machine translation, genomic sequence extraction, and word meaning extraction. 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. Prerequisites: 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 course is an advanced course on programming practices with a focus on verification. The course introduces programming tools and techniques that make individual engineers more effective and productive and help them develop quality code. Teams will work in Agile and eXtreme programming environments with a focus on design by contract. They will use formal specifications, design patterns and aspect-oriented programming. Projects will use tools for code control, building, configuration, language recognition, dynamic documentation, fast prototyping, refinement, coverage, automated and manual debugging, and dynamic and static verification. Prerequisite: EECE 330 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; detection and diversity techniques; resource management and power control; OFDM and ultra-wideband systems; opportunistic communication; multiple-antenna systems; multiple-access techniques and multi-user communication; diversity-multiplexing tradeoff; precoding; emerging topics in wireless communications systems. Prerequisite: EECE 442 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, algebraic, and algorithmic aspects. Topics include: Background material from combinatorics, probability, 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. A course on abstract algebra is not a prerequisite. The needed algebra background will be covered.

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 646/446 Data Communications 3 cr.
This course provides an integral view of data communication systems and their digital signal-processing solutions at the link level. The course studies contemporary techniques for signal representation (sampling, quantization, compression), signal transmission and reception (modulation, data detection, channel estimation), and error correction coding (soft and hard, code-specific and noise-centric channel decoding). Conventional signal processing techniques are compared to machine-learning-based solutions under practical multi-antenna and high-frequency wireless constraints. The techniques are studied from information-theoretic and algorithmic/architectural (complexity) perspectives, laying the foundations for analysis and design. Pre/corequisite: EECE 442 or consent of the instructor.

EECE 648/MECH 691/ENMG 628 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 or consent of instructor.

EECE 649 The Art and Science of Thick Tails 3 cr.
This course examines the theory and application of thick-tailed statistical models, focusing on their role in various learning and estimation problems from both mathematical and practical perspectives. In contrast to standard Gaussian techniques, this course introduces the fundamentals of thick tails through examples taken from the real world. We further explore the statistical implications of thick tails in real-life applications in engineering and in the financial sector. Concepts such as stability, Central Limit Theorems, domain of attractions, and law of large and medium numbers are explained. The course also discusses the inadequacy of standard statistical tools and techniques under thick tails in typical learning problems such as linear regression, classification, and dimensionality reduction. The course includes a project in which students have to deal with data sampled from a thick-tailed distribution and compare Gaussian to robust methods within a specific context related to their discipline. Prerequisites: MATH 201 and STAT 230; or consent of instructor.

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 consent of instructor.

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 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 multi-hop 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 350or 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. Students cannot receive credits for both EECE 655 and CMPS 243. Prerequisite: EECE 350or 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 350or 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 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 covering the fundamentals of robotics, emphasizing recent advancements. The curriculum encompasses key topics such as robot architecture, mechanics of robots, kinematics, dynamics, trajectory planning, and control of end effector motion. The scope extends beyond serial manipulators to include various architectures like parallel and legged robots. The hands-on lab involves programming and using robotic middleware for robot coordination and control. Engaging projects are an integral part of the course, providing opportunities to apply learned concepts in real-world scenarios, including the coordination and control of diverse types of robots in different tasks. Pre/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. Prerequisite: Senior or graduate standing, or consent of instructor.

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 666/MECH 659 Aerial Robotics 3 cr.
This course provides a comprehensive understanding of aerial robotics, focusing on the design, control, and application of unmanned aerial vehicles (UAVs). Students will gain hands-on experience with UAV systems, delve into advanced control algorithms, and explore real-world applications of aerial robotics. The technology is set to have a profound impact on society from delivering packages to watering crops and inspecting and repairing building structures etc. This course will introduce the topic of aerial robotics and provide the foundations to be skilled in their design and control, as well as operational aspects such as ethical & legal considerations. Prerequisites: EECE460 or MECH 436, PHYS 210 and PHYS210L or MECH420, EECE 320 or MECH 201, EECE 230, MATH 202; 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.
Game theory provides a set of tools, approaches, and perspectives on decision making to mimic the human elements of decision making that is best described by strategy, coercion and cooperation. This course offers an introduction to fundamentals of game theory and decision making with a special emphasis on the foundations of the mathematical background. Topics covered include: games of skills, game 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.
Electric energy and peak demand forecasts using weather sensitive, time curve, and autoregressive models; generation reliability evaluation, loss of energy expectation, probabilistic production costing, generating capacity expansion analysis, maintenance scheduling, and planning with renewable energy sources, power flow and security analysis, 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.
World energy resources and classifications. Sources and effects of air pollution. Air quality modeling, Gaussian dispersion models. Motor vehicles emissions and noise pollution, mitigation strategies. Environmental impacts of electricity generation, pollution control systems, electromagnetic radiations. Environmental impact assessment.

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 photovoltaic (PV) and wind electric energy systems in terms of their physics, design, technology, and operation. Models and characteristics of autonomous and grid connected systems. Economics, optimization techniques and feasibility studies of PV and wind electric energy systems.

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, sub-transient 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, power capability curves, energy audit: definition and types, data analysis, reporting and recommendation. Prerequisite: EECE 210, 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 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 design. Prerequisite: EECE 380 or consent of instructor.

EECE 687/487 Radio-Frequency Integrated Circuit (RFIC) Design 3 cr.
The course addresses the analysis and design of various Radio Frequency Integrated Circuits (RFICs) with an emphasis on specific RF blocks such as low noise amplifiers, oscillators, mixers, phase locked loops and frequency synthesizers. It also introduces the design of on-chip lumped elements and passive RF components. The course provides students with hands-on experience in the simulation of RFICs as well as the different techniques for RFIC 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 introduction to machine learning theory and algorithms, which 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 the 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, support vector machines, neural networks, and deep learning. For the graduate version of the course, the students are required to conduct a research project which constitutes a significant component of the course. This course is considered equivalent to CMPS 261; hence, students cannot receive credits for both EECE 490/690, CMPS 261 and EECE 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 the fundamentals of DSP systems, including properties of discrete-time linear systems, digital filter design, sampling and reconstruction, A/D and D/A conversion, quantization, discrete-time Fourier analysis, spectral analysis, sample-rate conversion, FFT and fast convolution, filter structures and realizations, and multi-rate DSP and filter banks. The course also discusses applications of DSP in areas such as speech/audio processing and includes a project to implement one such application. Prerequisite: EECE 340 or consent of instructor.

EECE 691L Digital Signal Processing 3 cr.
The EECE 691L graduate lab comprises of a set of lab experiments in C and MATLAB covering a series of real-time signal processing topics which include introductions to MATLAB and Code Composer Studio, programming in C, assembly and linear assembly, code optimization techniques, using the BIOS and BSL, IIR and FIR filter design, aliasing, and echo effects. 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. Prerequisites: MATH 202 and EECE 230 or EECE 231, or consent of instructor.

EECE 693 Neural Networks 3 cr.
The course provides a foundation to deep learning neural networks, including an overview of deep learning methods and related applications. We will discuss deep learning methods for supervised and unsupervised tasks covering different topologies in deep neural networks such as deep feedforward networks, Autoencoders, Convolutional Networks, Generative Networks, Recurrent and Recursive Networks. We will also discuss optimized learning techniques such as stochastic gradient descent. The course will include a project that explores advances or applications in deep learning. This course is considered equivalent to CMPS 364; hence, students cannot receive credits for both EECE 693 and CMPS 364. Prerequisite: EECE 490/690; 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: non-holonomy 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. Prerequisite: Senior or graduate standing.

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/corequisite: MECH 436; or Prerequisites: EECE 230 and Pre/corequisite: EECE 460; or consent of instructor.

EECE 699 Topics in Artificial Intelligence 3 cr.
Many Artificial Intelligence (AI) technologies from self-driving cars to robot surgeons and video games, to name a few, are having an increasing societal impact. AI techniques involve self-learning systems that extract information from heterogeneous data sources to produce knowledge or goal-directed behavior. 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 in the form of seminar 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 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

Chairperson	Maddah, Bacel
Professors	Maddah, Bacel; Salameh, Moueen
Associate Professor	Nouiehed, Maher
Assistant Professors	Abou Ibrahim, Hisham; Zahed, Karim; Olleik, Majd; Alame, Jawad
Senior Lecturers	Abou Jamra, Fadi; Nehme, Nabil; Noueihed, Nazim; Saad, Youssef; Trabulsi, Samir
Lecturers	Abboud, Jacques; Bdeir, Fadl; Dandache, Moustapha; Kalach, Mayssa; Khraibani, Rayan; Youness, Hasan
Instructors	Abdallah, Raja; Basmadjian, Garo; Gharios, Nadim; Hosn, Majd; Jaafar, Maysaa; Karam, Mario; Mattar, Maurice; Sfeir, Rana

Graduate Programs

Master of Engineering Management Programs

The Department of Industrial Engineering and Management offers a graduate program in engineering management. Students 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)

Engineering Management Master's Degree – Online

The Department of Industrial Engineering and Management offers a master of engineering management - online program.

Dual Master's Degrees: Master of Engineering Management and Master of Science in Energy Studies (thesis option only)

The Department of Industrial Engineering and Management offers a dual master's degrees - master of engineering management and master of science in energy studies.

Master of Engineering Management (MEM)

Program Mission

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.

Program Objectives

- To extend the legacy of the program for the next 20 years,
- To graduate outstanding students and increase impactful research output.

Program Learning Outcomes

- Analyze qualitative and quantitative information while conducting or applying research related to their graduate program.
- Analyze core concepts and theories in different areas of study in their discipline.
- Demonstrate scholarly communication skills in clear, detailed and well-structured scientific oral format consistent with high standards of their discipline.
- Demonstrate scholarly communication skills in clear, detailed and well-structured scientific written format consistent with high standards of their discipline.
- Apply professionalism and ethical research conduct in their discipline.

Admission Requirements

In order to be eligible for admission to the MEM program, students must have a bachelor's degree in engineering, architecture, or a related field. The 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.

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.

Students are not allowed to register in the program for more than four calendar years beyond the date of their first registration, except with the approval of the Graduate Studies Committee of the faculty.

Residency Requirements

A minimum of two calendar years of residence is required for graduation. For more information, refer to the General University Academic Information section of this catalogue.

Program Requirements

Master's Non-Thesis (30 cr.)

Under this option, students are 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 students' area of concentration (9 credits)
- Three free electives (9 credits)
- Seminar (0 credit)

Master's Thesis (30 cr.)

Under this option, students are 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 students' academic adviser. 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 students' transcript.

Engineering Management Master's Degree – Online

Program Mission

The master of engineering management - online program is a graduate program that provides the students with a complete management experience, coupling the analytical and scientific tools with business management skills.

Program Objectives

- To extend the legacy of the program for the next 20 years,
- To graduate outstanding students and increase impactful research output.

Program Learning Outcomes

- Analyze qualitative and quantitative information while conducting or applying research related to their graduate program.
- Analyze core concepts and theories in different areas of study in their discipline.
- Demonstrate scholarly communication skills in clear, detailed and well-structured scientific oral format consistent with high standards of their discipline.
- Demonstrate scholarly communication skills in clear, detailed and well-structured scientific written format consistent with high standards of their discipline.
- Apply professionalism and ethical research conduct in their discipline.

Admission Requirements

Following AUB's standards, in order to be eligible for admission to the MEM – online program, students 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.

Residency Requirements

A minimum of one calendar year of residence is required for graduation.

Program Requirements

Master's Non-Thesis (30 cr.)

The MEM – online program only admits students in the non-thesis option. Students are required to complete a total of 30 credits, subdivided as follows:

- Four core courses (12 credits): ENMG 602, ENMG 603, ENMG 606, and ENMG 661.
- Six electives (18 credits): The students choose 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 Management and Master of Science in Energy Studies (thesis option only)

The dual master's degrees – master of 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.

Students 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 students are already registered in one degree, they 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, students 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 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-credit elective course as approved by thesis adviser/s (ENST)

The courses that are counted towards both degrees are:

- ENMG 603 Probability and Decision Analysis 3 cr.
- ENMG 604 Deterministic Optimization Models 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 Operations Management 3 cr.
This course aims to present to the students how to design and manage operations in an organization for a sustainable and competitive advantage. The module addresses theoretical and practical insights into service and manufacturing operations, in both the private and public sectors. The module covers topics such as forecasting, strategic operations, aggregate planning; inventory management; MRP and ERP and scheduling.

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 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 students 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 3 cr.
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 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.

Other Courses

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 students' 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, Nesreen; Lakkis, Issam; Moukalled, Fadl; Shihadeh, Alan
Associate Professors	Harb, Mohammad; Mustapha, Samir
Assistant Professors	Abou Jaoude, Dany; Bakarji, Joseph; Honein, Theresa; Hussein, Hussein; Itani, Wael; Kaddouh, Bilal; Talih, Soha
Instructors	Al Saidi, Abed Alkader; Balhas, Zainab; Bou Karam, Samer; Fayad, Rami; Kassis, Lina; Kfoury, Elie

Graduate Programs

Master of Engineering Programs

The Department of Mechanical Engineering offers the degree of master of engineering (ME) with the following majors:

- Major: Mechanical Engineering (Thesis / Non-Thesis)
- Major: Applied Energy (Thesis / Non-Thesis)

Master of Science Programs

Also offered is a program leading to the degree of master of science (MS) in energy studies (thesis/non-thesis).

Doctor of Philosophy Programs

The Department of Mechanical Engineering offers the degree of doctor of philosophy (PhD) with a major in mechanical engineering.

Master Programs

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 / Non-Thesis)
- Master of Engineering, Major: Applied Energy (Thesis / Non-Thesis)

Program Mission

The master's program in mechanical engineering at the American University of Beirut prepares graduates to advance and apply mechanical engineering knowledge to address critical regional and global challenges. The program offers focused depth in key technical areas, meaningful research experience, and strong training in communication and teamwork, enabling graduates to take leading roles in industry, consulting, research, entrepreneurship, and academia.

Program Objectives

Graduates of the master's program in mechanical engineering will be able to:

- Equip our graduates with advanced expertise in at least one major area of mechanical engineering: thermal and fluid sciences; design, materials and manufacturing; or mechatronics.
- Empower our graduates with skills to plan and execute research that clearly defines engineering problems, applies appropriate analytical, numerical, and/or experimental methods.
- Prepare our graduates to understand interdisciplinary approaches in assessing complex engineering systems and their use in economic, social and environmental contexts.

Prepare and empower our graduates with skills to help them pursue impactful careers in industry, consulting, research, and academia, and sustain their professional growth through lifelong learning.

The objectives of the master's program leading to the master of engineering: applied energy degree is 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.
- Assess and evaluate the impact of new technical developments in energy systems on society, the environment, and the economy.

Program Learning Outcomes

- Advanced Core Knowledge in Mechanical Engineering: Critically evaluate and synthesize core concepts, theories, and research in mechanical engineering disciplines.
- Scholarly Communication: Demonstrate effective communication of mechanical engineering concepts and research findings through clear, well-structured, and professional oral and written formats, adhering to high academic and industry standards.
- Professionalism and Ethical Research Conduct in Mechanical Engineering: Apply professional ethics and responsible research practices in mechanical engineering, ensuring integrity, safety, and sustainability in both academic and industrial settings.

Admission Requirements

Students applying for admission to a graduate program are only eligible if they have a bachelor of engineering degree with a mechanical engineering major or the equivalent. 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 the university catalogue.

Residency Requirements

Refer to the General University Academic Information section in this catalogue.

Master of Engineering (ME) Major: Mechanical Engineering

Master's Thesis (30 cr.)

In this program, students may choose a concentration in any of the following areas:

- Thermal and Fluid Sciences
- Design, Materials, and Manufacturing
- Mechatronics

Students are 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 students and the graduate adviser, in coordination with the thesis committee, develop a plan of study tailored to the students' 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, CMPS 350, CMPS 373, ENMG 604, MATH 307, MECH 630, MECH 648, MECH 663, MECH 691/EECE 648/ENMG 628, MECH 764

The math or math-oriented course offered by other departments must be approved by the graduate students' adviser.

- 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 students' adviser.
- 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.

Master's Non-Thesis (33 cr.)

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 students' adviser.

- 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 616 (Aerodynamics), 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: MECH611/BMEN611 (Computational Modeling in Biomechanics), MECH 615 (Continuum Mechanics), MECH 619 (Quality Control in Manufacturing Systems), MECH 532/620 (Intermediate Dynamics with Applications), MECH 622 (Advanced Manufacturing Processes), MECH 631 (Micro Electro Mechanical Systems), MECH 632 (Structural Health Monitoring), MECH 633 (Biomechanics), MECH 634/BMEN 608 (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/ EECE 661 (Robotics), MECH 642/ EECE 692 (Computer Vision), MECH 648/ EECE 669 (Nonlinear Systems: Analysis, Stability and Control), MECH 650/ EECE 698 (Autonomous Mobile Robotics), MECH 653/ EECE660 (Systems Analysis and Control).

Technical Electives: MECH 532/620 (Intermediate Dynamics with Applications), MECH 628 (Design of Mechanisms), MECH 644 (Modal Analysis), MECH 645 (Noise and Vibration Control), MECH 646/ EECE697 (Wheeled Mobile Robotics), MECH 647 (Hydraulic Servo Systems), MECH 654/ EECE 665 (Adaptive Control), MECH 655/ EECE662 (Optimal Control), MECH 656/ EECE663 (System Identification), MECH 657 (Vehicle Dynamics and Control), MECH 691/EECE 648/ENMG 628 (Convex Optimization).

Master of Engineering (ME) Major: Applied Energy (APPE)

Master's Thesis (30 cr.)

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:

- **Mandatory Courses:** 9 credits
- **Lab:** 3 credits
- **Elective Courses** (selected with the approval of the graduate students' adviser in any of the following areas: sustainable energy production from renewable sources, hybrid systems, and sustainable energy utilization practices in the context of buildings): 6 credits.
- **General Graduate Technical Electives** (from science, math, or engineering as approved by thesis adviser): 3 credits
- **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 Course:** MECH 788 (equivalent to 9 credit hours). The thesis must be based on independent research.

Master's Non-Thesis (33 cr.)

The course-based master's program requires a minimum of 33 credit hours of graduate level courses distributed as follows:

- **Mandatory Courses:** 9 credits
- **Lab:** 3 credits
- **Elective Courses** (selected with the approval of the graduate students' adviser in any of the following areas: sustainable energy production from renewable sources, hybrid systems, and sustainable energy utilization practices in the context of buildings): 15 credits.
- **General Graduate Technical Electives** (from science, math, or engineering as approved by thesis adviser): 6 credits

- **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, MECH 672, MECH 673, MECH 674/ENST305
Lab Courses, 3 credits each: MECH 670, MECH 679, MECH 680
Technical Electives, 3 credits each: MECH 603, MECH 670, MECH 676, MECH 677, MECH 678, MECH 679, MECH 680, MECH 681, MECH 683, MECH 771, MECH 772, MECH 778
Any course from the thermal and fluid sciences concentration in the master of mechanical engineering program can be selected.

Master of Science (MS)

Professor	Ghaddar, Nesreen (MECH)
Lecturers	El-Meouchi, Chadia; Habchi, Carine; Kinab, Elias; Rached, Mounir

Program Mission

The energy studies program aims to engage students in the development of energy initiatives, prepare energy studies' professionals to meet market needs of the region and internationally, advance knowledge in energy science and technology through research, and support energy dialogue for the development of appropriate and informed public policies. The program aims to enhance the conceptual understanding of policy making model in the region. It draws on the expertise of faculty members in the fields of science, engineering, economics, political science, architecture, business and humanities. The program will be able to address the complex needs of the region and issues of energy mix as linked to development and economies.

Program Objectives

- Equip graduates with ability to evaluate conventional and alternative sources of energy production, utilization and distribution.
- Prepare graduates to understand interdisciplinary approaches in assessing complex energy systems and their use in economic, social and environmental context.

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:

- Advanced Core Knowledge in Mechanical Engineering: Critically evaluate and synthesize core concepts, theories, and research in mechanical engineering disciplines.
- Scholarly Communication: Demonstrate effective communication of mechanical engineering concepts and research findings through clear, well-structured, and professional oral and written formats, adhering to high academic and industry standards.
- Professionalism and Ethical Research Conduct in Mechanical Engineering: Apply professional ethics and responsible research practices in mechanical engineering, ensuring integrity, safety, and sustainability in both academic and industrial settings.

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 the Admissions section.

Residency Requirements

Refer to the General University Academic Information section in this catalogue.

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 adviser, 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 students have taken credit overload during their undergraduate BE studies. To apply, the students must have completed graduate electives that meet the program requirements with a score of at least 3.3.

Master of Science (MS) in Energy Studies (ENST)

Master's Thesis (30 cr.)

The program permits full-time or part-time enrollments. To obtain a master's degree in energy studies (thesis program), students 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:

- **Required Core Courses:** 9 credits
- **Elective Courses from List A** (energy resources, economics, and policy): 3 or 6 credits
- **Elective Courses from List B** (energy science and technology): 6 or 9 credits
- **Elective Graduate Course** (approved by the thesis adviser/s and program coordinator if elective is not from List A or B): 3 credits

- **Thesis:** 6 credits
- **Comprehensive exam:** 0- credit
- **Seminar:** 0-credit

Master's Non-Thesis (30 cr.)

To obtain a master's degree in energy studies (non-thesis program), students must complete a minimum of 30 credits of graduate coursework and a 0-credit seminar. The coursework is distributed as follows:

- **Required Core Courses:** 9 credits
- **Elective Courses from List A** (energy resources, economics, and policy): 6 or 9 credits
- **Elective Courses from List B** (energy science and technology): 9 or 12 credits
- **Elective Graduate Course** (approved by the thesis adviser/s and program coordinator if elective is not from List A or B): 3 credits
- **Comprehensive exam:** 0- credit
- **Seminar:** 0-credit

Required Core Courses: ENST 305 / ECON 333 / MECH 674, ENST 320, ENST 300

List A: ENMG 645, ENMG 661, ENST 310, ECON 337, ECON 338, ECON 305, ECON 347, MFIN 360, ENMG 601, ENMG 603, ENMG 604, ENMG 611, ENMG 632, ENMG 656, ENMG 698L, PPIA 310G, PSPA 316, PSPA 362, PSPA 381, ENST 396, ENST 396C, ENST 398, MFIN 356

List B: ENHL 314, CHEN 619, CHEN 690, CHEN 798A, CIVE 628, CIVE 656, CIVE 659, CIVE 601, CIVE 686, CIVE 691A, ENMG 602, ENMG 622, ENMG 655, ENST 330, ENST 396B, ENST 396D, EECE 670, EECE 671, EECE 672, ENST 398, MECH 600, MECH 671, MECH 673, MECH 682

Sample Curriculum 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**

Comprehensive Exam for Master Programs

Refer to the General University Academic Information section in this catalogue.

Supervision of Master's Thesis

For Thesis Proposal and Committee, Thesis Defense, and Deposit of the Project/Thesis in the Library, Refer to the General University Academic Information section in this catalogue.

Master's Degree Graduation Requirements

Refer to the General University Academic Information section in this catalogue.

Dual Master's Degrees – Master of Engineering Management and Master of Science in Energy Studies (thesis option only)

The dual master's degrees – master of 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.

Students 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 students are already registered in one degree, they may apply for the second degree no later than the end of their second term at AUB.

The program permits full-time or part-time enrollments. To fulfill the basic requirements for the dual degree, students 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 adviser/s (ENST)

The courses that are counted towards 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	INDE 301
ENST 320 Energy Law and Case Studies	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**	

Doctor of Philosophy Programs (PhD)

Programs Overview

The Maroun Semaan Faculty of Engineering and Architecture offers a graduate program of study leading to the PhD degree with specialization in mechanical engineering.

Program Mission

The doctor of philosophy graduate curriculum emphasizes the acquisition of advanced knowledge and fosters an individual experience of significant intellectual exploration.

Program Objectives

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.
- The practice of independent learning and advancing knowledge.

Program Learning Outcomes

- Advanced Core Knowledge in Mechanical Engineering: Critically evaluate and synthesize core concepts, theories, and research in mechanical engineering discipline.
- Independent Research and Original Contribution to Knowledge: Produce original and independent research that contributes to knowledge in their discipline
- Scholarly Communication: Demonstrate effective communication of mechanical engineering concepts and research findings through clear, well-structured, and professional oral and written formats, adhering to high academic and industry standards.
- Professionalism and Ethical Research Conduct in Mechanical Engineering: Apply professional ethics and responsible research practices in mechanical engineering, ensuring integrity, safety, and sustainability in both academic and industrial settings.
- Pedagogy and Teaching: Employ teaching activities focused on student learning related to their discipline.

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 Office of Admissions. 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).

Residency Requirements

The 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. An extension will require the approval of the AUB Graduate Council.

PhD in Mechanical Engineering

The PhD program in mechanical engineering requires a minimum of 18 credit hours of coursework beyond the master's degree. The students must pass a two-part PhD Qualification Examination. In addition, the students must submit an original thesis based on independent research that makes a significant contribution to their area of research. The thesis is the principal component of the doctoral program and the part that will serve as the major indicator of candidates' abilities. A minimum of 30 credits registered as thesis work is required.

Advisers

After admission into the department, a general adviser will be assigned to the PhD students to guide them with the initial selection of courses and to introduce the students to the various research areas in the department. The students must select a thesis adviser by the end of the first term after admission into the program. The students must seek the faculty members that are in the students' area of interest and discuss possible research topics for the PhD thesis with them. Once an adviser is identified, the students will develop a Proposed Program of Study that lists the courses the students intend 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 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 students' 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 students' 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 PhD students are required to register MECH 797 (graduate seminar course) every term it is offered.

Mathematics Course Requirements

A 3-credit advanced course in mathematics is required from all doctoral candidates. The course must be approved by the candidates' adviser. The mathematics course requirement is satisfied if the students have completed at least 6 credits of advanced courses in math beyond the bachelor's degree.

Acceptable courses include the following: MATH 307, CMPS 354, CMPS 350, CMPS 373, ENMG 604, MECH 630, MECH 648, MECH 663, MECH 691 / EECE 648/ ENMG 628, MECH 764.

Note that in the Faculty of Arts and Sciences, 300 level courses are graduate courses.

Major Area Course 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 students and must be approved by the students' graduate thesis adviser. This will enable the doctoral candidates to pursue coursework in direct support of their research. The coursework must address all recommendations made during the qualification period by the students' adviser and thesis committee.

The following major course areas are offered:

- **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 616, 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 620/532, 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 620/532, MECH 643, MECH 645, MECH 740, MECH 641, MECH 642, MECH 650, MECH 628, MECH 644, MECH 648, MECH 647, MECH 653, MECH 654, MECH 657

Minor Subject Requirements

The minor is a program of advanced study that will help the students develop knowledge and some competence in an area related to their research other than the candidates' 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 students' 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 students are registered in a graduate program at AUB. The minor subject must be approved in advance by the students' thesis committee and the MSFEA Graduate Studies Committee. The approval of the department offering the minor should also be sought.

If the students choose mathematics as their minor, then the course taken to fulfill the mathematics course requirement will count towards the minor subject requirements.

Seminar Course

Seminar Course: MECH 797 (0-credit). The students must register for the course once a year. This is a pass/fail course.

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.

PhD Qualifying Exam

Refer to PhD Qualifying Exam under General University Academic Information section

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 students 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, Refer to Qualifying Exam Part I: Comprehensive Exam under General University Academic Information section.

Qualifying Exam Part II: Defense of Thesis Proposal

Refer to Qualifying Exam Part II: Defense of Thesis Proposal under General University Academic Information section.

Admission to Candidacy

Refer to Admission to Candidacy section under the General University Academic information section.

Supervision of Doctoral Thesis

PhD Thesis Committee

refer to PhD Thesis Committee under General University Academic Information section.

PhD Thesis Proposal

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 students intend to do and how they intend 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.

PhD Thesis

MECH (982-986) PhD Thesis: The thesis is based on original, independent research. Students are required to register for a minimum of 30 credits of thesis work. Students may register for a maximum of 12 credits in any given term. They must submit a thesis based on the results of original, independent research.

PhD Thesis Defense

MECH 987 PhD Thesis: 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 students' thesis adviser, a final oral examination will constitute the thesis defense.

Deposit of the Thesis in the Library

Refer to the section of Deposit Project/Thesis in the library under General University Academic Information section.

PhD Degree Graduation Requirements

Refer to PhD Degree Graduation Requirements under the General University Academic information section.

Course Descriptions

Mechanical Engineering Courses

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/ CHEN 214 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/ CHEN311, 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/CHEN214, MECH 314/CHEN 311, 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 616/ MECH 516 Aerodynamics 3 cr.
This course introduces the fundamental principles of aerodynamics, focusing on the behavior of airflow around bodies, the calculation of lift and drag using analytical and computational tools, and the application of these principles to the design and performance analysis of aircraft. The course includes both theoretical and practical components, with emphasis on understanding the physical phenomena and applying them to real-world problems. Prerequisites: MECH 314/ CHEN 311 and MECH 414.

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, students 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 students are directly responsible for the progress and quality of the results. At the end of the term, the students are 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 620/ MECH 532 Intermediate Dynamics with Applications 3 cr.
This course examines the dynamics of systems of particles and rigid bodies moving in three dimensions using the Newton-Euler and Lagrange equations of motion. The equivalence between these formulations of the equations of motions and others such as the Gibbs-Appell and Kane equations is established. Topics include tensor calculus, curvilinear coordinates, Euler angles and parameters, and constraints. Applications of the material range from vibrations of multi-degree of freedom systems to robotics. Numerical simulations and animations are included. Prerequisites: MECH 230 and EECE 230. Corequisites: MATH 202 and MATH 218.

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.
This course covers the principles of fatigue and damage tolerance in engineering structures, including fracture mechanics and simulation of crack propagation. You will learn to assess fatigue life, design against fatigue, and validate strength justifications using both fundamentals and best practices. The program emphasizes the role of materials, manufacturing, design, and fracture analysis with the Finite Element Method and case studies that break down the analysis process into clear steps. By the end, you will be able to identify critical areas, prevent failures, and apply advanced simulation tools to improve fatigue performance and damage tolerance in real structures. Prerequisite: MECH 320.

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.
The course will cover selected topics in polymer structure and properties, rubber elasticity, viscoelasticity, time-temperature superposition, dynamic mechanical analysis, polymer rheology, thermoplastic polymer converting and compounding, commercial polymers, testing and characterization, and design & selection of polymer materials. The students will be exposed to hands-on fabrication methods, industrial tours, and industrial-level R&D novelty. 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 algorithms 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. Prerequisite: 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 covering the fundamentals of robotics, emphasizing recent advancements. The curriculum encompasses key topics such as robot architecture, mechanics of robots, kinematics, dynamics, trajectory planning, and control of end effector motion. The scope extends beyond serial manipulators to include various architectures like parallel and legged robots. The hands-on lab involves programming and using robotic middleware for robot coordination and control. Engaging projects are an integral part of the course, providing opportunities to apply learned concepts in real-world scenarios, including the coordination and control of diverse types of robots in different tasks. Corequisite: MECH 436 or 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. Prerequisites: 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, omnidirectional 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 651/536 / EECE 610/466 Intelligent Control Systems 3 cr.
This course introduces students to learning-based control methods including adaptive control, reinforcement learning, and model predictive control, with a focus on their applications in controlling uncertain systems. A fundamental concept linking these methodologies is ‘learning’, thus the course explores the role of learning in control tasks and the various approaches used to achieve effective adaptation. Additionally, students will examine the strengths and limitations of these methods in real time control applications. The Course combines theoretical lectures with problem sets and hans-on sessions to provide both conceptual understanding and practical implementation experience. Pre-requisite: MECH 436 or 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; 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: 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 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. Prerequisite: MECH 436.

MECH 658/534 / EECE 690/490 Intro 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 MATH 218 and 219. Prerequisites: MATH 218 or MATH 219, and STAT 230 or STAT 233.

MECH 659/EECE 666 Aerial Robotics 3 cr.
This course provides a comprehensive understanding of aerial robotics, focusing on the design, control, and application of unmanned aerial vehicles (UAVs). Students will gain hands-on experience with UAV systems, delve into advanced control algorithms, and explore real-world applications of aerial robotics. The technology is set to have a profound impact on society from delivering packages to watering crops and inspecting and repairing building structures etc. This course will introduce the topic of aerial robotics and provide the foundations to be skilled in their design and control, as well as operational aspects such as ethical & legal considerations. Prerequisites: MECH 201, EECE 230, and MATH 202.

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/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/corequisite: 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 682 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.

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 shows 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. Prerequisites: MECH 314 and MECH 320.

MECH 691/EECE 648/ENMG 628 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 microsegregation, 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 students 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 multiphase 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, multicomponent 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 nonderivative optimization techniques. Control strategies and technologies related to gaseous indoor air pollutants. The control strategies analyzed in the course are: scheduled startstop, 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 students to take a given set of requirements and to select and design a complete renewable energy system to fully meet those requirements. The students 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 students are 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 0-3 cr.
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 students 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/MECH 503A 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). Prerequisites: MATH 201, MATH 218, STAT 230, EECE 230.

MECH 798M/EECE 798K 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. Prerequisites: 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 students fail MECH 799T, they 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 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 0 cr.
Must be registered once per year.

ENST 398 Special Projects in Energy Studies in Cooperation 3.0, 3 cr.
With Industry and/or NGO and Legislative Bodies.

ENST 395A/B Comprehensive Exam 0 cr.
Comprehensive Exam.

ENST 699 Thesis 6 cr.
Thesis.

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 term. 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 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 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.

Online Diplomas

Artificial Intelligence and Data Science Graduate Professional Diploma – Online

Coordinator	Elbassuoni, Shady (Computer Science, FAS)
Program Teaching Faculty	Assaf, Rida (Computer Science, FAS) Barakat, Karim (Philosophy, FAS) El Asmar, Khalil (Health Sciences, FHS) Ghannam, Hiyam (Computer Science, FAS) Helwe, Chadi (Postdoctoral Researcher, KAUST) Makary, Mireille (Business, OSB) Taleb, Sirine (Business, OSB)

General Description

The online professional graduate diploma in artificial intelligence and 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:

- Four mandatory (core) courses
- Three elective courses, as offered by the program

Course Requirements

Core Courses

Students are required to complete the following 7.5 credits of core courses:

- Data Science
- Machine Learning
- Deep Learning
- AI Ethics

Elective Courses

Students are required to complete the following 4.5 credits by choosing 3 elective courses:

- Arabic Natural Language Processing
- AI for Health
- Business Analytics
- Data Analytics for Public Policy
- Large Language Models

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 data driven 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.

Large Language Models 1.5 cr.
This course explores the foundations, architectures, and applications of Large Language Models (LLMs), focusing on transformers, self-supervised learning, and fine-tuning techniques. Students will gain hands-on experience developing generative AI applications, including prompt engineering, retrieval-augmented generation, and deployment strategies. Ethical considerations, and real-world case studies will be integrated to ensure a practical understanding of LLMs.

Cybersecurity Graduate Professional Diploma – Online

Coordinator	Ayman, Tajeddine (ECE, MSFEA)
Program Teaching Faculty	Bakri, Hussein (ECE, MSFEA) Chehab, Ali (ECE, MSFEA) Dessouki, Khaled (ECE, MSFEA) Elhorr, Suzanne (ECE, MSFEA) Ghalayini, Iman (ECE, MSFEA) Tajeddine, Ayman (ECE, MSFEA)

General Description

The online graduate professional diploma in cybersecurity will equip you with essential highly in demand technical skills needed to take on cybersecurity roles confidently.

The program will cover a broad range of the current and emerging areas of cybersecurity, including computer and network security, software security, data and information security, cloud security, mobile platform security, and IoT security, as well as applied cryptography and computer forensics.

To help learners develop advanced specialization and shape their career focus, the program offers two distinctive tracks:

1. Network Defender Track (Blue Team)
2. Pen Tester Track (Red Team)

The diploma is offered by the Maroun Semaan Faculty of Engineering and Architecture (MSFEA).

Eligibility

Admission to the program follows the university's policy on graduate professional diploma programs. Admitted students should have an undergraduate bachelor's degree or its equivalent from AUB or other recognized institutions of higher learning. Applicants will need to have a basic knowledge in IT and programming (any programming language will be appropriate).

The program is mainly for:

- Fresh graduates of IT/computer science, or engineering programs seeking to expand their career opportunities.
- Working Professionals in IT (at all seniority levels) looking to assume cybersecurity roles.
- Applications from professionals with a different academic background, but with strong interest in cybersecurity, will be evaluated on a case-by-case basis.

Admission Requirements

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. Refer to the Readiness for University Studies in English (RUSE) under the Admissions section.

Structure and Program Requirements

The cybersecurity diploma will require the successful completion of 12 credits (6 courses) as follows:

- 5 mandatory (core) courses
- 1 mandatory (elective) course

Course Requirements

Core Courses

Students are required to complete the following 10 credits of core courses:

- Fundamentals for Cybersecurity
- Threats, Attacks and Vulnerabilities
- Cryptography and PKI Infrastructure
- Information Security Management
- Network Security 1
- Ethical Hacking 1

Elective Courses

Students are required to complete one of the following courses of elective courses:

- Ethical Hacking 2
- Network Security 2

Course Descriptions

Core Courses

Fundamentals for Cybersecurity 2 cr.
This course introduces students to cybersecurity fundamental topics that are essential for other diploma's courses. It introduces cybersecurity terminologies and gives a quick overview of the CIA triad, the usability triangle, The Bell-La Padula Model, Biba model, basic coverage of security attack vectors, threat actors, Pyramid of Pain, Identification, and prevention frameworks such as Cyber Kill Chain, phases of attacks frameworks such as the Unified Kill Chain, the Diamond model & MITRE. It offers overview of basic networking concepts, types of networks, and networking devices, underpinned by a dive into the OSI and TCP/IP models. In addition, it covers basic operating systems concepts. On a practical level, the course covers scripting languages useful for other courses such as Python, Linux terminal and BASH scripting, Windows Command line usage and PowerShell.

Threats, Attacks and Vulnerabilities 2 cr.
This course covers threats, attacks, and vulnerabilities. The objectives of this course are to ensure that students can understand and explain different types of security compromises, the types of actors involved, and the concepts of penetration testing and vulnerability scanning.

Cryptography and PKI Infrastructure 1 cr.
This course provides an overview of encryption techniques. It covers block ciphers and the data encryption standard, advanced encryption standard, confidentiality using symmetric encryption, public-key cryptography, key management, hash and MAC algorithms, digital signatures, and authentication applications. It also provides hands on labs to be applied for the cryptography concepts learned in relation to cybersecurity.

Information Security Management 1 cr.
This course provides an in-depth understanding of the fundamentals of information security and introduces a structured approach to managing security through the implementation of an Information Security Management System (ISMS) based on the ISO/IEC 27001 standard.
Learners will gain familiarity with essential terminology and concepts, examine the key provisions of the ISO/IEC 27001 framework, and understand their alignment with the Plan-Do-Check-Act (PDCA) methodology.
The course emphasizes experiential learning through hands-on activities, case studies, and real-world projects. Students may engage in exercises such as conducting risk assessments, developing organizational security policies and programs, and participating in simulated incident response scenarios. By the end of the course, learners will be equipped with both theoretical knowledge and practical skills to contribute effectively to information security management.

Network Security 1 2 cr.
This course focuses on creating network administrators who are trained on protecting, detecting and responding to threats on the network. It covers the fundamentals of creating a secure networking environment using firewalls (traditional and next generation), IDS, IPS, VPNs. Students will know how to use standard security tools to locate and fix security leaks in a computer network and will understand a variety of cryptographic algorithms and protocols underlying network security applications.

Ethical Hacking 1 2 cr.
This course covers the fundamentals of ethical hacking and penetration testing. It includes topics such as reconnaissance & Open-Source Intelligence, enumeration, scanning, and a myriad of exploitation & post exploitation techniques, as well as countermeasures to protect systems from threats. It provides hands-on exercises and labs with real-world examples and scenarios. The course introduces many tools & techniques such as port scanners, vulnerability scanners, password cracking, ARP spoofers, keyloggers, backdoors, SQL/Command injection, XSS, CSRF, IDOR, Denial of Service Attacks (DOS), traffic redirection, session hijacking among many others. Students will learn how to set a hacking environment using Kali Linux & will practice penetration testing on a myriad of victim virtual machines. The course covers as well reporting and the ethical aspect of hacking as well as most important legal considerations.

Network Security 2 2 cr.
This course covers advanced topics in network security such as network virtualization security, cloud and wireless network security and network/traffic indicators of compromise, attacks, and exposures. This course also explores the necessary tools, techniques, and concepts of threat intelligence and incident response. It addresses both emerging technologies and research topics.

Ethical Hacking 2 2 cr.
This course is a continuation of Ethical Hacking I, focusing on advanced techniques and attack vectors not covered in the introductory course. It provides an in-depth exploration of web and database attacks, including SQL injection, command injection, Cross-Site Scripting (XSS), Insecure Direct Object references (IDOR) and many other vulnerabilities. Students will also learn advanced post-exploitation techniques such as advanced privilege escalation, persistence mechanisms and methods for covering tracks. A dedicated module addresses network redirection, traffic manipulation, session hijacking and Denial-of-Service (DoS) attacks. The course expands on the tools introduced in Ethical Hacking I while introducing a broader set of utilities and frameworks used by professional penetration testers. The course culminates in a Capture the Flag project.

Project Management Graduate Professional Diploma – Online

Coordinator	Dimashkieh, Farah (Civil and Environmental Engineering, MSFEA)
Program Teaching Faculty	Dimashkieh, Farah (Civil and Environmental Engineering, MSFEA) Kalash, Mayssa (Electrical and Computer Engineering, MSFEA) Kiomjian, David (Civil and Environmental Engineering, MSFEA) Moukadem, Imad (Industrial and Engineering Management, MSFEA) Nehme, Nabil (Industrial Engineering and Management) 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 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. Refer to the Readiness for University Studies in English (RUSE) under the Admissions section.

Structure and Program Requirements

The PM diploma will require the successful completion of 12 credits (6 courses) as follows:

Track 1: Construction Management

- 4 mandatory core courses
- 2 elective courses, as offered by the program

Track 2: Adaptive and Strategic Project Management

- 2 mandatory core courses
- 4 elective courses, as offered by the program

Course Requirements

Track 1: Construction Management

Core Courses

Students are required to complete the following 8 credits of core courses:

- Fundamentals of Project Management
- Construction Contract Administration and Legal Aspects
- Construction Project Delivery and Contracting
- Project Planning Scheduling and Control

Elective Courses

Students are required to complete the following 4 credits of elective courses:

- Agile Project Management
- Procurement and Supply Chain in Project Management
- Feasibility and Economic Evaluation for Project Managers
- Project Leadership & Communication
- Lean Project Management
- Software Project Management
- Conflict Resolution in Project Management
- Project Risk Management
- PMP® Certification Exam Preparation Course

Track 2: Adaptive and Strategic Project Management

Core Courses

Students are required to complete the following 4 credits of core courses:

- Fundamentals of Project Management
- Project Planning Scheduling and Control

Elective Courses

Students are required to complete the following 8 credits of elective courses:

- Agile Project Management
- Procurement and Supply Chain in Project Management
- Feasibility and Economic Evaluation for Project Managers
- Project Leadership & Communication
- Lean Project Management
- Software Project Management
- Conflict Resolution in Project Management
- Project Risk Management
- PMP® Certification Exam Preparation Course

Course Descriptions

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.

Project Planning Scheduling and Control 2 cr.
This course provides students with essential project management concepts and methodologies for planning, scheduling, and controlling projects. Key topics include Critical Path Method (CPM), Critical Chain Project Management (CCPM), resource allocation and leveling, cost analysis, time-cost trade-offs, and project monitoring and control techniques. The course emphasizes efficient scheduling, risk management, and performance tracking to help students make informed project decisions. Through practical case studies and hands-on exercises, students will develop the skills needed to manage time, cost, and scope of trade-offs effectively in complex project environments.

Procurement and Supply Chain in Project Management 2 cr.
This course introduces the essential principles of supply chain management, covering concepts, stages, and main flows of goods, information, and finances. Practicing and future project managers will evaluate supply chain design strategies, address challenges, and develop resilient networks. The course also includes project procurement processes, make-or-buy decisions, contract types, push and pull systems, integration strategies, and performance metrics. Additionally, participants will analyze different production strategies, such as Engineer to Order (ETO), Make to Order (MTO), Make to Stock (MTS), and Assemble to Order (ATO), to optimize supply chain performance and achieve competitive advantage.

Feasibility and Economic Evaluation 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 Project Management 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 prerequisite for PMP® certification. Students will need to acquire the PMBOK® 2021 edition and extensively practice exam questions prior to sitting for the test. “PMP” is a registered mark of Project Management Institute, Inc.

UX/UI Graduate Professional Diploma – Online

Coordinator	Berro, Maher (Architecture and Design, MSFEA)
Program Teaching Faculty	Berro, Maher (Architecture and Design, MSFEA) Saber, Romy (Architecture and Design, MSFEA)
Instructors	Assio, Stephanie ; Chikhany, Lara ; El Khatib, Tarek ; Haidar, Sabah

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 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. Refer to the Readiness for University Studies in English (RUSE) under the Admissions section.

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

The following are the course requirements for this program:

- Prerequisite for Non-designers – Design Principles
- Design Thinking for Innovation
- Interaction Design I – Methodologies and UX Processes
- Interaction Design II – Web & Mobile User Experience
- Interaction Design III – Designing Intuitive User Interfaces for Web and Mobile
- Interaction Design IV – Conducting Usability Testing and Optimization
- UX Management Strategy and Tactics

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 nondesigner 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 Thinking for Innovation 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	El-Awad, Ziad (Suliman S. Olayan School of Business - Dean's Office)
Program Teaching Faculty	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) El-Awad, Ziad (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 and 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 advisers.
- Introduce all learners with business ideas to potential financing sources.

Eligibility

The course is intended for:

- Fresh graduates and 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 advisers.
- Intrapreneurs who want to innovate and drive change within their organization and are looking to develop their design thinking and leadership skills.

Admission Requirements

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. Refer to the Readiness for University Studies in English (RUSE) under the Admissions section.

Course Requirements

The following are the course requirements for this program:

- Design Research for Innovation and Change
- Introduction to the Lean Startup
- Foundations of Entrepreneurial Management
- Regional Entrepreneurial Ecosystems
- Strategic Communication for Entrepreneurs
- Capstone Project

Course Descriptions

Design Thinking for Innovation 2 cr.
This course aims to support aspiring entrepreneurs and professionals exploring intraorganizational 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.

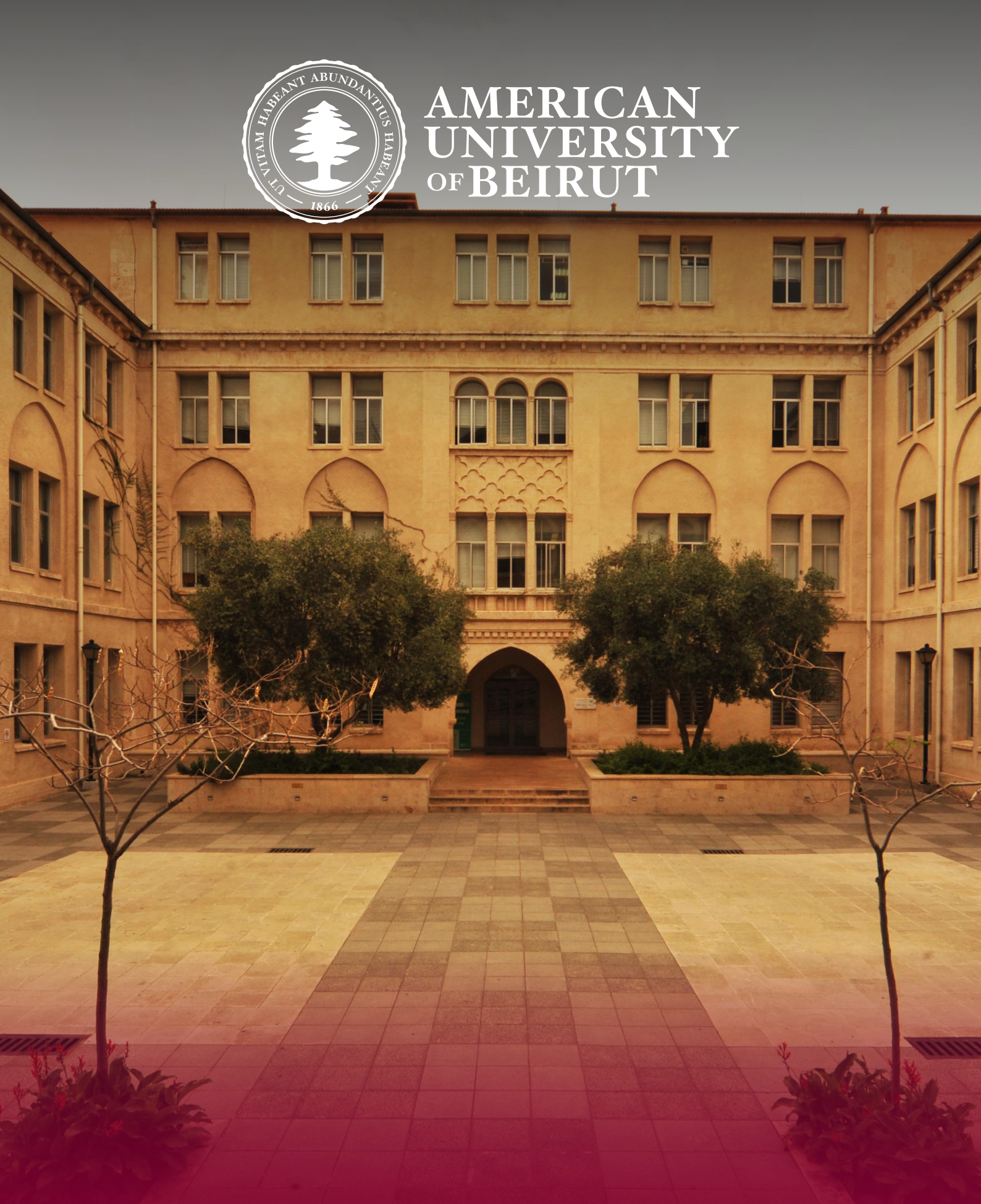
Foundations of Entrepreneurial Management 2 cr.
The Entrepreneurial Management course, developed by OSB and MSFEA is designed to provide students with the management foundations and equip them with tools and frameworks needed by startups. The course takes a 360-degree approach by providing a holistic 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.

AMERICAN UNIVERSITY OF BEIRUT



Faculty of Health Sciences (FHS)

Graduate

Officers of the Faculty

Fadlo R. Khuri	President of the University
Zaher Dawy	Provost
Abla Mehio Sibai	Dean
Monique Chaaya	Associate Dean
Bradley Jon Tucker	Vice-Provost and Registrar
Antoine Sabbagh	Director of Admissions
Lokman Meho	University Librarian

Faculty Administrative Support

Amal Kassis	Student Services Manager
Annie Tabakian	Project Manager
Daisy Nasr	Financial Officer
Diala Badreddine	Accreditation Officer
Farah Ammache	Executive Officer
Gina Cordahi	Operations and Strategic Initiatives Manager
Mayada Kanj	Director, Public Health Education Office
Maya Abou Khouzam	Events and Projects Officer
Sawsan Awada	Graduate Officer

Faculty Academic Support

Maya Abi Chahine	Instructor of Public Health Practice (University for Seniors)
Nida' El Helou	Instructor (Practicum Coordination and Career Services)

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 Biostatistics (EPBS), Environmental Health (EH), Health Promotion and Community Health (HPCH), Health Management and Policy (HMP), and a Division of Health Professions. FHS offers the graduate public health program including a master's degree in public health (MPH) (concentrations in epidemiology and biostatistics, health promotion and community health, and health management and policy), an MS in epidemiology, an MS in environmental sciences, major: environmental health (as part of an interfaculty graduate environmental sciences program), and a PhD in epidemiology.

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 a 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 newly launched bachelor of arts in health communication. 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.

Graduate Public Health Program (GPHP)

The graduate public health program (GPHP) at FHS provides advanced training in public health to prepare professionals, both practitioners and academicians, to competently assess, research, and respond to the health needs and public health issues in Lebanon and the region. The program applies multidisciplinary and community-based research as well as community service to improve instruction, to advance knowledge, and to address the public health issues and needs of the population served.

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 and 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 and 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.

GPHP has programs leading to three academic degrees:

- The Master of Public Health (MPH) with concentrations in:
  - Epidemiology and Biostatistics
  - Health Management and Policy
  - Health Promotion and Community Health

- The Master of Science (MS) with majors in:
  - MS in Epidemiology
  - MS in Environmental Sciences, Major: Environmental Health
- The Doctor of Philosophy (PhD) with a major:
  - Epidemiology

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.

Master of Public Health (MPH)

The master of public health (MPH) is a professional degree that provides students with interdisciplinary educational experiences combining the biological, epidemiological, environmental, sociological, behavioral and managerial dimensions of public health. Students then choose specialized training in an area of concentration and engage in relevant community-based experiences in public health practice.

Admission Requirements

Applicants for graduate study in the MPH program may be considered for admission in one of the following categories:

Graduate

Candidates qualify for this category if they:

a. Hold 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. Hold 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, applicants will qualify for this category if their 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, may be admitted to this category upon recommendation of the department and approval by the Graduate Studies Committee (GSC).

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.

Graduate on Probation

Candidates qualify for this category if they hold 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, applicants will qualify for this category if their 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 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.

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.

To be eligible for graduation in the MPH program, students must accomplish the following:

- Pass all required courses with a minimum grade of C+.
- Earn an overall GPA of at least 3.3.
- Successfully complete a minimum of 42 credit hours.

Credit Requirements

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

Full-time students 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. Part-time students must carry a minimum load of 4 credits per term. Students who wish to register for less than 4 credits must get the registration adviser's approval to ensure that their residency does not exceed the maximum of four 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 terms may petition to do so. Students are allowed to register for the Practicum in the same term 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 students need to seek the approval of the concerned department.

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 graduate course toward program and/or graduation requirement may be considered only if the student have proof that they have 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 totally to 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

- Students submit a petition for course equivalence 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 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 students are 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

Transfer of Credits from One Master's Degree to Another

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 towards 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. The approval of the Graduate Studies Committee 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 Graduate Studies Committee is required for all transfer credits.

Transfer of Credits from Joint Graduate Programs

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. The approval of the Graduate Studies Committee is required for all transfer 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 advisers:

- 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 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

Students 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 8 credits of coursework towards the degree and then is evaluated every term.

Part-timers can only be evaluated after completion of at least 8 credits. Their cumulative GPA is evaluated whenever a minimum of 8 credits is completed.

Students are placed on probation if one of the following occurs:

- They fail in any graduate course taken for credit (passing grade is C+).
- They fail to obtain a minimum overall GPA of 3.3 in graduate courses.

Removal of Probation

- Students placed on probation due to average must remove the probation at the end of the following term by attainment of a cumulative GPA 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 C+. In case this condition cannot be met, students in consultation with the adviser must petition the faculty/school Graduate Studies Committee to retake the course.

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:

- The student fails to be removed from probation after one term or its equivalent for part-timers (8 credit hours).
- Placement on probation more than once (not counting the probation at admission time).
- The student attains a cumulative GPA of less than 2.3 after completion of 8 credits or fails two courses in one term.
- The student attains a cumulative GPA of 2.3 or above but less than GPA of 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 has 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.

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
ENHL 301	Environmental Health and Sustainable Development	1	0	1
EPBS 300	Principles of Epidemiology	1.5	2	2
EPBS 310	Basic Biostatistics	2	2	3
HMPD 300	Health Systems Management	3	0	3
HPCH 301	Health Communication	2	0	2
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	1	0	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
PBHL 310	Research Methodology in Public Health	2	2	3
PBHL 312A	Foundations of Public Health	2	2	3
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				
EPBS 312	Analysis of Continuous Data	1.5	2	2
EPBS 313	Analysis of Categorical Data	2	2	3
EPBS 316	Epidemiology, Prevention and Control of Communicable Diseases	2	0	2
EPBS 317	Epidemiology of Non-Communicable Diseases and Mental Health Disorders	1.5	2	2
EPBS 320	Epidemiology Beyond the Basics	1.5	2	2
Required Public Health Experience Courses				
EPBS 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, Mobilization, 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 3 credits of electives to complete their credit requirements.				

C. Health Management and Policy (HMP) Health Service Management Track

		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 4 credits of electives to complete their credit requirements.				

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. Prerequisites: PBHL 310 and (PBHL 312 or PBHL 312A). Open to students majoring in PHNU.

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. Open to students majoring in PHNU.

PBHL 305 Contemporary Issues in Public Health 1.0; 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 (EPBS 300, EPBS 310, PBHL 310, and (PBHL 312 or PBHL 312A)).

PBHL 306A 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. Open to students majoring in PHNU.

PBHL 306B 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. Open to students majoring in PHNU.

PBHL 306C 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 healthcare 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; 1 cr.
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 or PBHL 312A).

PBHL 310 Research Methodology 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. Open to students majoring in PHNU.

PBHL 312A Foundations of Public Health 2.2; 3 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. Open to students majoring in PHNU.

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 seniors 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 1.0; 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 325 Cross Border Public Health Surveillance 2.2; 3 cr.
This course provides students with essential skills in cross-border public health surveillance, with a focus on health security in the MENA region. Students will explore key topics such as international health regulations, strategies for strengthening health systems, risk communication, preparedness, and data collection methods designed to address regional challenges, particularly those affecting mobile populations.

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 adviser. The ILE is completed over two terms: Integrative Learning Experience I, PBHL 399A (1 credit) and Integrative Learning Experience II, PBHL 399B (2 credits). Prerequisite for PBHL 399A: Completion of all but two of the concentration courses. ENHL 301 (concurrent) & PBHL 303 & PBHL 304 & PBHL 310 (concurrent) & (PBHL 312 or PBHL 312A) & EPBS 300 (concurrent) & EPBS 310 (concurrent) & HMPD 300 (concurrent) & HPCH 301. Prerequisite for PBHL 399B: PBHL 399A.

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
Part-time Lecturer	Araji, Fayez

The Department of Environmental Health offers a graduate program leading to the MS degree in environmental sciences (Major: environmental health).

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

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 and the admission policies for the master of science in environmental sciences under Division of University Interdisciplinary Programs (DUIP) of this catalogue

Graduation Requirements

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

Credit requirements

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

Full-time students 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 environmental sciences (major: environmental health), refer to the graduate General University Academic Information section in this catalogue.

Curriculum

Course Type		Credits
A. Core Courses		**16**
ENHL 301	Environmental Health and Sustainable Development	1
ENHL 312	Occupational Health	3
ENHL 314	Environmental Management Systems	3
ENSC 640	Toxicology and Environmental Health Hazards	3
ENSC 695	Comprehensive Exam	0
PBHL 306A	Library and Literature Search Skills 0 credit	0
PBHL 306B	Proposal Writing and Literature Synthesis for Public Health Research and Practice	0

PBHL 310	Research Methodology in Public Health	3
PBHL 312A	Foundations of Public Health	3

B. Electives	**8-11**
Directed Electives	6
Free Electives	2-5

C. Thesis or Project		**3-6**
ENSC 697	Project	3
ENSC 699	Thesis	6
Total number of credits required for graduation		**30**

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 ecological 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-led 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. Students who are unable to finish the project in one term can register for it one additional time.

Department of Epidemiology and Biostatistics

Chairperson	Ghandour, Lilian
Professors	Chaaya, Monique; DeJong, Jocelyn; Ghandour, Lilian; Jaffa, Miran; Sibai, Abla
Professor of Public Health Practice	Adib, Salim
Assistant Professors	El-Asmar, Khalil; Mumtaz, Ghina
Assistant Professor of Public Health Practice	McCall, Stephen
Instructors of Public Health Practice	Akl, Christelle; Saad, Ghada
Part-time Instructor	Kabalan, Mayssan
Affiliates	El Bejjani, Martine; Tamim, Hani; Fahme, Sasha

The Department of Epidemiology and Biostatistics 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.

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 Academic Information section in this catalogue.

Credit requirements

Course Type	Credits
Required	22
Electives	2
Thesis	6
Total number of credits required for graduation	**30**

Credit Load

Full-time students 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 refer to the graduate General University Academic Information section in this catalogue.

Curriculum for MS in Epidemiology

		Lecture Hrs./ Week	Lab Hrs./ Week	Credits
EPBS 300	Principles of Epidemiology	1.5	2	2
EPBS 310	Basic Biostatistics	2	2	3
EPBS 312	Analysis of Continuous Data	1.5	2	2
EPBS 313	Analysis of Categorical Data	2	2	3

EPBS 316 or EPBS 317	Epidemiology, Prevention, and Control of Communicable Diseases Epidemiology of Non-Communicable Diseases and Mental Health Disorders	2 or 1.5	0 or 2	2 or 2
EPBS 319	Advanced Quantitative Methods of Epidemiology	1	0	1
EPBS 320	Epidemiology Beyond the Basics	1.5	2	2
EPBS 320A	Epidemiology Beyond the Basics II	1	0	1
EPBS 395	Comprehensive Exam	–	–	0
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 305	Contemporary issues in Public Health	1	0	0
PBHL 310	Research Methodology in Public Health	2	2	3
PBHL 312A	Foundations of Public Health	2	2	3

Electives				
EPBS 314	Data management and manipulation	1	2	1
EPBS 318	Introduction to Mathematical Modeling for Infectious Diseases	1.5	1.5	2
EPBS 321	Design and Analysis of Clinical Trials	1	2	2
EPBS 322	Special Topics in Epidemiology	2	0	2
EPBS 324	Special Topics in Biostatistics	–	–	1-3
Students should take at least 3 credits of electives.				

Thesis				
EPBS 399	Thesis			6

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 healthcare 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, candidates 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 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	Credit Hours
Epidemiology/ Biostatistics core courses (16 cr.)		
EPBS 403	Advanced Epidemiology Methods: Case Control and Cohort Studies	3
EPBS 404	Introduction to Causal Inference Methods	2
EPBS 405	Social and Behavioral Factors in Epidemiology	2
EPBS 406	Epidemiology in Action	3
EPBS 410	Applied Multivariate and Longitudinal Methods in Health Sciences	3
EPBS 411	Statistics for Psychosocial Research Psychometrics and measurement of Latent Constructs	3
Research related core courses (1.5 cr.)		
EPBS 440	Doctoral Seminar	0
EPBS 445	Writing Research Grants	0
SHRP 315	Introduction to Research Ethics and Responsible Conduct of Research	1.5

Specified set of Epidemiology/Biostatistics courses (4-5 cr.)		
EPBS 312	Analysis of Continuous Data	2
EPBS 313	Analysis of Categorical Data	3
EPBS 314	Data Management and Manipulation	1
EPBS 315	Nonparametric Data Analysis	2
EPBS 319	Advanced Quantitative Methods in Epidemiology	1
EPBS 320	Epidemiology Beyond the Basics	2
EPBS 321	Design and Analysis of Clinical Trials	2
EPBS 328	Systematic Review and Meta-Analysis	3
SHRP 332	Applied Survival Analysis	1

Elective courses		**5-6**
Thesis courses		**24**
EPBS 480	Qualifying Exam Part I: Comprehensive Exam	0
EPBS 481	Qualifying Exam Part II: Defense of Thesis Proposal	0
EPBS 482 (3), EPBS 483 (6), EPBS 483A (6), EPBS 484 (9), EPBS486 (0): PhD Thesis		
EPBS 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 (refer to the graduate General University Academic Information section of the 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 statute of limitations (for program completion) and leaves of absence are identified in the graduate General University Academic Information section of the 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 graduate 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, students must register for at least six terms beyond the completion of the master's degree.

Course Descriptions

EPBS 300 Principles of Epidemiology 1.5:2; 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. Open to students majoring in PHNU.

EPBS 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. Open to students majoring in biomedical engineering.

EPBS 312 Analysis of Continuous Data 1.5:2; 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: EPBS 310 or consent of instructor.

EPBS 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: EPBS 310 or consent of instructor.

EPBS 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 enrolled students have a project specific data, they have 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.

EPBS 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: EPBS 310 or graduate basic biostatistics course.

EPBS 316 Epidemiology, Prevention and Control of Communicable Diseases 2.0; 2 cr.
This course is based on service learning, a pedagogical approach that "combines academic instruction, meaningful service to the community and critical reflective thinking to enhance student learning and social responsibility. Service learning differs from volunteerism and internship through its use of structured, critical inquiry and the importance placed on establishing partnerships with communities and generating mutual benefit." Service learning allows students to experience non-traditional classroom teaching, which is a way of "sharing" and "receiving" knowledge and expertise with and from the community partners involved. This will lead to enhanced learning for students and a greater benefit to the community.

EPBS 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 EPBS300 or any equivalent graduate or undergraduate-level course in epidemiology.

EPBS 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.

EPBS 319 Advanced Quantitative Methods in Epidemiology 1.0; 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, (2) Competing risk analysis. Prerequisites: EPBS 320, EPBS 313 or instructor's approval.

EPBS 320 Epidemiology Beyond the Basics 1.5:2; 2 cr.
The course 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). 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 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: (EPBS 300 and EPBS 310) or (SHRP 300 and SHRP 310), or consent of instructor. Equivalent to SHRP 320.

EPBS 320A Epidemiology Beyond the Basics II 1.0; 1 cr.
The course complements and expands on materials and activities covered in EPBS 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. EPBS 320A aims at reinforcing students' skills in designing and evaluating observational epidemiological studies. Topics discussed include causality, potential outcomes, and counterfactuals, directed acyclic graphs (DAGs), confounding and biases, and key features of setting up a cohort study and challenges in follow up. Prerequisites: EPBS 320 or SHRP 320.

EPBS 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: (EPBS 300 and EPBS 310) or (SHRP 300 and SHRP 310), or consent of instructor.

EPBS 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: EPBS 300 or consent of instructor.

EPBS 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 biostatistics. Prerequisite: EPBS 310 or consent of instructor.

EPBS 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: EPBS 300 or any undergraduate or graduate basic epidemiology course.

EPBS 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 Population Intervention Comparison Outcomes (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. PICO is an acronym referring to the components of the question forming the basis for a research study, a systematic review in this case: Population, Intervention, Comparison, Outcomes. 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. This is a relatively intensive course and students need to allocate adequate time and effort. Prerequisites: (EPBS 310 and EPBS 300) or (SHRP 300 and SHRP 310), or consent of instructor.

EPBS 336 Tutorial in Epidemiology 1-3 cr.
Tutorial in epidemiology.

EPBS 337 Tutorial in Biostatistics 1-3 cr.
Tutorial in biostatistics.

EPBS 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. Prerequisite: PBHL 399A.

EPBS 366 Practicum 0.15; 1 cr.
Practicum for students who receive a partial waiver. Prerequisite: PBHL 399A.

EPBS 395 Comprehensive Exam 0 cr.
Comprehensive exam.

EPBS 399 Thesis 6 cr.
Thesis.

EPBS 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 casecohort). Prerequisite: EPBS 320 or its equivalent.

EPBS 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: EPBS 320 or SHARP 300/320 (or any equivalent intermediate level course in epidemiology and basic biostatistics).

EPBS 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, EPBS 300, and EPBS 310(or an equivalent basic epidemiology course).

EPBS 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: EPBS 300 (or its equivalent of basic epidemiology course).

EPBS 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: EPBS 310, EPBS 313, and EPBS 312.

EPBS 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 (exploratory and confirmatory). Students will learn about the basic principles of classical test theory and latent variables, and using Stata; will learn how to conduct reliability and validity tests, including exploratory and confirmatory factor analysis. Students will also learn 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 and applied sessions on Stata. Prerequisites: EPBS 300 and EPBS 310.

EPBS 440 Doctoral Seminar 0 cr.
Doctoral seminar.

EPBS 445 Writing Research Grants 0 cr.
Writing research grants.

Thesis Courses

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

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

EPBS 482 PhD Thesis 3 cr.
Every term.

EPBS 483 PhD Thesis 6 cr.
Every term. Listed as 483A when registered the second time.

EPBS 484 PhD Thesis 9 cr.
Every term.

EPBS 486 PhD Thesis 0 cr.
Every term. Taken after 24 credits of thesis are completed in case further thesis work is necessary.

EPBS 487 PhD Thesis Defense 0 cr.
PhD Thesis Defense.

Department of Health Promotion and Community Health

Chairperson	Makhoul, Jihad
Professors	Abdulrahim, Sawsan; Makhoul, Jihad
Associate Professors	Kabakian-Khasholian, Tamar; El Kak, Faysal (Joint appointment with FM)
Lecturers	Al Barazi, Rana; Kanj, Mayada; Khawam, Grace
Instructors of Public Health Practice	Kalot, Joumana; Najem, Martine
Part-time Instructor	Hassan, Nabil
Affiliate	Saracini, Federico
Research Affiliate	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.

Course Descriptions

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.

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 PBHL 312A or (PHNU 300 (concurrent). Open to students majoring in PHNU.

HPCH 332 Community Health Promotion, Mobilization 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 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 or PBHL 312A.

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 face-to-face format and uses diverse models of teaching and learning styles, including service learning, 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 PBHL 312A.

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 0.15; 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
Part-time Lecturer	Kahhale, Joseph
Part-time Instructors	Chaya, Rima; Kanaan, Nivine

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 healthcare 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 healthcare 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 has 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.

Course Descriptions

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 healthcare 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 healthcare 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.
The course introduces students to the fundamental principles of economics, including demand and supply, opportunity cost, elasticity, and marginal analysis. Through these core economic principles, students will be able to understand how individuals, institutions, and markets make decisions. The course will draw on cases and examples from health and HealthCare systems, illustrating how economic principles are applied in real world contexts.

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 healthcare 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 healthcare 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; and (3) examine actors roles, responsibilities, interactions and challenges at each level of governance, including the international; (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 healthcare. 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 the use 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 0.15; 1 cr.
Practicum for students who receive a partial waiver. Prerequisite: PBHL 399A.

Joint Programs

Scholars in Health Research Program (SHARP)

The scholars in health research program (SHARP) is a joint FM and FHS graduate program that consists of a 12-credit summer diploma, a 12-credit two-term diploma, as well as a 35-credit master's degree. Each option includes a mix of didactic training based on select core courses with implementation of a hands-on research practicum, training or thesis project. The program provides graduates with the required foundation to pursue a career in clinical and translational research.

SHARP's curriculum is modeled on similar programs in top-tier academic institutions in the US. It is the first of its kind in the region and has been polished by expert faculty over a decade since program launch. Synchronous and asynchronous sessions, VOPs, tutorials, hands-on applications and lab sessions provide an unprecedented enriching experience.

For more information, refer to Faculty of Medicine and Medical Center (FM) section in this catalogue.

MS in Public Health Nutrition

The MS in public health nutrition is the first graduate-level program of its kind in Lebanon and the MENA region. It is offered jointly by the Faculty of Agricultural and Food Sciences and the Faculty of Health Sciences and builds on the strong expertise of each of these schools in the fields of nutrition science and public health, respectively.

The MS in public health nutrition program adopts a multi-disciplinary approach as it aspires to train and equip highly qualified individuals to respond to national and regional needs in the field of public health nutrition by providing them with strong skills in nutrition, policy and program planning, health promotion, monitoring, evaluation, and research.

For more information, refer to the Faculty of Agricultural and Food Sciences section in this catalogue.

Diploma

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 terms. 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 for 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 for 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, applicants must hold an undergraduate university degree recognized by AUB with a GPA of at least 3.0 or demonstrate "reasonable potential for academic success."

For AUB students:

To be eligible for admission to the diploma program, applicants 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.

Certificates

Certificate in Innovation Management in Contexts of Uncertainty

Program Overview

The certificate is a 7-credit program offered to Mastercard Foundation Scholars program students from all majors. It aims to introduce students to critical thinking, collaboration across various fields, project management, and the cultivation of resilience skills that are essential for professional growth. Through course work, and the experiential learning course, the certificate will build their capacity to create practical and innovative solutions in their jobs, particularly in contexts of uncertainty. By focusing on real-world applications and hands-on experiences, the program ensures that scholars are not only prepared to face professional challenges but also capable of making transformative contributions to society in times of need.

Program Competencies

Students who complete the certificate will be able to:

PLO1: Identify assets, resources, and problems of population groups in fragile, low-resourced and/or settings of uncertainty using participatory approaches.

PLO2: Demonstrate design techniques and entrepreneurial skills to develop, implement, and scale-up appropriate innovations.

PLO3: Incorporate multidisciplinary perspectives to manage complexity while adhering to ethical standards.

PLO4: Reflect critically on how crises impede effective action and, on the skills, and attitudes needed to mitigate challenges.

The certificate is composed of 7 credits that include:

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 303 - “Experiential Learning”; 4 cr.
A service-learning graduate course that revolves around managing complex projects while working in multidisciplinary teams and collaborating closely with community partners within fragile low-resourced settings. Multidisciplinary teams will conduct background research, develop needs assessments with relevant stakeholders, design and create solutions/interventions that are tested and refined with community partners, and develop a business plan; all under joint supervision of two mentors from two different disciplines. The course will be offered in the winter term. Prerequisites: HEHI 301.

This certificate is also offered in an online format for Mastercard Foundation Scholars program students enrolled in online academic programs.

Certificate for Public Health in Complex Emergencies and Protracted Crises

Program Overview

The certificate is an 8-credit program offered to MPH and MS students at FHS and focuses on the determinants of health in contexts of complex emergencies and protracted crises. The certificate prepares students to address public health challenges in complex emergencies using an evidence-informed and ethically grounded approach. Students gain an understanding of how humanitarian systems operate and how health needs are rapidly assessed and prioritized in crisis settings. They develop the ability to generate and interpret timely evidence and to design, implement, and evaluate interventions that respond to the realities of emergency contexts. Emphasis is placed on understanding the broader determinants that shape health outcomes and translating analysis into practical action. Through coursework, a practicum at a relevant site, and the completion of an ILE, thesis, or project (according to program requirements), the certificate will provide the opportunity for students to gain applied experience relevant to public health practice in complex emergencies.

Program Competencies

Students who complete the certificate will be able to:

- Demonstrate an understanding of humanitarian principles, international legal frameworks, and the structure and coordination mechanisms of the humanitarian system.
- Apply public health tools and research methods, including rapid assessments, to generate, interpret, and communicate evidence relevant to complex humanitarian settings.
- Demonstrate the capacity to plan, implement and evaluate a health intervention in a variety of humanitarian contexts.
- Analyze the political, social, environmental, economic and commercial determinants that shape health outcomes in complex humanitarian settings.
- Apply ethical reasoning in humanitarian public health practice.

Eligibility to Apply

Students must be enrolled in any MPH concentration or MS program at FHS and have a demonstrated interest in improving public health in humanitarian emergencies. A minimum cumulative GPA of 3.7 at the time of application submission is required.

Certificate Requirements

Students must complete the application form, attach an updated CV, and provide the name of their academic adviser and one additional reference (academic or professional). All documents should be sent to Ms. Sawsan Awada at sa175@aub.edu.lb. Before applying to the certificate program, students should consult with their registration advisers to understand enrollment process.

The certificate is composed of 12 credits that include:

Two Required Courses

- **An online course - "Building a Better Response"; 0 cr.**
  BBR Certificate is an online self-paced course that aims to enhance the effectiveness of NGOs and other humanitarian actors in international humanitarian coordination systems. The curriculum is designed to fill knowledge gaps and strengthen the capacity of humanitarian professionals to engage more effectively in coordination efforts, thereby improving responses to the needs of affected populations.
- **PBHL 308 - Research Methods in Humanitarian Settings; 0 cr.**
  The workshop will aim to: 1) introduce students to the definition, types, and management of humanitarian emergencies; 2) enhance their methodological skills to conduct research and evaluation in complex humanitarian and disease outbreak settings; 3) prepare them to identify and discuss solutions to practical, conceptual, and ethical challenges in humanitarian response. Prerequisites: PBHL 310 and (PBHL 312 or PBHL 312A).

One 3 credit course from the selection below:

- **HPCH 343 - Forced Migration and the Humanitarian Relief System; 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.
- **HEHI 201/301 - 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.

A practicum, ILE, thesis, or project focused on public health in complex emergencies, tailored to the student's program:

- For MPH students, their practicum and ILE would both need to be focused on topics related to public health in complex emergencies. The practicum would need to take place at a humanitarian response site or organization engaged in emergency or crisis-related activities. The students must reinforce at least one competency of the certificate in the ILE project.

  For MS- EH students, their thesis or project would need to be focused on relevant to public health in complex emergencies. For MS-EPI, their thesis would need to focus on public health in complex emergencies.

Online Programs

Executive Master in Health Care Leadership (EMHCL)

Program Description

The executive master in health care leadership (EMHCL) is designed for professionals who have significant responsibility in the healthcare sector, including those from healthcare 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.

Program Aims and Goals

The EMHCL program's overall objective is to transform learners into leaders in the healthcare sector by expanding their knowledge in the field of healthcare management and administration. Through case-based learning, the program will enhance the capacity of participants in leadership and decision-making skills. This will help them shape local and national policies and apply their managerial skills and knowledge to tasks that range from problem solving of highly technical problems to dealing with socio-cultural complexities.

Along the journey, participants will be equipped with a wide spectrum of tools, skills and methods derived from multiple disciplines to facilitate their transformation from learner to leader. These shall include conflict management, problem-solving, decision-making, systems thinking, planning and implementation, analytical thinking, emotional Intelligence, and policy analysis, to name a few. Furthermore, it will enhance their implementation and operation of healthcare practices know-how in varying contexts, all the while ensuring the use of evidence-based practices and conforming to ethical principles.

Program Mission

The EMHCL is an innovative academic program to enhance the knowledge and skills of current and future generations of healthcare leaders. The program is tailored to the needs of the healthcare sectors in the Middle East and North Africa region, with the aim of advancing public health knowledge and practice.

Format and Credits

The EMHCL is an online program designed to provide learners with a comprehensive curriculum, emphasizing group work as central to many of the activities and assessments. It offers a flexible yet interactive curriculum delivery, where courses are built through a mix of engaging asynchronous self-contained modules, providing learners the flexibility to adapt their learning process to their busy schedule.

Healthcare entrepreneurs/consultants and non-healthcare providers who wish to acquire the skills and knowledge needed for a career change into the healthcare sector can join the program. Enrollees in the Health Management and Leadership (HML) have the opportunity to transfer their credits towards the EMHCL program. The program requires 18 months to complete; on average, a 1-credit course demands 8-10 hours per week, including time spent reviewing lectures and learning materials. Learners are expected to attend one Q&A synchronous session per week, although this session is optional and will be recorded.

Interactive Learning Experience

The online courses are strategically designed to build an interactive space for both the learners and the course facilitator. The LMS (Moodle) plays an integral role in providing this space through its offered tools. A prominent example would be the discussion forums that operate as the main area for general messaging and announcements, for instructor-student support on course deliverables, and a reference for all course materials and submissions dues.

Program Features

The following are key features of our EMHCL program at AUB:

- Regional and international focus: The program is tailored to the needs of the healthcare sectors internationally while focusing on the Middle East and North Africa region. It aims to advance public health knowledge and practice to enhance and improve healthcare outcomes.
- Significant topics: The EMHCL covers topics that are essential for executives to enhance their skills learners and for learners looking for developing leadership skills.
- Interactive learning experience: The program consists of a series of modules that cover a range of topics related to EHCL. These modules will include case studies, problem-solving assignments, group and individual projects, and experiential learning.
- Capstone: Integrated capstone in healthcare leadership.
- Experienced instructors: The FHS faculty members have intimate knowledge of the challenges and opportunities for change and improvement in health systems in the region. The experienced instructors will provide participants with personalized feedback and support throughout the program.
- Flexible schedule: The modules are delivered online in a specific sequence and can be completed at the participant's own pace asynchronously.
- Learner Assessments: Assignments throughout the modules to evaluate learners.

Admission Requirements

Applicants are considered for admission to the program if they meet 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 three 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 might 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.

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

Students are placed on probation if one of the following occurs:

- They fail any graduate course taken for credit (passing grade is C+).
- They fail to obtain a minimum GPA of 3.3 on at least 9 credit hours.

Students with an admission score (cumulative and major averages) between GPA 3.0 and 3.3 will be admitted on probation.

Removal of Probation

- Students placed on probation due to GPA must remove the probation at the end of the following term by attainment of a cumulative GPA 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 C+. In case this condition cannot be met, students in consultation with the adviser must petition the faculty/school Graduate Studies Committee to retake the course.

Graduation Requirements

To be eligible for graduation from the EMHCL program, students must accomplish the following:

- Pass all required courses with a minimum grade of 70 (C+).
- Must have attained a cumulative course GPA 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 (45 credits).
- Must have completed project (capstone) requirements for the non-thesis option degrees.

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.

Theme I: Foundation

- EHCL 300 Managing Healthcare Organizations (3 credits)
- EHCL 301 Communication and Behavioral Change for Health (2 credits)
- EHCL 302 Epidemiology in Health Care (1.5 credits)
- EHCL 303 Health Economics (2 credits)
- EHCL 304 Statistical Tools and Analysis (2 credits)
- EHCL 305 Research Methods and Application (3 credits)
- EHCL 306 Evidence Based Management (1.5 credits)

Theme II: Advanced Managerial Functioning

- EHCL 307 Leadership (3 credits)
- EHCL 308 Marketing in Healthcare (1.5 credits)
- EHCL 309 Financial Accounting and Management (2 credits)
- EHCL 310 Health Informatics and Information Technology (2.5 credits)
- EHCL 311 Human Resources Management (2 credits)
- EHCL 312 Performance Improvement and Innovation (1.5 credits)
- EHCL 313 Data and Decision Making (Use of IT) (1.5 credits)
- EHCL 314 Advanced Program Planning and Evaluation (2 credits)
- EHCL 315 Strategic Planning and Management (2 credits)

Theme III: Health Systems Policy and Reform

- EHCL 316 Organizational Restructure and Reform (1.5 credits)
- EHCL 317 Ethics and Law (1.5 credits)
- EHCL 318 Policy, Politics, and Decision Making (2 credits)
- EHCL 319 Communicating with Policy Makers (3 credits)
- EHCL 320 Capstone in Leadership (4 credits)

Healthcare Management and Leadership (HML) Online Diploma

Program Description

The health management and leadership (HML) is an online graduate academic diploma that provides a unique perspective on healthcare leadership by integrating best global practices with region-specific challenges. The program equips current and future healthcare leaders with the skills and knowledge required to navigate complex challenges and drive innovation, resulting in improved healthcare outcomes and the delivery of high-quality care. Provide distinctive education to prepare learners for leadership roles across a variety of healthcare settings, including hospitals, clinics, health systems, healthcare enterprises/ consultancies and other healthcare organizations.

Program Aims and Goals

- Address the shortage of skilled healthcare leaders in the industry and provide a pipeline of talented and skilled healthcare leaders.
- Prepare individuals to lead healthcare organizations.
- Consider all the challenges of the healthcare industry and incorporate regional experiences.
- Provide professional networking opportunities.
- Implement the program at an opportune time to address market needs.

Program Learning Outcomes

- Apply systems thinking, program planning, and ethical leadership principles to resolve organizational problems and promote healthcare equity and social justice.
- Demonstrate leadership skills by understanding leadership perspectives and tools, applying leadership insights in simulated settings, and utilizing team-building skills to facilitate group dynamics.
- Apply conflict resolution theories and techniques to resolve conflicts and disputes in healthcare organizations and community initiatives.
- Analyze institutional values and culture and how these impact key institutional functions.
- Apply marketing, finance, and human resources principles in the decision-making process.
- Apply quality and performance improvement concepts to address organizational performance issues.
- Plan and promote institutional development and change, and utilize health information systems to successfully manage and lead healthcare organizations.
- Integrate the knowledge, analytical and problem-solving skills gained through the program into a comprehensive operational capstone project, that demonstrates innovative leadership approaches in changing and reforming health systems.

Program Features

The following are key features of our HML online academic diploma program at AUB:

- Regional and international focus: The program is tailored to the needs of the healthcare sectors internationally while focusing on the Middle East and North Africa region. It aims to advance public health knowledge and practice to enhance and improve healthcare outcomes.
- Significant topics: The HML Diploma covers topics that are essential for learners looking for developing leadership skills. These topics include: healthcare systems, strategic management, human resource management, information and material management, performance improvement and innovation, marketing, and leadership.
- Interactive learning experience: The program consists of a series of modules that cover a range of topics related to HML. These modules will include case studies, problem-solving assignments, group and individual projects, and experiential learning through a Q&A interactive session per week.
- Experienced instructors: The program will be delivered by experienced instructors who will provide participants with personalized feedback and support throughout the program.
- Multi-lingual faculty: The program's language of instruction is English but faculty are fluent in Arabic or French other than English which may cater to learners whose native language is not English.

- Flexible schedule: The modules are delivered online in a specific sequence and can be completed at the participant's own pace asynchronously.
- Learner assessments: Assignments throughout the modules to evaluate learners with an integrated practicum and capstone in leadership.

Courses

This program consists of 6 courses with a total of 12 credits:

- EHCL 300 Managing Healthcare Organizations (3 credits) EHCL 307 Leadership (3 credits)
- EHCL 308 Marketing in Healthcare (1.5 credits)
- EHCL 311 Human Resources Management (2 credits) EHCL 312 Performance Improvement and Innovation (1.5 credits).
- EHCL 320A- Capstone (1 credit)

Admission Requirements

Admission to the program follows the university's policy on graduate academic diploma programs. Admitted learners should have the following:

- An undergraduate bachelor's degree or its equivalent from AUB or other recognized institutions of higher learning, with a GPA of at least 3.0 (or standardized equivalent from other institutions of higher learning).
- The approval of the Faculty Graduate Studies Committee (FGSC).
- At least two years of experience working in the related field.
- Demonstrate leadership potential and prospects for academic and professional success.
- Demonstrate proficiency in the English language following the university's requirements for graduate diplomas.
- Candidates will be considered based on their undergraduate education performance, English proficiency, work experience, and recommendation from their supervisors. It will focus on their capacity in advanced managerial functioning areas as well as in leadership, decision making and innovation.

Graduation Requirements

To be eligible for graduation from the HML program, the following must be accomplished:

- Passing all required courses with a minimum grade of 70 (C+).
- Earning a cumulative GPA of at least 3.3.
- Successfully completing the required 12 credits.

Healthcare Financing and Management (HFM) Online Diploma

Program Description

The online diploma in healthcare financing and management (HFM) provides learners with a comprehensive understanding of healthcare financing and management to navigate the complex financial and managerial challenges facing healthcare organizations today. The curriculum is built on the foundations of the executive master in health care leadership (EMHCL) and its established courses and bundled in a diploma for those who are interested in gaining a thorough understanding of health economics, health systems financing, and management as well as the skills necessary to apply this knowledge to reforming health systems. The program is designed to provide learners with a comprehensive understanding of healthcare financing, including where the money comes from, how it is pooled, and the payment mechanisms for healthcare providers. This knowledge will be integrated with the specifics of managing healthcare organizations, to prepare learners for leading health systems reform.

Program Aims and Goals

- Develop refined healthcare financing skills in individuals who are capable of handling confidently the most challenging situations presented by contemporary health systems.
- Enhance the knowledge of learners in financial resources, reduce waste, and allocate resources more efficiently across service delivery units leading to better health outcomes.
- Consider the various financing and economical challenges of the healthcare industry and incorporate regional experiences in the planning and implementation of programs.
- Provide professional networking opportunities.
- Implement the program at an opportune time to address market needs.

Program Learning Outcomes

- Distinguish organizational structures and explore the dynamics in healthcare settings and alternative financing mechanisms.
- Apply microeconomic principles in healthcare, including cost analysis and projections.
- Apply financing principles and best practices to enhance the efficient delivery of health services.
- Utilize reliable data for informed decision-making in healthcare strategies.
- Develop and manage strategic goals for healthcare organizations.
- Apply systems thinking to policy development and healthcare analysis.
- Demonstrate leadership and healthcare financing skills through practical project execution.

Program Features

The following are key features of our HFM online academic diploma program at AUB:

- Regional and international focus: The program offers and encourages the exploration of regional and global health policy and financial trends, enabling learners to develop solutions applicable to diverse health contexts.
- Significant topics: The HFM diploma covers topics that are essential for learners looking for developing healthcare financing and management skills. These topics include: health economics, strategic planning and management, financial accounting and management, data and decision making (use of IT), organizational restructuring and reform, and policy, politics and decision making.
- Interactive learning experience: The program consists of a series of modules that cover a range of topics related to HFM. These modules will include case studies, problem-solving assignments, group and individual projects, and experiential learning through one interactive Q&A session per week.
- Experienced instructors: The program will be delivered by experienced instructors who will provide participants with personalized feedback and support throughout the program.
- Multi-lingual faculty: The program's language of instruction is English but faculty are fluent in Arabic and/or French which may cater to learners whose native language is not English.
- Flexible schedule: The courses are delivered online in a specific sequence and can be completed at the participant's own pace asynchronously.
- Learner assessments: Assignments throughout the modules to evaluate learners with an integrated capstone in healthcare financing.

Courses

This program consists of the following courses:

- EHCL 303- Health Economics (2 credits)
- EHCL 309- Financial Accounting and Management (2 credits)
- EHCL 313- Data and Decision Making (Use of IT) (1.5 credits)
- EHCL 315- Strategic Planning and Management (2 credits)
- EHCL 316- Organizational Restructure and Reform (1.5 credits)
- EHCL 318- Policy, Politics and Decision Making (2 credits)
- EHCL 320B- Capstone (1 credit)

Admission Requirements

Admission to the program follows the university's policy on graduate academic diploma programs. Admitted learners should have the following:

- An undergraduate bachelor's degree or its equivalent from AUB or other recognized institutions of higher learning, with an GPA of at least 3.3.
- The approval of the Faculty Graduate Studies Committee (FGSC).
- At least two years of experience working in the related field.
- Demonstrate leadership potential and prospects for academic and professional success.

- Demonstrate proficiency in the English language following the university's requirements for graduate diplomas.
- Candidates will be considered based on their undergraduate education performance, English proficiency, work experience, and recommendation from their supervisors. It will focus on their capacity in advanced managerial functioning areas as well as in leadership, decision making and innovation.

Transfer of Credits Policy

Upon successful completion of the HFM online academic diploma, participants will have the opportunity to apply for transfer of credits towards the Executive Master in Healthcare Leadership (EMHCL) program. It is important to note that the transfer to the EMHCL is contingent upon meeting the EMHCL criteria, which will serve as the basis for the transfer process. This transfer opportunity will allow participants to broaden their understanding in healthcare leadership while also benefiting from reduced financial requirements for earning a master's degree.

Graduation Requirements

To be eligible for graduation from the HFM program, the following must be accomplished:

- Apply for graduation.
- Have attained a cumulative course GPA of 3.3 or above.
- Not be on probation by the time the coursework is completed.
- Have completed the minimum credit hours of coursework designated by the specific program.
- Have completed project requirements for the non-thesis option degrees.

Course Descriptions

EHCL 300 Managing Healthcare Organizations 3 cr.
The course addresses the main components, resources, and functions of healthcare 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 healthcare 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 healthcare 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 healthcare 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 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.

EHCL 320A Capstone 1cr.
This course offers the healthcare leader the chance to put into practice the theories and knowledge acquired in previous courses. Learners need to identify and develop a healthcare project that puts their leadership skills and competencies into practice.

EHCL 320B Capstone 1cr.
This course offers the healthcare leader the chance to put into practice the theories and knowledge acquired in previous courses. Learners need to identify and develop a healthcare project that puts their healthcare financing and leadership skills and competencies into practice.

Health Data Analytics Professional Diploma (HDA)

Program Overview

The graduate professional diploma in health data analytics is an online upskilling program for health sector professionals and current graduate students. The first cohort commenced in January 2025. Health data analytics supports informed decisions to address individual, family, community, and global health challenges. Health sector professionals, from analyst through leadership levels, must analyze data, interpret findings, and present results to stakeholders. The program will prepare learners to leverage relevant data from many sources to inform healthcare facility and program management and policy at local, national, and international levels. Given demand for health data analytics skills and upskilling market on this topic, attaining enrollment to sustain the program will require marketing to employers that yields hundreds of their staff enrolled over the first five program years. Targeted employers include healthcare and social service organizations, insurance and pharmaceutical companies, professional associations, NGOs, UN agencies, and universities.

Admission Requirements

To qualify for admission, the prospective students should meet the university's minimum requirement for admission per the AUB Policy on graduate diploma programs. For this program, they also need quantitative and computer skills including basic knowledge of spreadsheet software. No specific computer programming language knowledge or experience is required, but such skills are advantageous given the course topics and exercises in this program. Students should have completed an undergraduate course

in statistics for admission to the program; however, a workshop Statistics Made Easy, offered by the AUB Faculty of Medicine Clinical Research Institute will be proposed to those that do not have this prerequisite upon applying to the diploma program. Applications are encouraged from healthcare providers that meet the above requirements, including but not limited to nurses; midwives; clinical psychologists; physicians; occupational, physical, recreation, and sports therapists; dietitians; nutritionists; and social workers.

Policy on Transfer of Credits

Transfer of course credits from a graduate academic diploma program at AUB to a graduate degree program is allowed following the academic rules and regulations specified by the university and the faculty/school offering the graduate degree program. However, the number of course credits that can be transferred is up to 6 credits for graduate professional diplomas. In addition, only graduate-level courses in which the applicant earned an equivalent grade of 80 or above can be transferred. Approval by the department or the academic unit concerned and the GSC is required for all transfers.

Curriculum

This series of courses provides a comprehensive foundation in health data analysis, covering key aspects of epidemiology, biostatistics, healthcare informatics, data visualization, and machine learning. The first course delves into the principles of epidemiology and biostatistics, focusing on health data analysis using R programming to perform statistical methods and regression analysis. The second course explores the role of technology in healthcare, emphasizing data management, privacy, and digital health trends. The third course teaches the practical skills of managing and visualizing health data using tools like Power BI and R. Finally, the fourth course introduces machine learning techniques for health data analysis, offering hands-on experience with Python for building predictive models.

Course Name	Credits	Number of weeks
Epidemiology and Biostatistics Using R	4	8 weeks
Health Informatics and Digital Health	3	6 weeks
Data Management and Visualization	3	6 weeks
Machine Learning (ML) Models for Health-Related Data	2	4 weeks
Total	**12**	**24 weeks**

Epidemiology and Biostatistics Using R
Dive deep into the core principles of epidemiology and biostatistics, focusing on health data analysis. This course covers the distribution and determinants of diseases in populations and introduces essential methods for disease prevention. Using R programming, students will learn to perform comprehensive descriptive and inferential statistics and conduct regression analysis. The emphasis is on applying biostatistical techniques to real-world health data, equipping students with practical skills for analyzing and interpreting epidemiological studies.

Health Informatics and Digital Health

This course explores the use of technology and data in healthcare. Students will learn how to use informatics, databases, and communication technologies to gather, process, and visualize health data. Topics include hospital systems, virtual care, consumer health, and electronic health records. The course also covers data privacy and the latest trends in digital health.

Data Management and Visualization

Gain skills in managing and visualizing health data. This course teaches students how to clean and prepare datasets, perform statistical analysis, and create effective visualizations. Students will use tools like Power BI, R(GGPLOT2) to present health data clearly.

Machine Learning (ML) Models for Health-Related Data

This course introduces machine learning techniques for health data analysis. Students will learn about supervised and unsupervised learning, classification, and clustering. Using Python libraries, students will run machine and deep learning models to analyze health data.

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

Center for Research on Population and Health (CRPH)

Director	McCall, Stephen
Instructors of Public Health Practice	Akl, Christelle; Saad, Ghada
Assistant Research Professor	Hajj, Samar
Affiliates	Fahme, Sasha; Abi Zeid, Berthe; Jamaluddine, Zeina

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.

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 the director, an assistant director for operations, senior scientific officer, research manager, program manager, communication officer, project coordinators, and several 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 Policy Memo, K2P Citizens Consultation Summary, and K2P Media Bites. The center also published the K2P Crisis Chronicles, the K2Parliament Series and the K2P COVID19 Series Initiative in response to pressing national and global policy priorities, the center also launched the K2P Mentorship Program that supports research and policy organizations in the six regions of the World Health Organization (WHO).

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 thrice as a WHO Collaborating Center for Evidence-Informed Policy and Practice. This designation, which has been in effect for three consecutive 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 center of its 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 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 the Knowledge to Policy (K2P) Center and the AUB GRADE Center at the American University of Beirut.

Faculty of Medicine and Medical Center (FM/AUBMC)

Officers of the Faculty and Medical Center

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
Kamal Badr	Deputy Vice President for Medical Affairs, Vice Dean, Faculty of Medicine
Joseph Otayek	Medical Center Director
Samir Alam	Associate Vice President for Health Affairs
Assaad Eid	Associate Dean for Research and Graduate Education
Ramzi Sabra	Associate Dean for Medical Education
Fuad Ziyadeh	Executive Associate Dean for Faculty Affairs
Salah Zeineldine	Associate Vice President for Clinical Affairs, Chief Medical Officer (CMO) Assistant Dean for Graduate Medical Education & DIO
Ali Taher	Associate VP for Academic Centers, Development and External Affairs
Haytham Kaafarani	Assistant Dean for Surgical Sciences and Research
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 Manager
Rami Hawi	Instructional Designer and Assessment Specialist
Rania Jaber	Graduate Medical Education Manager
Hala Kaidbey	Research and Education Grants Manager

Khalil Kreidieh	FM Academic Affairs Manager
Nabil Mansour	Director of Operations
Ali Nabbouh	Graduate Student Officer
Reem Saad	Accreditation and Faculty Development Manager
Ruaa Saadeddine	Medical Student Affairs Coordinator
Rida Zeineddine	Medical Simulation 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 healthcare 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:

- The University of Toledo
- The University of Alabama
- University of Massachusetts
- University of Illinois at Chicago
- Kansas University
- University of Texas at Houston
- Trinity College Dublin

- Wayne State University
- Baylor University
- Washington University in St. Louis
- University of California, Los Angeles
- West Virginia University
- University of Iowa

The Faculty of Medicine and the Medical Center (FM/AUBMC) are currently accredited by the following American-based accreditation bodies:

- The World Federation for Medical Education (WFME) global standards for quality improvement
- 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 fourth 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 Suliman S. Olayan School of Business. At the end of the year (which includes fall, spring, and summer terms), the students will return to the Faculty of Medicine to complete their fourth 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 fourth 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 students' rotations during their MED III would be considered as equivalent to the required MBA work experience.

To be considered for admission, MD students 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 students by the middle of the third year in the MD program.

For more information regarding MD-MBA dual degree program refer to the Graduate OSB section.

Admission to the MD Program

The Faculty of Medicine was established to give properly qualified candidates the opportunity for sound education in the art and science of medicine. All applicants must hold at least a bachelor's degree and must have completed the premedical requirements as well as the Medical College Admission Test (MCAT). A subset of applicants is then invited for interviews based on their GPAs and MCAT scores. Admission to the Faculty of Medicine will be determined by a composite score based on the applicants' GPAs, MCAT scores, and interview scores.

For the purposes of the description below an "application cycle" is defined as the period between September of the year preceding admissions to August of the following year.

Applicants with a Bachelor's Degree

The AUB Faculty of Medicine values diversity in its student body and encourages students from any major to apply. A bachelor's degree in any field of study is accepted provided the applicants have completed the premedical core courses required for admission to the Faculty of Medicine (see section below). Applicants who hold a bachelor's degree or who are in their senior year expecting to graduate in June of the application cycle are eligible to apply provided they have completed the premedical course requirements by the fall term of the application cycle and have taken the MCAT by September of the application cycle.

Applicants who are pursuing a bachelor's degree at the time of application should be aware of the following:

- Applicants must be in their senior year and expect to graduate by June of the application cycle.
- Their cumulative GPA in at least 70 credits (completed by the fall term of the application year) should be equal to or higher than 3.5 for students from AUB, or its equivalent for those from other universities. The cumulative GPA in the major courses must also be equal to or greater than 3.5. All required core premedical courses must have been completed by the end of the fall term of the senior year with a GPA of at least 3.2.
- Applicants are responsible for submitting an updated transcript of their grades fulfilling the above requirements after the deadline form application. The deadline for submission of the transcript is January 15 of their application cycle.
- Their admission to the Faculty of Medicine is contingent upon completion of graduation requirements and obtaining a bachelor's degree, which should be achieved by June of their application cycle.

Applicants with Higher Degrees

Applications from individuals holding (or expecting by June of the application cycle) a master's degree or a doctoral degree are encouraged. In addition to GPA and MCAT scores, research productivity of the applicant is another consideration in inviting applicants from this pool for interviews. In addition, some of the premedical course requirements may be waived depending on the field of graduate study. These applicants should be aware of the following:

- Only applicants from a 2-or-more year master's program with a required research component (thesis) may be considered as graduate applicants. Applicants from one-year or non-thesis programs will be included in the undergraduate pool, and their cumulative GPA will include all undergraduate and graduate courses. These latter applicants must fulfill all the premedical course requirements. A minimum GPA of 3.5 is required for consideration.
- For applicants with a master's or a doctoral degree, a minimum GPA of 3.5 is required for consideration.
- Applicants completing a 2-or-more-year master program or a doctoral program at the time of application must be in their final year and must expect to graduate by June of application cycle. They must have completed at least 70 percent of the graduate credits by the fall of the application cycle. A minimum GPA of 3.5 is required for consideration.
- Applicants are responsible for submitting an updated transcript of their grades fulfilling the above requirements after the deadline for application. The deadline for submission of the transcript is January 15 of their application cycle.
- Admission to medical school is contingent upon completion of graduation requirements and obtaining the master's or doctoral degree, which should be achieved by June of the application cycle.

MCAT

A competitive score in the MCAT, which may be taken more than once, is required. If taken multiple times, the highest score is considered. The deadline for submitting the MCAT score is January 15 of the application cycle. Applicants are responsible for submitting the score by that deadline. Failure to do so means the application will be incomplete and will be cancelled.

The MCAT has sections on biological, chemical, physical, social, psychological and behavioral sciences, and on critical analysis and reasoning skills. Students are encouraged to review the content of the MCAT and plan their studies and preparation accordingly.

Interviews

Interviews are granted to a selected group of applicants based on their MCAT scores and their GPA and academic achievements. Granting an interview does not necessarily imply that the applicant will be accepted. The interviews include assessments of the applicants' letters of recommendation, their curriculum vitae, their personal statements, and their attitudes, experiences and extracurricular achievements. 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.

Acceptance

Students are accepted on the basis of their academic qualifications, their MCAT scores and the results of their interviews. Conditional acceptance to the faculty is issued by the middle of April at the latest and is contingent on applicants completing the requirements for the bachelor's, master's, or doctoral degree.

The Faculty of Medicine at AUB does not discriminate on the basis of age, gender, nationality, ethnic origin, or religion.

Premedical Core Course Requirements

The minimal course requirements for admission to the MD program at AUBFM are 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; BIOC 255, 3 credits for students majoring in medical laboratory sciences; NFSC 261, 3 credits for students majoring in nutrition and dietetics; and BIOC 246, 4 credits for students majoring in nursing).

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 may take CHEM 210, 211 and 212 to fulfill the requirements of organic chemistry.

Computer Science: 3 credits in introductory programming (CMPS 203, 3 credits), or its equivalent EECE 230 given to Engineering students).

English: 6 credits in academic English (ENGL 203 and ENGL 204, or ENGL 206).

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 may take PHYS 204, 204L, 205 and 205L and chemistry majors may take PHYS 211 and PHYS 211L). Other majors can take PHYS 210 and PHYS 210L as dictated by their majors in lieu of PHYS 206 and PHYS 206L.

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" label or requirements may be accepted. AT AUB, this excludes some courses listed under the bullet points below. AUB students are encouraged to consider minoring in the medical humanities. The following possibilities are recommended - but not mandatory - to fulfill the humanities requirements:

- Any 2 CVSP/CHLA courses
- One CVSP/CHLA course and one English or Arabic literature humanities course, excluding those listed below:
  - ENGL 227: Introduction to Language
  - ENGL 228: Phonetics
  - ENGL 229: History of the English Language
  - ENGL 233: Introduction to Translation
  - ARAB 211/212: Survey of Arabic Grammar
  - ARAB 213/214: Introductory Biblical Hebrew
  - ARAB 215: Introductory Syriac
  - ARAB 224: Arabic Stylistics and Metrics
  - ARAB 227: Arabic Linguistics
  - ARAB 228: Arabic Linguistics
- One CVSP/CHLA and one philosophy course from the following:
  - PHIL 210 Ethics
  - PHIL 214 History of Modern Philosophy
  - PHIL 216 Political Philosophy
  - PHIL 221 Philosophy of Mind
  - PHIL 222 Philosophy of Science
  - PHIL 224 Philosophy of Religion
  - PHIL 225 History of Moral Philosophy
  - PHIL 230 Philosophy of Plato

Graduation Requirements

To be eligible for the degree of doctor of medicine, students 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 percent, 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, students must be full-time and must not be repeating the year. The dean's honor list includes 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

Refer to the General University Academic Information section.

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 students in each subject is based on their total performance and not solely on the results of examinations.

The students' 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 credit to themselves, the faculty and the medical profession are advanced.

To be promoted, students must attain a grade of Pass or better in all courses or clerkships and must be recommended by the committees concerned. However, students 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, students who fail 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. Students who fail more than one re-examination will be asked either to repeat the year or leave the program. Students who fail 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. Students who fail this second re-examination will be asked either to repeat the year or leave the program.

Students in the first or second year who fail 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, students who are 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, students 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, students who fail 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). Students who fail more than one re-examination, remedial work or repeated clerkship or course may be asked to either repeat the year or leave the program. Students who fail 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. Students who fail this second attempt will be asked either to repeat the year or leave the program.

Students in the third or fourth year who fail 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, students who are 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.

Students in the medical program may not fail more than one academic year. Students who fail a second academic year will be asked to leave the program. Students who repeat a year and fail any course or clerkship may be asked to leave the program.

Students who are 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 students 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 students' performance and fitness for promotion or graduation. The following guidelines apply to students who fail less than 50 percent 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 students fail both the clinical performance and the final written examination of a clerkship, they will be required to repeat it in its entirety: the clinical components and the final written examination.
- If students fail only the final examination of a clerkship, they will be required to repeat it. If the students fail a second time, they will be required to repeat the clerkship in its entirety: both the clinical components and the final written examination.
- If students fail only the clinical performance component, they will be asked to repeat the clinical components of the rotation (totally or partly as determined by the department concerned). If the students fail the clinical component a second time, they 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 towards 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	48	57	105	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 236	Critical Perspectives in Medicine and Society	10	10	10	20	1
IDTH 237	Introduction to Evidence based Medicine	-	10	10	20	1
				Total	**835**	**39**

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	160	180	–
PHRM 333	Clinical Pharmacology	1	16	–	16	–
DGRG 247	Clinical Radiology	1	10	10	20	–
				Total	**2588**	

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	4	–	180	180	–
PEDT 267	Clinical Clerkship Pediatrics and Adolescent Medicine	4	–	180	180	–
ANES 247	Clinical Clerkship Anesthesiology	3	–	135	135	–
Elective in any department		16	–	720	720	–
Two different selectives from the following specialties: Opthalmology, Otolaryngology, Radiology, Surgery (including subspecialties)		6	–	270	270	–
IDTH 268	Clerkship in Preventive Medicine and Public Health	3	15	120	135	–
				Total	**2400**	

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. Students are 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 pre-clinical 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 advisers 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 students' 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 236 Critical Perspectives on Medicine and Society 10.10.1 cr.
This course introduces medical students to the social, ethical, historical, and political dimensions of medical practice. It invites them to move beyond a purely biomedical understanding of disease and to examine how illness is shaped by lived experience, institutions, culture, inequality, technology, and systems of power. The ultimate aim is to help future physicians become more reflective, humane, historically informed, and socially attentive practitioners.

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

Assaad Eid	Associate Dean for Research and Graduate Education
Elias Rahal	Director of the Graduate Programs at the Faculty of Medicine
Wassim Abou Kheir	Director of Graduate Student Affairs at the Faculty of Medicine
Ali Nabbouh	Graduate Student Officer
Jana Abou Orm	Administrative Assistant

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 of this catalogue.

MS Disciplines

Biochemistry	Refer to Department of Biochemistry and Molecular Genetics
Human Morphology	Refer to Department of Anatomy, Cell Biology, and Physiological Sciences
Microbiology and Immunology	Refer to Department of Experimental Pathology, Immunology, and Microbiology
Pharmacology and Therapeutics	Refer to Department of Pharmacology and Toxicology
Physiology	Refer to Department of Anatomy, Cell Biology, and Physiological Sciences
Neurosciences (Interfaculty)	Refer to Department of Anatomy, Cell Biology, and Physiological Sciences

Admission to MS Programs

For admission as a regular student and admission on probation, refer to the Admissions section.

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. 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 graduating with a doctorate in biomedical sciences should be able to demonstrate expertise in:

1. Research Methods:
   - Designing experiments within the discipline of biomedical science.
   - Executing experiments within the discipline of biomedical science.
   - Analyzing quantitative research output related to the discipline of biomedical science.
2. Advanced Core Knowledge in Biomedical Sciences:
   - Analyzing advanced core concepts, research and theories in different areas of study within biomedical science.
3. Scholarly Communication Skills:
   - Communicating scientific written and oral material in clear, detailed and well-structured formats consistent with high standards of the discipline of biomedical science.

4. Professionalism and Ethical Research Conduct:
   - Applying professionalism and ethical research conduct in the discipline of biomedical science.
5. Independent Research and Original Contribution to Knowledge:
   - Producing original and independent research that contributes to knowledge in biomedical science.
6. Pedagogy and Teaching:
   - Employing teaching activities focused on student learning related to biomedical science.

PhD Disciplines

- Biochemistry and Molecular Genetics
- Cell Biology of Cancer
- Microbiology and Immunology
- Neurosciences
- 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 programs 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 research experience.

Minimum requirements for admission into the program are the following:

- Applicants with a master's (MS), medical doctor (MD), pharmacist (Pharm D or equivalent), veterinarian doctor (VMD), dental doctor (DMD, DDS), will be considered for admission into the program.
- Students should provide three letters of recommendation.
- Students should have prior laboratory experience, including wet lab skills.
- 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.
- 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.

PhD program applications are accepted for fall admission only.

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

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. Students are expected to register for 24 credits of thesis.

Upon admission into the program, students will be advised by the coordinator of the PhD program. After the first year, students will have selected a thesis adviser who will design the set of elective courses to meet students' research interests and career goals. Students' course of study will be designed individually in light of the students' interests and career goals. All the duties of the coordinator of the PhD program will be transferred to the students' thesis adviser, who must be selected no later than the end of the first year for students entering the 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 491A	Laboratory Rotation	1	Required
BIOM 491B	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 302	Principles of Drug Action	1	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
PHRM 303	Comprehensive Pharmacology	1	Required
At least one of the following electives:			
PHYL 302	Neuroanatomy	2	Elective
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 Department of Biochemistry and Molecular Genetics
HUMR Courses	Refer to Department of Anatomy, Cell Biology, and Physiological Sciences
PHYL Courses	Refer to Department of Anatomy, Cell Biology, and Physiological Sciences
IDTH Courses	Refer to Interdepartmental Courses – Graduate Program
PHRM Courses	Refer to Department of Pharmacology and Toxicology
MBIM Courses	Refer to Department of Experimental Pathology, Immunology and Microbiology

Course Descriptions

BIOM 310 Biostatistics for Biomedical Sciences 2 cr.
This 1-credit course introduces fundamental statistical concepts and analytical methods essential for biomedical sciences students engaged in laboratory and basic research. With an emphasis on application over theory, the course covers data types, experimental design, hypothesis testing, group comparisons, regression models, and survival analysis. Students will learn to interpret real experimental results and avoid common statistical pitfalls in biomedical research. Two lab sessions provide hands-on experience using SPSS for data analysis and visualization. The course is designed to build statistical reasoning in the context of experimental biology rather than population-level statistics.

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 the 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 students' knowledge in their 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 PhD committee, take it for a second time in the following term. Failure on the second attempt will result in the students' 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 students present their 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 students to inform and update the thesis committee members about their 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 students' discontinuation from the graduate program.

BIOM 491A/B 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, students must submit a thesis (equivalent to 24 credit hours) that is expected to make a significant and original contribution to their 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 adviser. Refer to PhD Thesis Committee under General University Academic Information section.

Thesis Defense

After qualifying as a PhD candidate, students 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 section.

Publication Requirements

PhD students should have published 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, students 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 first author publication (original paper) in a leading international journal, based on the PhD research.

- Have at least one accepted abstract (first author) 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 the Admissions section.
- **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 at 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 term.
- **Transfer Students:** See Transfer of Credits into a PhD Degree Program under General University Academic Information section.
- **Visiting Graduate Students:** is a status applicable to students who pay a fee to attend a period of observership 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

Refer to Leave of Absence under General University Academic Information section.

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 towards the end of the PhD candidate's residency.

Department of Anatomy, Cell Biology, and Physiological Sciences

Chairperson	Eid, Assaad, A.
Professors	Abou-Kheir, Wassim; Barada, Kassem; Bazarbachi, Ali; Eid, Assad, A.; El-Sabban, Marwan; Jurjus, Abdo; Mourad, Fadi; Nasr, Rihab
Associate Professor	Daoud Georges
Assistant Professors	Eid, Stephanié; Hawi Jihad; Soueid Jihane
Associates	Bodgi Larry; Husari, Ahmad; Kahhale, Joseph; Kfoury Kassouf, Hala; Oueidat, Doureid; Saadé, Nayef
Adjunct Professors	El Osta, Sam; Massaad Charbel
Visiting Professor	Khoury Nabil

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.

Course Descriptions

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. In addition, 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 adviser.

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 HUMR 244 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
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; Kaddoum, Roland; Khatib, Mohammad; Siddik-Sayyid, Sahar
Associate Professors	Taha, Samar; Zeeni, Carine
Assistant Professors	Dabbous, Aliya; Abou Nafeh, Nancy; Karam, Cynthia; Khalili, Amro; Nauphal, Maud; Rouphael, Christian; Msheik El-Khoury, Fatima
Instructors	Al Jazzar, Mohammed; Mkhayel, Samar
Clinical Associates	Assaf, Boutros; El Masri, Shafika Zeinab; Ramadan, Jowana; Sarkis, Sarine
Associate	Louis, Faek

The Department of Anesthesiology offers a clinical clerkship to fourth year medical students. At the graduate level, it offers a four-year residency program and a one-year clinical fellowship in cardiovascular anesthesia.

Course Descriptions

ANES 247 Clinical Clerkship 0 cr.
A clinical clerkship offered to fourth year medical students, consisting of instructive lectures given by an 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 0 cr.
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 appointees	Boustany, Rose-Mary; Dbaibo, Ghassan; Kurban Mazen; Refaat, Marwan; Ziyadeh, Fuad
Associate Professor	Yazbek, Soha
Associates	Karam, Pascale; El- Khoury Riyad
Adjunct Professors	Echtay, Karim; Kobeissy, Firas; Slim, Rima
Assistant Professor	Khalil, Athar

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 (BIOC 255) and nursing students at the Hariri School of Nursing (BIOC 246).

It also offers courses to medical students and to students in the graduate program leading to a master's degree (MS) in biomedical sciences and biomedical engineering, MS biochemistry, and a doctoral degree (PhD) in biomedical sciences and biomedical engineering.

The requirements for admission to the MS program are BS degrees such as biochemistry, biology, chemistry, genetics, biomedical sciences, health sciences, or related fields. For regular admission, students should have 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 MS program during which they must complete 21 credits (cr.) of graduate courses, pass a comprehensive exam (BIOC 395 A/B), and submit a thesis (9 cr., BIOC 399 A/B/C/D/E) based on independent research. The 21 cr. of graduate courses include a total of 14 cr. of required core courses and 7 cr. of elective courses.

Required MS courses in biomedical sciences track biochemistry include: 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 in PhD program section of the graduate catalogue.

Undergraduate Courses

Course Descriptions

BIOC 246 Biochemistry for Nursing 60.0; 4 cr.
A course that is tailored to nursing students. It provides students with 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 term.

BIOC 255 Biochemistry for MLSP 45.0; 3 cr.
The course is an introductory biochemistry course and a pre-medical requirement, offered to undergraduate students in the medical lab technology program and related fields. A course that provides an overview of the 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. The course fulfills the premedical requirement in biochemistry, Prerequisite: CHEM 208. Second term.

Graduate Courses

Courses in the graduate program are open to all graduate students enrolled in the various biomedical sciences programs in several departments and in biomedical engineering as well as to science major graduates, such as biology, chemistry, or related fields upon the consent of the coordinator.

Description of Required Courses

BIOC 305 a, b, c Biochemistry Research Seminars 0.30; 1 cr.
Required courses that spread over three terms. During their residency in the MS 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. Students will be asked to present recently published research or literature reviews on a specific topic as advised by the different coordinators. Required from all 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 and editing in eukaryotes. Required from MS and PhD students in biomedical sciences and biomedical engineering. 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 term.

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 term.

BIOC 325 Receptors and Signal Transduction 25.10; 2 cr.
This course covers the basic concepts of the mechanisms of signal transduction. Emphasis is placed on the signal transduction pathways involving the activation of G protein coupled receptors (GPCR), receptor tyrosine kinase (RTK) and hormone nuclear receptors in health and disease. The course will cover the mechanisms leading to the activation of these receptors, receptor cross-talk and the resulting downstream signaling pathways and how these various intricate signals are integrated to modulate the biologic response of the cell. 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 cr./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.
The course deals with one of the major technologies used to identify functional elements in the human genome such as Next Generation sequencing (NGS). The course aims to introduce students to NGS technologies and highlight different NGS applications in basic research and translational medicine. Students will learn about the tools and methods that are widely used in this field allowing them to apply these tools in their future career.

BIOC 326B Bioinformatics Tools and Applications in Genomics: Next Generation Sequencing analysis for functional genomics and precision medicine 1 cr.
This module will introduce basic steps in NGS analysis and interpretation. Students will have hands-on NGS visualization, and exploration employing different computational tools. Prerequisite is BIOC 326A.

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 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 term.

BIOC 395A/B Comprehensive Exam 0 cr.
Prerequisites: completion of 18- 21 cr. with a GPA of 3.3 and consent of adviser.

BIOC 399 A/B/C/D/E MS Thesis 9 cr.
A 9-credit 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 disorders, molecular mechanisms of cancer, cancer therapeutics, cell death, herbal medicine, natural product remedies, liver injury, inflammation, traumatic brain injury causes and mechanisms, proteomics, bioinformatics among others.

Elective Courses

The following are graduate elective courses that are offered by the department.

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 303A (1 cr.) and BIOC 303B (2 cr.) that is available to MS and or PhD students.
BIOC 303A: A course that deals with the regulatory mechanisms of tumor cell growth and cancer formation at the cellular, molecular, genetic, and epigenetic levels. The course addresses the fundamental characteristics of human cancers, with emphasis on cell cycle regulation, cell death pathways, and their dysregulation in cancer. The 1-cr elective course is open to all graduate students in basic biomedical sciences, biomedical engineering, and biology or upon the consent of the coordinator. Second term.
BIOC 303B: This advanced course in the molecular biology of cancer focuses on recent developments and emerging concepts in tumor biology. Building on foundational knowledge, the course examines key processes underlying cancer progression, including metastasis and angiogenesis, major oncogenes and tumor suppressor genes, cancer stem cells, and cancer immunology, with an emphasis on immunotherapeutic applications. Additional topics include radiobiology in cancer, the molecular basis of cancer therapy and therapeutic resistance, interactions between cancer and the microbiome, the use of animal models in cancer research, and cancer genomics.The 2-credit elective course is recommended for graduate students whose research interest can benefit from a thorough knowledge of tumor biology. BIOC 303A is a prerequisite for BIOC 303B. Students can register for BIOC 303A and BIOC 303B concurrently. 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 term.

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. 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 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 basic biomedical sciences, biomedical engineering, 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 cr. each, which emphasize the basic concepts and introduce recent developments in the fields of (a) Proteomics; (b) Metabolomics; (c) Genomics; (d) Lipidomics; (e) Enzymology; (f) Molecular Mechanisms of Cell Death; (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 MS/PhD students in biomedical sciences and /or related fields. Elective. Prerequisite: consent of coordinator. First/second /summer terms.

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 students: MS, PhD as well as medical students. Requires coordinator approval for other graduate disciplines. First term.

Department of Dentofacial Medicine

Chairperson	Ghafari, Joseph G.
Professors	Barakat, Nabil (Adjunct Clinical); Geha, Hassem (Adjunct Clinical); Ghafari, Joseph (Tenured); Makary, Christian Pierre (Adjunct Clinical); Sabri, Roy (Adjunct Clinical)
Associate Professors	Haddad, Ramzi; Macari, Anthony; Saadeh, Maria (Adjunct Clinical)
Assistant Professor	Zeno, Kinan
Instructors	Abou Chebel, Naji (Clinical); Ammoury, Makram (Adjunct Clinical); Chalala, Chimene (Adjunct Clinical)
Clinical Associates	AbouJaoude, Nadim; Afeiche, Nada; Anhoury, Patrick; Bou Assi, Samar; Chahine, Tony; Chedid, Nada; Chidiac, José; Diab, Charbel; El Chekie, Michelle; Feghali, Roland; Ghougassian, Saro; Hanna, Antoine; Itani, Mohammad; Kassab, Ammar; Kamel, Nadine; Karam, Ingrid; Metni, Hoda; Tabet, Kristel; Ayoub, Maya
Research Fellow	Genno, Pamela

The Department of Dentofacial Medicine offers post graduate residency and MS in orthodontics 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. The completion of a research project and defense of a corresponding thesis, related to clinical or basic sciences, is a requirement towards graduation. 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 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) and approved by the New York State Education Department:

- The inclusion of core credits of basic science courses
- The conduct of original research and the corresponding successful defense of a written thesis

The clinical specialty training, is also subject to defined requirements.

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 MS degree and Residency Certificate are awarded after successful completion of both didactic coursework and research (thesis defense).

Admission

Admission is offered on a highly selective basis only to applicants (dentists) who have shown distinct academic ability and success on the entrance examination. 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 Studies Committee (MS) and the Graduate Medical Education Committee (Residency), then through the institutional process.

The specific prerequisites for acceptance in the MS/Residency program include, in addition to the AUBMC general conditions for admission in an MS or a Residency program, the following:

- Only applicants possessing the doctoral degree in dental medicine (DMD) or its equivalent dental surgery (DDS) from a recognized institution in Lebanon or abroad are accepted.
- 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 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. Specific 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 treatment 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. 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 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). Orthodontics residents 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. Supervised clinical activities are supplemented with classroom activities (seminars, case presentations, literature review).

Research

The research project may be clinical or basic. Students 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 among AUB faculties foster the concept of inter-professional cooperation, bringing together medical/dental disciplines with public health and business (e.g., medical management, third party pay and insurance development), 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 specialties.

Faculty

Faculty members in the program are full-time and part-time associated faculty. Depending on the courses and instruction they provide, their role is 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. This course includes lectures, seminars, review of key articles and presentations by residents of selected assignments.

ODFO 302 Craniofacial Imaging 48.0; 3 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. This course also 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.

ODFO 303 Biology and Mechanics of Tooth Movement 48; 3 cr.
This course includes fundamental knowledge on the biological response of the periodontal structures that occur during tooth movement. It also explains the cellular reactions and histological changes in different tissues in response to orthodontic treatment. A thorough overview on the properties of different wires used in orthodontics with their clinical implication will be given and the physical principals underlying different types and techniques of orthodontic tooth movements, with the appropriate ways applied to control anchorage will be highlighted.

ODFO 304 Research Science: Method, Design and Report 26.12; 2 cr.
The course teaches fundamental statistical knowledge and research design considerations that will enable residents to complete the research requirement of the program. Additionally, residents will participate in special sessions with the faculty that are designed to assist the residents with research proposal development. A guided laboratory course in methods used as aids in morphologic research.

ODFO 305 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.

ODFO 306 Journal Club 1 cr.
This course consists of seminar sessions dedicated to the critical and analytical review of current orthodontic and orthodontically-related topics.

ODFO 307 Craniofacial Seminar Series 1 cr.
This course consists of seminar sessions relating to the ongoing treatment of patients with various craniofacial anomalies, and focusing on the interdisciplinary approach among orthodontists, maxillofacial and plastic surgeons, ENT, and other specialists.

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 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	1. Craniofacial Development; 2. Somatic Growth		
ODFO 301B	3. Development of the Dentition; 4. Facial Musculature in Orthodontics		
ODFO 302	**Craniofacial Imaging**	**1**	**3 cr.**
ODFO 302A	Craniofacial Imaging I: Basics of Radiographic Imaging		
ODFO 302B	Craniofacial Imaging II: Cephalometrics		

ODFO 303	**Biology of Mechanics of Tooth Movement**	**1**	**3 cr.**
ODFO 303A	Biology of Tooth Movement		
ODFO 303B	Mechanics of Tooth Movement and Properties of Wires		

General and Maxillofacial Medicine			
ODFO 305	**General and Maxillofacial Medicine – Issues in Dentistry and Medicine (hrs)**	**1/2/3**	**2 cr.**
ODFO 305A	A. Bone biology (4), Comparative mammal anatomy (2), nose anatomy and physiology (2), pediatric otorhinolaryngology (2), voice and speech pathology (2), sleep apnea (4), other (2)		
ODFO 305B	B. 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); other (4)		

Scientific Methods and Reviews			
ODFO 304	**Research Science: Method, Design and Report Scientific Method and Research Design**	**1**	**2 cr.**
ODFO 306	**Journal Club**	**1/2/3**	**1 cr.**

Craniofacial Anomalies			
ODFO 307	**Craniofacial Seminar Series**	**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 395	**Comprehensive Exam**		**0 cr.**
ODFO 399	**MS Thesis**	**3**	**9 cr.**

Department of Dermatology

Chairperson	Kibbi, Abdul-Ghani
Professors	Abbas, Ossama; Kibbi, Abdul-Ghani; Kurban, Mazen; Rubeiz, Nelly; Zaynoun, Shukrallah (Clinical)
Associate Professors	Maatouk, Ismail (Adjunct); Saade, Dana
Assistant Professors	Abou Rahal, Jihane; El Feghaly, Jinia (Adjunct)
Clinical Associates	Abdel-Baki, Jasmine; Saad-Debahy, Nada; Muallem, Maya; Salman, Salah

The Department of Dermatology offers a course, "The Skin" (IDTH 229) to Medicine I students. Elective clerkship is 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.

Course Descriptions

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.

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, 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, and research meeting. For further details, visit the Department of Dermatology website at:

https://www.aub.edu.lb/fm/Dermatology/Pages/default.aspx.

Department of Diagnostic Radiology

Chairperson	Berjawi, Ghena
Professors	Berjawi, Ghena; Haddad, Maurice; Haidar, Mohamad; Hourany-Rizk, Roula; Hourani, Mukbil; Khoury, Nabil
Associate Professors	Moukaddam, Hicham; Nassar, Lara
Assistant Professors	Abi Ghanem, Alain; Chokr, Jad; Lutfi, Sukru; Mourany, Bassem; Muallem Nadim; Mustafa Natout
Instructors	Abou Diwan, Ralph; Khouzami, Riad; Tamer, Christel
Adjunct	Al-Kutoubi, Aghiad; Bou Ayache, Jad; Sawan, Peter; Abusamra, Murad; Azaghal, Arwa
Clinical Associates	Chebli, Hala; El Ngheioui, Ziad; Hobeika, Carla; Geara, Aline; Mehanna, Mayssoun; Nader, Reine; Sammour, Maya; Abou Kassm, Rolande; Abi Fakher-Saab, Faysal

The Department of Diagnostic Radiology offers a selective rotation to medical students, elective rotations to medical students, interns and residents, and a five-year residency training program.

Course Descriptions

DGRG 247 Clinical Radiology 10.10.1cr.
This course, offered to third year medical students, aims to enhance their clinical decision-making by integrating imaging into diagnosis and management. It familiarizes the students with the appropriate imaging choices, patient safety issues, and radiation protection. It also develops their interpretation skills relevant to general clinical practice.

DGRG 268 Radiology Elective for Medical Students 0.180
Similar to the selective in Radiology, this rotation is open to fourth year medical students within and outside AUB who would like to consolidate their knowledge in radiology. Duration: four weeks.

DGRG 287 Radiology Elective for Residents 0.262-1048
The elective rotation is open to interns and residents. This rotation involves attending teaching conferences and read out sessions. Duration: four weeks.

Weekly Conferences

The Department of Diagnostic Radiology organizes daily teaching activities divided into 13 blocks including: General Radiology, Emergency Radiology, Ultrasound, Breast Imaging, Gastrointestinal Radiology, Genitourinary Radiology, Neuroradiology, 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; El Zahran, Tharwat
Adjunct Associate Professors	Kazzi, Ziad; Hamam, Mohamad; Harmouche, Elie; Sawaya, Rasha
Instructors	Faris, Nagham (Clinical); El Helou, Rachelle (Clinical); Skoury, Assaad (Clinical)
Clinical Associates	Alameddine, Kawsar; Anka, Mariam; Chalhoub, Sana; Ghanem, Mario; Ghalayini, Nisrine; Farah, Karim; Fares, Sobhi; Hoballah, Hassan; Hakim, Michel; Helbawi, Ali; Ismail, Ali; Itani, Ziad; Kanso, Mohamad; Khaddaj, Wajdi; 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. The department has successfully maintained its accreditation since then.

Course Description

EMMD 262 Clinical Clerkship in Emergency Medicine 230.230; 0 cr.

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; Rahal, Elias
Associate Professors	Abou Fayad, Antoine; El Hajj, Hiba; Massaad, Michel; Rizk, Nesrine; Shirinian, Margret; Zaraket, Hassan
Assistant Professors	Al-Awar, Ghassan; 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 in the Graduate Program section of this catalogue.

Course Descriptions

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 a 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: BIOC 322.

MBIM 320 Microbiology and Immunology 3 cr.
A course on the fundamental aspects of basic and medical microbiology and immunology offered to non-Microbiology and 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 Microbiology 32.64; 1 cr.
A treatise on advances in the epidemiology, pathogenesis, immune response, diagnosis, and prevention of microbial infections, with particular emphasis on microbial genetics and antimicrobial resistance. Second term. Alternate years.

MBIM 328 Antimicrobial Resistance 32.64; 1 cr.
A treatise on advances in antimicrobial resistance in a one health approach. Second term. Alternate years.

MBIM 329 Bacteriophage and Microbiome 32.64; 1 cr.
A treatise on advances in bacteriophage and microbiome in research. 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 adviser.

MBIM 399 A/B/C/D/E MS Thesis 9 cr.
MS thesis.

Department of Family Medicine

Chairperson	Musharrafieh, Umayya
Professors	Antoun, Jumana; Musharrafieh, Umayya; Saab, Bassem; Usta, Jinan
Associate Professors	Mufarrij, Afif; Romani, Maya; Sakr, Carine, Zahran, Tharwat
Assistant Professors	Assaf, Georges; Khater, Beatrice; Makarem, Nisrine; Rahme Ballan, Diana; Osman, Mona; Shararah, Nabil
Instructors	Khaddaj, Wajdi; Khairallah, Ghassan; Khattar, Joe; Moukheiber, Sami; Razzouk, Jibrayil; Sarkis Habib Ishak, Hala
Clinical Associates	Badr, Samia; Chalhoub, Wissam; El Ashkar, Khalil; Ghanem, Mario; Hleis, Sani; Lakkis, Najla; Maalouf, Grace; Malek, Elie; Rahimi, Rose Maria; Zeidan, Randa

The Department of Family Medicine offers a clinical clerkship and specialty electives to third 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. In addition, residents participate in inpatient rotations and receive hands-on exposure to minor surgical procedures. All residents are required to sit for the In-training examination of the American Board of Family Medicine during the first three years.

Course Descriptions

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 settings. 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 third year students.

They attend special lectures and workshops tailored to their needs, including musculoskeletal, geriatrics, adolescent and sexual health, clinical skills and other topics related to integrative medicine and will get a certificate in lifestyle medicine coaching. One block; four 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, workshops and sessions on professionalism through discussion of movies.

Family Medicine Added Qualifications Fellowships

The Department of Family Medicine offers three 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, in collaboration with the Department of Internal Medicine, 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. In addition, fellows are required to complete the SHARP course in their second year of training. 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. In addition, the department is actively engaged in community work, including school health initiatives, and the organization of educational booths.

Department of Internal Medicine

Chairperson	Abu-Alfa, Ali
Professor Emeritus	Cortas, Nadim (Dean Emeritus); Berbari, Adel (Professor Emeritus)
Professors	Abu-Alfa, Ali; Akl, Elie; Alam, Samir; Arabi, Asma; Arnaout, Samir; Assi, Hazem; Badr, Kamal; Barada, Kassem; Bazarbachi, Ali; Bou Khalil, Pierre; Dakik, Habib; El-Hajj Fuleihan, Ghada; El-Saghir, Naji; Ghazzal, Ziyad; Husari, Ahmad; Kanafani, Zeina; Kanj-Sharara, Souha; Khuri, Fadlo; Mallat, Samir; Meho, Lokman; Mourad, Fadi; Nasrallah, Mona; Refaat, Marwan; Sawaya, Jaber (Clinical); Shaib, Yasser; Shamseddine, Ali; Sharara, Ala'; Soweid, Assaad; Taher, Ali; Tamim, Hani; Tfayli, Arafat; Uthman, Imad; Ziyadeh, Fuad
Associate Professors	Abi-Rached, Joelle; Abi-Saleh, Bernard; Bassil, Nazem; Bouakl, Imad; Daniel, Fady; Daouk, Majida; El Cheikh, Jean; Hajjar, Ramzi; Hazimeh, Yusef; Juvelekian, Georges; Khoury, Maurice; Medawar, Walid; Merashli, Mira; Moukadem, Hiba; Moukalled, Nour; Rebeiz, Abdallah; Rizk, Nesrine; Safa, Malek; Salem, Ziad; Sawaya, Fadi; Tabbarah, Zuhayr (Clinical); Temraz, Sally; Zein-El-Dine, Salah
Assistant Professors	Abou Dalle, Iman; Al-Awar, Ghassan; Bou Fakhreddine, Hisham, Chakhtoura, Marlene; Choucair, Mahmoud; El Bejjani, Martine; Finianos, Antoine; Gharzuddine, Walid; Hallak, Patrick; Kanj, Nadim; Karam, Marilyn; Masri, Abdul Fattah (Clinical); Menassa, Janine; Moukadem, Hiba; Moukalled, Nour Noujeim, Carlos; Yamout, Rana; Zakhem, Aline
Instructors	Al Mahmasani, Layal; El Asmar, Noelle; Farah, Pamela; Haddad, Aline; Ibrahim, Zahi; Kreidieh, Firas; Rhayem, Caline; Younan, Lara
Adjunct Faculty members	Mohty, Mohamad (Adjunct Professor); Sayegh, Mohamed Hassan (Adjunct Professor); Karam, Sabine (Adjunct Clinical Associate Professor); Mukherji, Deborah (Adjunct Clinical Associate Professor); Bizri, Abdul Rahman (Adjunct Clinical Assistant Professor); Ghusn, Husam (Adjunct Clinical Assistant Professor)
Clinical Associates	Abboud, Diana; Abou Fadel, Carla; Akiki, Bassem; Omaya Baydoun; El-Imad, Zuhayr; Farran, Abbas; Farah, Karim, Francis, Nadine; Hallal, Hawraa; Hilal, Nadeen; Issa, Zeinab; Rayshouni, Hamza; Nakhoul, Nancy; Saleh, Munzer; Salem, Charelle; Sukkariyyah, Ismail; Youssef, Mona

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 specialty fellowships. The residency program offers two tracks, which are a one-year training (preliminary track) and a 3-year training (categorical track). Fellowship training following a residency in internal medicine is offered in the following specialties: cardiology; endocrinology; gastroenterology; hematology-oncology; nephrology and hypertension; infectious diseases; rheumatology; pulmonary and critical care. A fellowship in geriatrics medicine is also jointly offered by the Division of General Medicine and Geriatrics in the Department of Internal Medicine, and the Department of Family Medicine. Applicants should have completed residency training in family medicine or internal medicine. In addition, two subspecialty fellowships are offered.
A fellowship in osteoporosis and metabolic bone disorders is offered by the Division of Endocrinology and Metabolism in the Department of Internal Medicine. Applicants who completed a fellowship in endocrinology or rheumatology; or a residency in Internal Medicine, family medicine, or obstetrics and gynecology are eligible. Another sub-specialty fellowship is offered by the Division of Hematology-Oncology in Adult Malignant Hematology Stem Cell Transplantation and Cellular Therapy. Applicants who completed residency in Internal Medicine and fellowship in Hematology-Oncology are eligible.

Course Descriptions

INMD 246 Clinical Clerkship in Internal Medicine 120.540
A clinical clerkship in 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, including a course on clinical pharmacology and a course on bioethics, and to prepare talks 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, prepare, and participate in clinical discussions, do clinical case presentations using an evidence-based medicine approach.

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	Ahmad Beydoun
Professors	Atweh, Samir; Beydoun, Ahmad; Khoury, Samia; Sawaya, Raja
Associate Professors	Nasreddine, Wassim; El Ayoubi, Nabil
Assistant Professors	El Halabi, Tarek; Jaafar, Fatima
Clinical Instructors	Doumiati, Hassan; Moussa, Badiee
Adjunct Assistant Professor	Makki, Ashraf
Adjunct Associate Professors	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.

Course Descriptions

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, Refractory Epilepsy Conference, Journal Club twice weekly, and a weekly Multiple Sclerosis conference.

Department of Obstetrics and Gynecology

Chairperson	Nassar, Anwar
Professors	Bazi, Toni; Ghazeeri, Ghina; Khalil, Ali (Clinical); Nassar, Anwar; Seoud, Muhieddine; Usta, Ihab
Associate Professors	Abdallah, Reem; Chamsy, Dina; El Kak, Faysal; Hobeika, Elie
Assistant Professors	Adra, Abdallah; Aswad, Naji (Clinical); Dagher, Christelle (Clinical); El Khoury, Nabil; Chahine, Rabih
Instructors	El Taha, Lina; Fellas, Stephanie (Clinical)
Clinical Associates	Atallah, Sandrine; Malas, Salah
Adjunct Professor	Awwad, Johnny

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 3-year fellowship program in reproductive endocrinology and infertility as of June 2014. One fellow is accepted every year.

Course Descriptions

OBGY 247 Clinical Clerkship 47-360
A clerkship is offered to third year students consisting of daily seminars in normal and abnormal obstetrics and gynecology, weekly grand rounds and a clinical clerkship in the delivery suite, hospital wards, 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:** Rounds 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, Ultrasound Course Lecture, and Laparoscopy Course

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
Associate Professor	Barazi, Randa
Assistant Professors	Alam, Elie; Dunya, Gabriel; Korban, Zeina; Mourad, Marc; Natout, Mohammad Ali (Clinical), Melki, Sami
Clinical Associates	Abi Akl, Pierre; Kasty, Maher; Mahfoud, Lorice (KMC); Murr, Ghassan (KMC)

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, Keserwan Medical Center (KMC), 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)

The 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 (Tenured); Mansour, Ahmad (Clinical); Noureddin, Baha’
Associate Professors	Haddad, Christiane; Hamam, Rola; Jabbur, Nada (Adjunct); Ma'luf, Riad (Clinical), Alameddine, Ramzi
Assistant Professors	Bou Ghannam, Alaa; Farah, Nadim (Clinical); Haddad, Randa; Jurdi Kheir, Wajiha; Saade, Joanna, Massoud, Vicky (New Faculty)
Instructor	Gendy, Jeremiah (New Faculty)
Clinical Associates	Allam, Souha; Shahin, Hasan; Younis, Mohammad; Saadeh, Anthony

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.

Course Descriptions

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	Chakhachiro, Zaher; El-Khoury, Riyad; Assaad, Adel
Assistant Professors	Fakhreddin, Najla; Assaf, Nada
Instructors	Jurdi, Nawaf; Aoun, Jessica; Sinno, Sara; El Beany, Nancy

The Department of Pathology and Laboratory Medicine offers courses to medical students and undergraduate courses to students in the medical laboratory sciences program which is jointly offered with the Faculty of Health Sciences. The department also offers two four-year residency training programs in anatomic pathology and laboratory medicine.

Multidisciplinary Medical 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 to Medical 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 203, 205, 211, 212, 225, 226, 227, 228, 229 and 230
These blocks are offered as part of an integrated multidisciplinary teaching blocks with basic medical departments and select clinical departments, primarily Internal Medicine. See Medical Program Interdepartmental Courses -First and Second Years.

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 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 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 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.

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, students are 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 students are 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.

Courses Offered in the Medical Laboratory Sciences Program

LABM 201 Clinical Chemistry I 2.0; 2 cr. and LABM 202 Clinical Chemistry II 3.0; 3 cr.
Clinical Chemistry is covered in two courses: LABM 201 in first term and LABM 202 in second term. 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). Prerequisite of LABM 202 Clinical Chemistry II is LABM 201 Clinical Chemistry I.

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 laboratory rotation in the clinical chemistry laboratory at AUBMC 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.

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.

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 includes 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 are 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.

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.

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.

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 fetus and newborn, as well as advanced Blood Bank procedures and quality management. Prerequisite: MLS 207.

LABM 280 Cytogenetics, Molecular Diagnostics, and Histotechniques 0.64; 2 cr.
Practical experience in cytogenetics, molecular diagnostics, and histotechniques. Prerequisite: LABM 210.

Department of Pediatrics and Adolescent Medicine

Chairperson	Abboud, Miguel
Professors	Abboud, Miguel; Badr, Lina (Adjunct); Bitar, Fadi; Boustany, Rose-Mary; Bulbul, Ziad; Charafeddine, Lama; Dbaibo, Ghassan; Majdalani, Marianne; Mikati, Mohamad (Adjunct); Mroueh, Salman; Muwakkit, Samar; Nabulsi-Khalil, Mona; Sanjad, Sami (Adjunct); Yunis, Khalid
Associate Professors	Aoun, Bilal (Adjunct); Arabi, Mariam; Assi, Jana (Adjunct); Hanna-Wakim, Rima; Karam, Pascale; Musallam, Salim (Clinical); Sinno, Durriyah; Tfayli, Hala; Yazbeck, Nadine
Assistant Professors	Al Ojaimi, Mode; Bechara, Elie; Charafeddine, Fatme; El Taoum, Katia; Haddad, Laith; Ismail, Ali; Maalouf Faouzi; Moukhaiber, Jihane; Munla, Nabil (Clinical)
Instructors	Abou Daher, Ghadi; Anka, Carine; Borghol, Rafah; Habanjar, Dima; Karam, Maria; Khalifeh, Simone; Noun, Dolly; Romani, Diala; Youssef, Nour
Clinical Associates	Abdelnabi, Reem; Al Ali, Razan; Al Araj, Alia; Badr, Dana; Khafaja, Sarah; Nasrallah, Mona; Shamseddine, Fadi; Tannoury, Theresia; Yazbek, Soha; Mroueh, Karim

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.

Course Descriptions

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 students' 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.

Conferences

Ward rounds and case discussions (daily), journal club, pediatric grand rounds, morbidity and mortality conference, and specialty conferences and journal clubs (adolescent medicine morbidity review, hematology/oncology, neonatology, infectious diseases, critical care, and pediatric cardiology) (weekly), core curriculum lectures and guidelines sessions (three times per week) , Med 3 and Med 4 clerkship lectures (daily).

Department of Pharmacology and Toxicology

Chairperson	Sabra, Ramzi
Professors	Sabra, Ramzi; Khoueiry Zgheib, Nathalie
Professor Emeritus	Cortas, Nadim; Simaan, Joseph
Associate Professors	El-Najjar, Nahed; Zouein, Fouad
Associates	Puzanian, Houry; Dhaini, Hassan

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 MS program include courses within the disciplines of biochemistry, physiology, and cell biology, and PHRM 302 & PHRM 303 courses (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). Pharmacology courses required of students pursuing a PhD in biomedical sciences include PHRM 302 and one of the PHRM 303 A-E courses.

Course Descriptions

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 302 Principles of Drug Action 11.6; 1 cr.
This course is designed for graduate students majoring in pharmacology and other biomedical sciences. It covers the basic principles of drug action and the important concepts in pharmacokinetics, pharmacodynamics, pharmacogenetics, drug development and drug toxicity that are applicable to all drugs.

PHRM 303 Comprehensive Pharmacology: An In-Depth Study of Drug Classes 60.42: 6 cr.
This course is designed for graduate students majoring in pharmacology and other biomedical sciences. It covers the pharmacological properties of the major classes of drugs. This course is also subdivided into individual 1-credit courses as follows:

PHRM 303A Pharmacology of the Autonomic Nervous System 11.8;1 cr.
This course is designed for graduate students majoring in pharmacology and other biomedical sciences. It covers the pharmacology of drugs acting on the autonomic nervous system.

PHRM 303B Cardiovascular and Renal Pharmacology 11.10;1 cr.
This course is designed for graduate students majoring in pharmacology and other biomedical sciences. It covers the pharmacological properties of the major classes of drugs acting on the cardiovascular and renal systems.

PHRM 303C Hematologic, Endocrine, Gastrointestinal and Inflammation Pharmacology 13.8;1 cr.
This course is designed for graduate students majoring in pharmacology and other biomedical sciences. It covers the pharmacological properties of the major classes of drugs used for treatment of hematological, gastrointestinal, endocrine, reproductive, and inflammatory disorders.

PHRM 303D Pharmacology of the Central Nervous System 13.8:1 cr.
This course is designed for graduate students majoring in pharmacology and other biomedical sciences. It covers the pharmacological properties of the major classes of drugs acting on the central nervous system.

PHRM 303E Cancer and Antimicrobial Chemotherapy 12.8;1 cr.
This course is designed for graduate students majoring in pharmacology and other biomedical sciences. It covers the pharmacological properties of the major classes of cancer and antimicrobial chemotherapeutic drugs.

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 fourth year medical students as an elective clerkship. Four, 8 or 12 weeks..

PHRM 333 Clinical Pharmacology 14.0; 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 adviser.

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; Safi, Dima; Shamseddeen, Wael; Ghossoub, Elias
Assistant Professors	Barakat, Marc; Baroud, Evelyne; Bizri, Maya; El Hayek, Samer (Adjunct); Khoury, Rita
Instructors	Ayna, Dinah; Dandan, Nadia Tina
Clinical Associates	Farhoud, Leila; Ismail, Ghina

The Department of Psychiatry offers a course to Med II students (PSYT 227), a clinical clerkship to Med III students (PSYT 252), a post-graduate residency training program in psychiatry, a clinical psychology training program, and clinical electives for students and residents.

Course Descriptions

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 management of patients. A variety of teaching/ learning techniques are implemented including lectures, interactive sessions, 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 up 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 covering 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 both 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, 2027 till April 30, 2027

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).

The program consists of four courses (one per term) taken in sequence.

The courses are as follows:

First 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.

Second 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 inpatient 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

Chairperson	Mohamad, Osama
Professor	Issa, Philip (Emeritus)
Associate Professors	Mohamad, Osama (Visiting); Youssef, Bassem
Assistant Professors	Ayoub, Zeina; Bodgi, Larry; Eid, Toufic; Hilal, Lara; Jalbout, Wassim; Shahine, Bilal

Course Descriptions

RADO 260 Introduction to Radiation Oncology 0.180
An elective clerkship that introduces students 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	Kaafarani, Haitham
Professors	Abi Saad, Georges; Atiyeh, Beshara (Clinical); Bulbul, Mohamad (Clinical); Haidar, Rachid; Hoballah, Jamal; Kaafarani, Haitham; Khalifeh, Mohammad; Khauli, Raja; Obeid, Mounir; Sawaya, Raymond
Associate Professors	Abbas, Jaber (Clinical); Akel, Samir (Clinical); Bakhach, Joseph; 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, Eman; Sidani, Mustafa (Clinical); Sunna', Tarek (Adjunct); Tayim, Ahmad; Wazzan, Wassim (Clinical); Zaghal, Ahmad (on leave); Tohmeh, Maroon; Papas; Yasmine; Nasser Eddine, Mohamad; Nassereldine, Mohamad; Abiad, Firas; Ibrahim, Ibrahim
Instructors	Abiad, Firas (Adjunct); Amine, Ali; El Hushaymi, Mohamad Nabih
Clinical Associates	Abdelnoor, John; Bazi, Tony; Bitar, Elias; Chahine, Fadl; Daher, Ronald; Harakeh, Ayman; Jassar, Yehya; Murr, Chadi; Saab, Mohamad; Korkomaz, Roger; Kamel, Gaby; El Houkayem, Michel

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.

Course Descriptions

SURG 246 Clinical Clerkship 44.540

The third-year surgery clerkship at AUBMC is a 12-week rotation consisting of 6 weeks on a core general surgical service (including a 1-week rotation on the cardiovascular service), 3 weeks in the Anesthesiology Department 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 students to the principles of caring for the surgical patient. This goal is accomplished by allowing the students 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

Knowledge of English is necessary. 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. 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 towards 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 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; 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-term diploma, as well as a 35-credit master's degree. The summer diploma, two-term 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-term 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 healthcare settings. Management and leadership courses are offered in collaboration with faculty at the Suliman S. Olayan School of Business.

Mission

The mission of 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 healthcare 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-term online program.

Master of Science in Health Research (SHARP)

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-term diploma is in June, and the acceptance is in August 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-term) 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.

Criteria for Admission

All applicants to the SHARP summer diploma and two-term 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) 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

Applicants are considered for admission to the SHARP summer diploma and two-term diploma and the MS program if they meet the following minimum admission requirements:

- An undergraduate cumulative GPA of at least 3.3 for MS and 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 (no cut-off score). Applicants with MD or master's degree from AUB 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. Refer to the Admissions section in this catalogue.

Graduation Requirements

Refer to the General University Academic Information section in this catalogue.

Incompletes

Refer to the General University Academic Information section in this catalogue.

Probation

Refer to the General University Academic Information section in this catalogue.

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-term 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 course in epidemiology is 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 of required courses, 2 credits of elective courses.
- **Thesis:** Each student is required to select a clinical research project and identify adviser(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

Students are expected to pass a 0-credit comprehensive examination course after completion of all required courses. If students do not pass the comprehensive exam, they are 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	FM	0
Elective	-	-	2
Advances in NCD Research	SHRP 340	FM/ FHS	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	FM	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/ FHS	2
Thesis	SHRP 400B	FM	0
Comprehensive Examination	SHRP 395A/B	FM	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. The 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 to 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 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. 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 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. 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.
Students are 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. Prerequisites: 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 healthcare 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 331 Analysis and Reporting of Large Clinical Datasets II 2 cr.
This course, in large part, takes the form of a single trainee research project on a clinical dataset that is done with direct supervision of the course coordinator/instructor and possibly SHARP investigators and mentors. Proposed research questions/projects are expected to be sufficiently novel, of clinical relevance, with well-designed and executed analyses that have publication potential. Students are expected to submit their work in abstract form to a scientific conference, present their work internally as a seminar and work towards a manuscript.

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 for censoring, applying 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 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.

SHRP 360 AI in Medicine 2 cr.
This course provides a comprehensive introduction to the application of artificial intelligence (AI) in the medical field. It explores the transformative impact of AI on healthcare, covering topics from disease diagnosis to medical imaging, and from large language models to ethical considerations. It does not require prior programming or computer science knowledge. Case studies will permeate throughout all forms of session delivery (asynchronous, synchronous, weekly assignments, hands-on sessions, and online forums).

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) Khraiche, Massoud (Biomedical Engineering, MSFEA) Refaat, Marwan (Internal Medicine, FM) Saad, Walid (Chemical Engineering, MSFEA) Zouein, Fouad (Pharmacology and Toxicology, FM)

Graduate Programs

The biomedical engineering (BMEN) graduate program 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 BMEN program is housed in the MSFEA and administered by both MSFEA and FM via a joint program coordinating committee (JPCC).

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.

Students may select their courses to satisfy the requirements of one of the three focus areas.

Master of Science (MS) in Biomedical Engineering

The BMEN program offers a master of science (MS) degree in biomedical engineering with two options: thesis option and non-thesis option.

Program Mission

The mission of the BMEN program 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.

Program Objectives

The BMEN MS program educational objectives are to graduate master's students able to:

- Achieve their goals in postgraduate studies and industry employment in fields related to Biomedical Engineering.
- Advance in their careers through innovation, leadership, and life-long learning.

Program Learning Outcomes

By the time of graduation, master's graduates possess:

- Basic knowledge of engineering and biomedical sciences necessary to understand advanced topics in biomedical engineering.
- Advanced knowledge in selected subareas related to biomedical engineering.
- Ability to use techniques, skills, and tools useful for biomedical project design, experimental studies, and/or engineering practice.
- Ability to utilize interdisciplinary knowledge to work on projects, do studies, and/or conduct.
- research in biomedical engineering.
- Understanding of the global impact of emerging new scientific findings in biomedical engineering.
- Ability to communicate project and/or research findings effectively, in both oral and written.
- formats, through technical presentations and reports.
- Skills such as teamwork and life-long learning.

Admission Requirements

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 students' 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/No Pass with a passing grade of C+.

The application procedures and admission requirements to the MS program follow AUB's General University Academic Information section 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.

Residency Requirements

Refer to the General University Academic Information section in this catalogue.

Program Requirements

Major: Biomedical Engineering

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: BIOC 321, BIOC 322, BMEN 600, BMEN 601, BMEN 672, BMEN 673L, EPHD 310, HUMR 310 (A, B, or C), HUMR 314, PHYL 346.

Restricted elective graduate courses: 6 credits restricted elective courses customized per focus area and required by both thesis and non-thesis options: BIOC 303, BIOC 325, BIOC 326A, BMEN 603, BMEN 604, BMEN 605, BMEN 606, BMEN 607, BMEN 608, BMEN 609, BMEN 610, BMEN 611, EECE 601 or EECE 602, EECE 603, EECE 605, EECE 633 or EECE 663 or EECE 667 or EECE 693, EECE 690, HUMR 305, PHYL 302, PHYL 300A.

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 students' adviser 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 section in the graduate catalogue.

Comprehensive Exam for Master Programs

Refer to the General University Academic Information section in this catalogue.

Supervision of Master's Thesis

For Thesis Proposal and Committee, Thesis Defense, Deposit of the Project/Thesis in the Library, refer to the General University Academic Information section in this catalogue.

Master's Degree Graduation Requirements

Refer to the General University Academic Information section in this catalogue.

PhD in Biomedical Engineering

Program Mission

The mission of the BMEN program 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.

Program Objectives

The BMEN PhD program educational objectives are to graduate PhD candidates able to:

- Achieve their employment goals in academia and/or industry in the field of biomedical engineering.
- Advance in their careers through innovation, leadership, and life-long learning.

Program Learning Outcomes

By the time of graduation, PhD graduates possess:

- Basic knowledge in engineering and biomedical sciences necessary to conduct research in biomedical engineering.
- Advanced knowledge in various subareas related to biomedical engineering.
- Ability to use techniques, skills, and tools useful for biomedical project design, experimental studies, and/or engineering practice.
- Ability to pursue independent research utilizing interdisciplinary knowledge from various fields, and generate novel contributions in biomedical engineering.
- Understanding of the global impact of emerging new scientific findings in biomedical engineering.
- Ability to communicate research findings effectively, in both oral and written formats, through presentations and reports including presentations at technical meetings and peer reviewed publications.
- Skills such as teamwork and lifelong learning, and understanding of ethical responsibility and the role of integrity in the advancement of knowledge through research.

Admission Requirements

The application procedures and admission requirements to the PhD program follow AUB's General University Academic Information section in the graduate catalogue. To be considered for admission, applicants must hold a 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.

Residency Requirements

Refer to the General University Academic Information section in this catalogue.

Program Requirements

Major: Biomedical Engineering

General requirements: 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.

Core graduate courses: 21 credits of core courses from biomedical sciences and engineering: BIOC 321, BIOC 322, BIOM 385, BMEN 600, BMEN 601, BMEN 671, BMEN 672, BMEN 673L, BMEN 675, EPHD 310, HUMR 310 (A, B, or C), HUMR 314, PHYL 346.

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.

Restricted elective graduate courses: 9 credits restricted elective courses customized per focus area and required by both thesis and non-thesis options: BIOC 303, BIOC 325, BIOC 326A, BMEN 603, BMEN 604, BMEN 605, BMEN 606, BMEN 607, BMEN 608, BMEN 609, BMEN 610, BMEN 611, EECE 601 or EECE 602, EECE 603, EECE 605, EECE 633 or EECE 663 or EECE 667 or EECE 693, EECE 690, HUMR 305, PHYL 302, PHYL 300A.

Free elective graduate courses: 6 credits additional elective courses. These courses should be taken based on the students' specific area of research as approved by their adviser.

PhD Qualifying Exam

For Qualifying Exam Part I: Comprehensive Exam and for Qualifying Exam Part II: Defense of Thesis Proposal, refer to the General University Academic Information section in this catalogue.

Admission to Candidacy

Refer to the General University Academic Information section in this catalogue.

Supervision of Doctoral Thesis

For PhD Thesis Committee, PhD Thesis Proposal, PhD Thesis Defense, and Deposit of the Thesis in the Library, refer to the General University Academic Information section in this catalogue.

PhD Degree Graduation Requirements

Refer to the General University Academic Information section in this catalogue.

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. Prerequisite: consent of instructor.

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. Prerequisite: MATH 201 and consent of instructor.

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. Prerequisite: 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 303A 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 303B 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 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 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. Prerequisite: EECE 490/690; or consent of instructor.

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 students 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).

AMERICAN UNIVERSITY OF BEIRUT

Rafic Hariri School of Nursing (HSON)

Graduate

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 and HSON Online Chair
Souha Fares	Associate Dean for Research
Angela Massouh	Convener Clinical Sciences
Gladys Honein	Convener Health Systems and Populations
Bradley Jon Tucker	Vice-Provost and Registrar
Antoine Sabbagh	Director of Admissions
Lokman Meho	University Librarian

Program Directors and Coordinators

Coordinator, PhD Program	Yazbik-Dumit, Nuhad
Coordinator, BSN program	Dakessian Sailian, Silva
Coordinator, MSN program	Younan, Lina
Director, Continuing Education and Offshore Programs	Massouh, Angela

School Administrative Support

Diana Chami	Executive and Financial Officer
Mira Abdallah	Student Services and Career Planning Officer
Joyce Nasr	Skills and Simulation Lab Coordinator
Layal Abi Jumaa	Administrative and Student Services Assistant
Nisrine Ghalayini	Administrative Officer

Abeer Hashem	Administrative Assistant
Maher Itani	Senior Service Delivery Manager
Toufic Karout	Senior Field and Remote Support Engineer
Rabih Daher	Office Assistant
Maya Abou Saad	Academic Assistant
Fatima Lababidi	Online Program Manager
Aya Sheaib	Online Program Manager
Sara Salman	Online Program Recruiter
Hania Sinno	Online Program Recruiter
Salpy Naalbandian	Head of Saab Medical Library

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 2018-19. The Rafic Hariri School of Nursing became the seventh independent faculty at AUB, on September 1, 2018.

Accreditation

The baccalaureate and master's nursing degree programs at the Hariri School of Nursing (HSON) are accredited by the Commission on Collegiate Nursing Education (CCNE) since 2007. HSON was the first nursing school outside US territories to have its BSN and MSN programs accredited in 2007. The programs are assessed by CCNE based on four standards: Mission and Governance, Institutional Commitment and Resources, Curriculum and Teaching and Learning Practices, and Assessment and Achievement of Program Outcomes. CCNE is officially recognized by the US Secretary of Education as a national autonomous accrediting agency, contributing to the improvement of the public's health, encouraging continuing self-assessment by nursing programs, and supporting continuing growth and improvement of nursing education. Being accredited by CCNE, ensures the quality and integrity of baccalaureate and graduate programs at HSON, in addition to effective educational practices. The most recent accreditation renewal by CCNE for HSON was in 2022 for a period of 10 years till 2032.

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 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 lifelong learning and scholarship, develop leaders in nursing and healthcare, and attract a competent and culturally diverse student body.

Master of Science in Nursing (MSN) Programs

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. The program admits 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.

Admissions

Applicants are eligible for consideration for admission to the master of science in nursing (MSN) program if they fulfill 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 GPA of at least 3.3 in the major field of study (nursing).

Refer to 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.
- At least two years of work experience for the MSN in nursing administration and management.
- Interviews will be required based on the applicants' background and based on a recommendation of the Graduate Studies Committee.
- Applicants may apply to three tracks of their choice (first choice, second choice, third choice). The school takes these options into consideration most of the time. Occasionally, however, students may not be assigned to their first choice if the number of applicants of the track is fewer than 6 as per the policy (refer to the Faculty Workload Policy: Factors relevant to the definition of and deviation from teaching and teaching load).

The MSN program admits applicants once per year in the fall term, except for the blended MSN in nursing administration and management track, which accepts applicants in fall and spring.

Special non-degree seeking applicants willing to register for graduate nursing courses may do so in fall or spring terms. However, they need to be approved by the HSON Graduate Studies Committee.

Applicants who fail to meet any of the admission requirements but who, in the opinion of the faculty, demonstrate potential capacity to fulfill the graduate program requirements, are admitted on probation. For example: applicants with a cumulative undergraduate GPA of at least 3.0 but less than GPA of 3.3 in the major field (nursing) may be conditionally admitted as graduate students on probation.

General Rules and Regulations

Master's Degree 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 GPA of at least 3.3.
- Completed the total number of credits required in the track of study.
- Passed the comprehensive examination.
- Completed the requirements for the thesis or project.
- Met the residency requirements as stated in the General University Academic Information section.
- Applied for graduation.

Transfer of Credits

Refer to Credit Transfer section under the General University Academic Information.

Supervision, Courses, and Grades

Graduate students are assigned academic advisers to guide and help in planning their course of study, as stipulated by the graduate curriculum. Non-nursing courses relevant to the students' areas of specialty can be taken as electives with the approval of the academic advisers.
For students working towards a thesis, a full-time faculty member is assigned as an adviser and chairperson of the thesis committee. The thesis adviser and two committee members must be of professorial rank.
Graduate-level courses in nursing are numbered 500 and above. The minimum passing grade for a graduate course is (C+). However, students are required to maintain a cumulative average of at least B+ (GPA: 3.3). 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 failing grade equal or below (C) of (F) for graduate courses. Results of tutorial courses, NURS 610, comprehensive exam, 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

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 GPA of 3.3 to achieve regular status.

Refer to Academic Standing of Student Working for a Master's Degree section under General University Academic Information.

Comprehensive Examination

Students must pass the 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 offered twice per year, once in the fall and once in the spring term. Students planning to take the comprehensive exam must register for 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 students' knowledge of their field of specialization. Students who do 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.
For more information, refer to Comprehensive Examination section, under General University Academic Information.

Thesis/Project

Students may opt for a three-credit project (NURS 598) or a thesis-based project (NURS 599). Students who opt for a three-credit project need to register for a three-credit elective coursework in a related area. Students need to submit a concept note not exceeding 350 words to the Graduate Studies Committee for approval of the topic and thesis/project committee members four months before the defense date. Once approved, students can proceed with the thesis/project work.
Part-time students must pass the comprehensive examination and complete all course requirements for the MSN degree before registering for the thesis/project. Full-time students are allowed to submit their concept note to Graduate Studies Committee in the same term as the comprehensive exam, however the approval is provisional pending passing the exam. Thesis/project is overseen by the thesis/project committee. Students must ensure that the final thesis/project manuscript conforms to the guidelines outlined in the University Thesis Manual found in the library. Theses not conforming to the manual requirements will not be accepted.

Master's Thesis Committee

The thesis committee should be composed of at least three members approved by the faculty Graduate Studies Committee. 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. Students must defend the thesis proposal to the Master's Thesis Committee for approval prior to proceeding with the thesis work.

Master's Project Committee

The Master's Project Committee should be composed of at least two members. 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.
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.

Thesis/Project Defense

Refer to Thesis Defense and Project Defense sections under General University Academic Information.

Deposit of Thesis/Project in the Library

Refer to Thesis Defense and Project Defense sections under General University Academic Information.

Curriculum for Master of Science in Nursing

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 (Clinical residency)	0	16	4
PHRM 314	Advanced Pharmacology and Therapeutics	3	0	3
Elective	-	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
NURS 545	Human Resources Management in Health Care Organizations	3	0	3
Elective	-	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

Elective	-	3	0	3

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
Elective	-	3	0	3

Pediatric Clinical Nurse Specialist Track				
NURS 503	Advanced Health Assessment	2	3	3
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
Elective	-	3	0	3

Thesis/Project				
NURS 599	Thesis	6	-	6
NURS 598	Project	3	-	3
Elective	Elective	3	-	3
Comprehensive Course				
NURS 526	Comprehensive exam	0	-	0

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.
The School of Nursing also offers online diploma courses that cover nursing issues of interest to students in various regular tracks. These courses can be counted towards the elective credits.

Course Descriptions

MSN Courses

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 healthcare 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.

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. This course is a prerequisite for the PHRM 314.

NURS 504A Complex Topics in Pathophysiology 3.0; 3 cr.
Students will take Pathophysiology (NURS 504) for 2 credits with the students from 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 NURS 504 and NURS 503, 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 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 healthcare settings. Prerequisite: NURS 507.

NURS 508D Nursing Administration Residency 1.0; 1 cr.
This residency course will give students 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 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 biobehavioral 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 students integrate 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 healthcare, 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 healthcare. 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. Prerequisites: NURS 532A, NURS 532B.

NURS 534B Pediatrics and 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 healthcare 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 545 Human Resources Management in Health Care Organizations 3 cr.
This course highlights the key roles, values, and benefits of managing human capital in health care organizations. Students will be exposed to the HR policies, processes, and procedures related to the primary and secondary functions of HR Management including manpower planning and staffing, learning and development programs, total remunerations, managing employee relations and personnel administration, in addition to ensuring occupational safety and security, promoting a healthy and productive work environment, building positive relations, identifying HR Metrics, managing risks and protecting employee personal data. The course will also focus on linking human resources practices to organizational strategy and performance.

NURS 598 Project 3 cr.
Special projects directed towards acquiring skills needed in the development of programs relevant to nursing care within the students' areas of interest. Projects vary depending on the track of study. Prerequisite: Comprehensive and residency.

NURS 599 Thesis 6 cr.
Thesis. Prerequisite: Comprehensive and residency.

Doctor of Philosophy (PhD) in Nursing

General Information

The PhD in nursing 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:

- Healthcare 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 five 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 master's degree will be considered on a case-by-case basis and may be required to take prerequisite courses prior to enrolling in the PhD program. Only holders of master's degree in nursing or a related field will be considered for admission into the program.

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 sections under the General University Academic Information of this 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, students must submit a thesis that is expected to make a significant and original contribution to their 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 residency 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.

Curriculum for PhD in Nursing

Year	Fall Term	Credits	Spring Term	Credits
Year 1	NURS 601 Philosophical and Theoretical Perspectives in Nursing Science	3	NURS 602 Quantitative Research Designs	3
	NURS 605 Bivariate Analysis and Linear Regression	3	NURS 603 Ethical issues in Health Research	1
	NURS 606 Qualitative Research	2	NURS 604 Measurement in Health Research (equivalent to EPHD 411)	3
	NURS 610 Advanced Searching of the Scientific Literature	0		
Total		**8**		**7**
Year 2	NURS 609 Research Seminar	0	NURS 607 Multivariate Analysis, Causal Modeling and Factor Analysis (equivalent to EPHD 410)	3
	EDUC 401 Teaching in Higher Education Theory I	0	NURS 608 Scholarship in Nursing	0
	Qualifying Exam I	0	EDUC 402 Teaching in Higher Education – Theory II & Practicum	0
	Elective	3	NURS 982 PhD Thesis	3
	Elective	3		
Total		**6**		**6**
Years 3 & 4	Qualifying Exam II	0	NURS 983 - 987 PhD thesis	21

Course Descriptions

PhD Courses

NURS 601 Philosophical and Theoretical Perspectives in Nursing 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.

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. 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 term 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. Students, with the help of their advisers, 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 for 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 6 cr.
The nursing PhD thesis courses are NURS 982 through NURS 987. Students must register for 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 6 cr.
The nursing PhD thesis courses are NURS 982 through NURS 987. Students must register for 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 3 cr.
The nursing PhD thesis courses are NURS 982 through NURS 987. Students must register for 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 for 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.

Online Diplomas

HSON offers two types of online diplomas: academic and professional. For graduate academic diplomas, students should have an undergraduate bachelor's degree (or its equivalent from AUB or other recognized institutions of higher learning) with a GPA of at least 3.0 (or standardized equivalent from other institutions of higher learning). Applicants who do 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).

The following are currently being offered:

- Online Academic Diploma in Nursing Administration and Management
- Online Professional Diploma in Nursing Education
- Online Professional Diploma in Analytics Informed Healthcare Quality
- Online Professional Diploma in Adult Critical Care Nursing

Online Graduate Diploma (Academic) 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 healthcare 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 want 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 3.0, 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 and Academic Plan

The online academic diploma in nursing administration and management requires 13 graduate-credits. These credits include five concentration courses (12 cr.) and a practicum (1cr.). Students can register for 6 credits per term and finish in one year. Students should complete the following courses required for the program:

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 is 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
	NURS 539	Project/Internship: Course/ Program Design	0	0	3
Total Credits					12

Online Professional Diploma in Analytics-Informed Healthcare Quality

Description

The online graduate professional diploma in analytics-informed healthcare quality provides participants/ healthcare professionals with analytics-informed knowledge and practical skills, and empowers them to drive quality improvement efforts contributing to the overall success of the healthcare system. Housed at the Hariri School of Nursing (HSON), Faculty of Health Sciences, and Olayan School of Business at the American University of Beirut, this diploma offers a deep understanding of complex healthcare quality issues, including the use of analytics to improve quality. The program aligns with the core principles of healthcare quality, emphasizing patient safety, improved outcomes, cost-effectiveness, patient experience, accountability, and continuous improvement.
This 12-credit program comprises four core courses and a capstone project. It accommodates both full-time and part-time students, with completion in 10 or 20 months, respectively. Students commit 6 to 12 hours per week to course engagement, offering flexible and interactive curriculum delivery.

Program Learning Outcomes

After completing the program, the participants will:

1. Develop a comprehensive understanding of how to use analytics and data-driven acumens to enhance organization performance in terms of healthcare quality, patient safety, staff performance, and patient outcomes.
2. Demonstrate skills in identifying and selecting relevant key performance indicators, assess healthcare processes, and implement evidence-based strategies for quality improvement.
3. Participate in data-driven initiatives, driving positive changes in healthcare practices, operational efficiency, and patient safety.
4. Develop the ability to interpret and communicate data findings effectively, facilitating informed decision-making and fostering a culture of continuous quality improvement within healthcare organizations.

Courses

The online graduate professional diploma in analytics-informed healthcare quality, requires the successful completion of 12 credits, which are distributed into four core courses and a capstone project. The capstone project entails applying concepts learned in these courses to real-world settings at AUBMC and similar healthcare organizations, both nationally and internationally.

Courses	# Credits	Faculty
1. Building a Culture of Safety and Quality	2-credit course	FHS

2. Team-led Quality Management (Exists, pathway to Masters)	3-credit course	HSON
3. Empowering Healthcare Through Data-Driven Insights	3-credit course	OSB
4. Engaging Staff in Redesigning Care Processes Through Data Analytics	3-credit course	HSON, FHS, and OSB
5. Capstone project	1-credit course	

Online Professional Diploma in Adult Critical Care Nursing

Description

Registered Nurses [RNs] working in critical care oversee the care of the most vulnerable patient population. They are charged with vigilantly monitoring, assessing, and treating the critically ill patients while advocating for their rights and supporting their families. The adult critical care nursing online diploma program is a specialized, fully online program that offers a flexible, professional development opportunity by enabling you to access continued learning regardless of your location, shift pattern or other commitments. Designed with flexibility in mind, this online format allows you to balance your professional and personal commitments while receiving a world-class education from experienced faculty.

The adult critical care nursing online diploma program is designed for RNs who wish to advance their careers by gaining expert knowledge and skills in the high-stakes environment of adult critical care. This program provides you with the foundational and advanced expertise required to thrive in these fast-paced, high-pressure environments.

This 12-credit professional diploma program builds upon the knowledge gained in undergraduate courses as well as through clinical practice. The content is organized around the nursing process framework and the bio-psychosocial dimensions of human beings. Areas of emphasis include advanced assessment in critical illness; ethical and psychosocial issues related to critical illness; management of critically ill adults with cardiovascular, respiratory, neurologic, metabolic, and renal problems, as well as emergency nursing care.

Program Learning Outcomes

Upon completion of this professional diploma program, participants will be able to:

1. Develop an in-depth understanding of the pathophysiology of critical illness and injury.
2. Analyze and monitor assessment data for patients with complex, multi-system problems in order to anticipate early deterioration in patients' conditions, establish priorities and plan interventions.
3. Demonstrate knowledge of evidence-based guidelines and practices for the management of critically ill patients with cardiovascular, respiratory, neurologic, metabolic, gastrointestinal, renal, and other emergency acute problems.
4. List pharmacological and non-pharmacological treatment modalities in critical care.
5. Appraise the ethical considerations and communication strategies in critical care settings.

6. Apply critical thinking and decision-making skills in high-pressure situations.
7. Practice evidence-based care with a focus on patient safety and quality improvement.
8. Critically evaluate and apply research findings to improve clinical practice in critical care.

Courses

This diploma consists of 6 required courses for a total of 12 credits. There is one optional credit of clinical [equivalent to 60 hours] that can be done in your country of residence and based on an area you would like to gain more hands-on experience in.

Courses	# Credits
Course 1 - Foundations of Critical Care Module 1. Global Concepts in Critical Care Module 2. Special Populations in Critical Care	2-credit course
Course 2 - Caring for Patients with Acute Cardiovascular Disorders Module 1. Dysrhythmia Interpretation and Management Module 2. Hemodynamic Monitoring Module 3. Acute Coronary Syndrome and Complications Module 4. Acute Cardiomyopathy Module 5. Shocks	3-credit course
Course 3 - Caring for Patients with Acute Pulmonary Disorders Module 1. Acute Respiratory Failure Module 2. Pleural Space Abnormalities Module 3. Managing the Ventilated Patient	2-credit course
Course 4 - Caring for Patients with Acute Neurological Disorders Module 1. Assessment and Monitoring Module 2. Strokes Module 3. Traumatic Brain and Spinal Cord Injuries	2-credit course
Course 5 - Caring for Patients with Emergency and Trauma Module 1. Triaging Module 2. Non-Trauma Emergencies Module 3. Trauma Related Emergencies Module 4. Emergency Preparedness Plans	2-credit course
Course 6 - Caring for Patients with Other Acute Critical Illnesses Module 1. Acute Gastrointestinal Disorders Module 2. Acute Kidney Disorders Module 3. Acute Endocrine Disorders Module 4. Acute Hematological Disorders	1-credit course
Optional Clinical Residency	1 credit – 60.0 hours

Course Descriptions

1- Building a Culture of Safety and Quality – 2 credits

This course ensures quality practices that are reliant on the capacity development of the human resource providing the health services, most notably the nursing team. For that, this course prepares healthcare providers to speak the same language and appreciate the importance of using data analytics in informing the evaluation and improvement of care processes. Building this culture of the working team and securing a collegial and safe practice environment, coupled with an informative evidence-based learning system shall safeguard an effective and efficient patient centered health system.

2- Managing Quality with Teams – 3 credits

This course is designed to prepare healthcare providers to meet the challenge of effectively managing patient care units and health services while focusing on use of the quality team approach to improve work processes and effectiveness. Emphasis is placed on total quality management and continuous improvement concepts, approaches, and tools; designing effective project teams; and decision-making tools to achieve quality results. Risk management and service outcomes measures are addressed as measures to assure quality care and achieve patient safety goals and organizational outcomes.

3- Empowering Healthcare Through Data-Driven Insights – 3 credits

This course is designed for healthcare professionals aiming to harness data's power for transformative insights in healthcare. From grasping data's fundamental role in healthcare operations to unleashing untapped potential in data-driven decision-making, participants will receive an accessible, non-technical introduction to healthcare analytics and digital strategies. Specifically, participants will explore data-driven approaches in enhancing patient care, improving healthcare delivery, and fostering innovation in service. Real-world examples will be highlighted throughout the course, equipping healthcare professionals with valuable insights to make informed decisions. By the end of this course, participants will be empowered with a newfound appreciation for data's role in healthcare and the knowledge to navigate the data landscape effectively, improving patient outcomes, ensuring quality accountability, and advancing healthcare delivery.

4- Engaging Staff in Redesigning Care Processes Though Data Analytics – 3 Credits

This 3-credit course focusses on engaging staff in the use of data analytics in redesigning healthcare service processes. It will include principles of redesigning healthcare and utilization of eHealth and data analytics to improve effectiveness and quality in healthcare services. The course covers staff engagement approaches as key factors for successful development and implementation of quality and performance improvement initiatives based on digital decision support systems. During the course, the students will be guided by mentors from different faculties in developing a proposal that addresses real time redesign of a healthcare service with staff engagement in selected data-driven quality initiatives. The proposal will be the base for the program capstone project.

5- Capstone Project – 1 credit

Work individually or in small groups to utilize analytics in identifying gaps in quality and propose evidence-based solutions in real context.

Online Certificate

Online Certificate in Adaptation and Validation of Research Instruments

Description

This program provides participants with the skills to adapt, validate, and culturally tailor research instruments for diverse populations. Also, it will deepen their expertise in applying rigorous psychometric methods to ensure the reliability and validity of instruments used in health studies, social sciences, psychology, quality of life studies, and education. By mastering the principles of adaptation and validation, participants will be able to confidently assess the accuracy and relevance of tools across different cultural contexts.

Successful completion of the online professional certificate in adaptation and validation of research instruments program requires 6 credits offered through two comprehensive courses, each to be delivered over seven weeks. The program offers asynchronous learning, with one live Q&A session for real-time interaction and guidance each week. Delivered in a collaborative format, the courses are co-taught by expert instructors, ensuring a rich and engaging learning experience. Participants will have the opportunity to work on assignments and case studies that simulate real-world challenges, allowing them to apply theoretical concepts in practical contexts using statistical software (SPSS and the R project).

Program Learning Outcomes

After completing Course1of the program, the participants will:

1. Demonstrate a clear understanding of the selection, application, and evaluation of research instruments, with an emphasis on assessing their cultural validity and appropriateness for diverse populations.
2. Perform translation and back-translation of research instruments, identifying and resolving discrepancies.
3. Refine research instruments, ensuring that they accurately and consistently measure the intended constructs.
4. Conduct cognitive interviews to evaluate the comprehensibility and relevance of translated research instruments.
5. Perform pilot test on the pre-final version by critically analyzing the feedback and preliminary data collected, and make necessary revisions to enhance the instrument's clarity, reliability, and cultural relevance.
6. Integrate ethical considerations into the adaptation and use of research instruments, Including issues related to the responsible reporting of findings.
7. Design cognitive interviews to assess the comprehensibility and relevance of translated research instruments.

After completing Course 2 of the program, the participants will:

8. Demonstrate a clear understanding of fundamental psychometric principles, including different types of validity (e.g., content, construct, criterion) and reliability (e.g., test-retest, inter-rater, internal consistency).
9. Apply appropriate statistical techniques, such as reliability analysis and factor analysis, to assess the validity and reliability of research instruments using statistical software (e.g., SPSS and R).
10. Critically evaluate the psychometric properties of existing research instruments, identifying strengths, weaknesses, and areas for improvement.
11. Apply psychometric analysis techniques in various research contexts, considering cultural and contextual factors that may influence the validity and reliability of instruments.
12. Effectively communicate the results of psychometric analyses to both technical and non-technical audiences, ensuring that the implications for research and practice are well understood.

Courses

The online graduate professional diploma in analytics-informed healthcare quality, requires the successful completion of 6 credits, which are distributed into two courses.

Courses	# Credits
1. Translation and Cultural Adaptation of Research Instruments	3-credit course
2. Psychometric Evaluation of Research Instruments	3-credit course

AMERICAN
UNIVERSITY
OF BEIRUT
Division of University
Interdisciplinary Programs (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	Jaafar, Hadi (FAFS); Zurayk, Rami (LDEM); Massoud, May (FHS)
Associate Professors	Doummar, Joanna (Earth Sciences); Yehya, Alissar (CEE); Salam, Darine (CEE)
Administrative Coordinator	Nivine Hajj Hassan

Background

The Interfaculty Graduate Environmental Sciences Program (IGESP) is a multidisciplinary field of study which leads to the master of science 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 environmental, societal, and cultural diversity 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.

Admission Requirements

To be accepted into the program, applicants 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 GPA in the last 60 credits or the last two years is greater than 3.3.
- Graduate on probation – if the GPA 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 adviser 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 four regular terms to be completed. In both options, students are 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**	**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 adviser. 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 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

Students can take other elective courses from other faculties after securing the approval of their adviser.

Graduation Requirements

See General University Academic Information section 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.

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.

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 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 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/ENSC 600 Air Pollution and Control 3 cr.
A course that examines processes and design equipment for the control of particulates and gaseous emissions.

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.

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 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.

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.

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.

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.

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. Although 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.

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.

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. Students who are 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 terms for holders of BS or BA degrees.
- Two terms 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 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 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 adviser.

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.

AUB Nature Conservation Center (NCC)

Director	Abunnasr, Yaser, PhD Planning, MLA, BArch
Staff	Melhem, Maya (Assistant Director); Hourani, Anna (Operations Manager); Kronfol, Ahmad; Mouawad, Leila Rossa; Badran, Sara; Ghanem, Salma; Makarem, Lynn Julia; Farghal, Lynn; Al Turk, Ali; Choueib, Jawad; Khodor, Rawya; Abboud, Hala; Kaskas, Aya; Joubrane, Ghada

Executive Committee Members

Associate Professor, Landscape Design and Ecosystem Management (MSFEA)	Abunnasr, Yaser, PhD
Senior Lecturer, Architect and Urban Planning, Urban Planning Policy and Design (MSFEA)	Yazigi, Serge PhD
Professor, Biochemistry and Molecular Genetics (FM)	Darwiche, Nadine, PhD
Associate Professor of Clinical Specialty, Family Medicine (FM)	Romani, Maya, MD
Assistant Professor, Sociology, Anthropology and Media Studies (FAS)	Perdigon, Sylvain Jean Daniel, PhD
Professor, Landscape Design and Ecosystem Management Department (MSFEA)	Talhouk, Salma, PhD

Introduction

The AUB-NCC is a multidisciplinary academic center focused on environmental research and advocacy, dedicated to promoting sustainable development and conservation. Through innovative research, education, and community-based initiatives, AUB-NCC addresses pressing environmental issues, including climate change. Collaborating with partners at local, regional, and global levels, the center develops effective solutions to advance environmental impact and action to support a sustainable future.
As Lebanon and the wider MENA area encounter more difficult environmental issues, AUB-NCC is stepping up its work to develop new strategies to tackle these issues and strengthen community resilience. Furthermore, the center's initiatives are designed to tackle key environmental challenges through a series of forward-thinking programs, listed below:

- **Water and Life:** Investigates critical issues surrounding water resources, including availability, quality, and governance, while exploring solutions for water-related challenges. The program addresses the nexus between water, energy, food, and ecosystems, promoting sustainable water management practices that benefit both human and environmental health.
- **Earth, Society, and Wellbeing:** Explores the interdependencies between environmental health and human wellbeing, advancing research on natural remedies, traditional medicine, and the role of ecosystems in supporting mental and physical health. The program aims to generate insights that contribute to sustainable healthcare solutions grounded in biodiversity.
- **Eco-transition and Circularity:** Focuses on pioneering sustainable waste management practices, promoting the circular economy, and advancing green transitions in industries and communities. This program addresses critical issues of resource scarcity and environmental degradation by fostering innovative solutions for recycling, reducing waste, and improving resource efficiency.
- **Citizenship and Nature:** Promotes environmental stewardship through place-based education, conservation initiatives, and community-led actions, fostering a deep connection between individuals and their natural surroundings. The program emphasizes local engagement and behavioral change to build resilient ecosystems and informed citizens.
- **Biodiversity Conservation:** Develops strategies for creating resilient and regenerative systems that support environmental, social, and economic sustainability. By integrating whole-system approaches, the program promotes long-term health and vitality of ecosystems, cities, and communities through landscape restoration, urban planning, and resilient infrastructure development.

Since its establishment in 2002, 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)

Since its founding in 1999, the Center for Advanced Mathematical Sciences (CAMS) has become a key player in the nucleation, stimulation, and celebration of research in the mathematical sciences in Lebanon and the MENA region. Part playground, part laboratory and part crossroads, the center is keen on engaging multiple stakeholders in the development and dissemination of mathematics, the making and telling of its history. In addition to the research activities which it funds and organizes, the center aims to nurture the rich and productive dialogue between mathematics, the humanities and the arts through innovative interventions that amplify the impact of mathematics across fields, and communities. Naturally, and through opportunities for collaborative, interdisciplinary research and teaching, CAMS advances AUB's mission by attracting and retaining exceptional scholars as members of its intellectual community.

Director: Jihad Touma

International Advisory Committee

The CAMS International Advisory Committee (IAC) is envisaged to be a dynamic, relevant, and representative advisory body, taking into account gender, diversity of research fields, longstanding association with CAMS, mathematics in Lebanon, connections to Sir Michael Atiyah and his legacy, connections to leading researchers at AUB in mathematics, and related fields. The committee oversees the activities of CAMS, assists in charting future directions, and evaluates, on an annual basis, the center's success in meeting its objectives with recommendations. Members of the committee may also provide help in securing continued external funding for CAMS in accordance with the University's fundraising policy. Its members are appointed by the president of the university, with the provost of AUB as an ex-officio member who acts as its vice-chair and secretary.
In addition to AUB's provost, and CAMS director, members of the International Advisory Committee include:

Claire Voisin	Collège de France
Cumrun Vafa	Harvard University
Frances Kirwan	Oxford University
Madhu Sudan	Harvard University
Mikhael Balabane	University of Paris
Nassif Ghoussoub	University of British Columbia
Peter Glynn	Stanford University
Peter Goddard	Institute of Advanced Study
Scott Tremaine	Institute of Advanced Study/University of Toronto (IAC Chair)

CAMS Objectives

In fulfillment of its mission, CAMS engages with a spectrum of actors within the mathematical community and its broader public, via organically structured thematic explorations. In so doing, CAMS aims to:

- Act as a catalyst of mathematical research that reflects longstanding interests within AUB and collaborating Lebanese Universities [e.g., number theory/algebraic geometry, complex and differential geometry, PDEs, optimal transport, stochastic modeling, theoretical computer science, complexity and network science, control theory, information theory, and increasingly statistical learning and artificial intelligence].
- Stimulate the formation of research units, through targeted fellowships, and seed funding, leading to clustering around fields sustained by programmatic grants.
- Act as a focal point for promoting collaborative research among scientists in the region, partly by hosting visitors, and partly by organizing thematic programs, topical meetings, workshops, and conferences in pertinent fields.
- Respond to national/regional priorities by collaborating with national research centers/units around vital data and its mathematical/computational modeling (e.g. stochastic modeling of epidemics, complexity and network science at the service of resilience, modeling of hydrogeological/geophysical measurements, data driven models of ocean/atmosphere circulation).
- Structure and support activities that stimulate awareness about mathematics across all levels, leading up to undergraduate and graduate research [e.g., Mathematics Olympiad, summer research programs, PhD-to-PhD conferences, CIMPA Schools, broad public talks, teacher training workshops, etc.].

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:

- 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.
- To generate research and evidence-based policy recommendations to address local and regional challenges.
- 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 & 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

Introduction

The Munib & 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 & Angela Masri Foundation.

Mission

The Munib & 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 & 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, and management of 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 & 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.

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
- Chair in Conflict Medicine in Honor of Dr. Ghassan Abu-Sittah
- 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

- Albert Rihani Chair in Humanities
- 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
- Philip K. Hitti Endowed Chair in Middle Eastern Studies
- 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)
- The Writing Center

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
- Prince Alwaleed Bin Talal Bin Abdulaziz Alsaud Center for American Studies and Research (CASAR)
- Science and Mathematics Education Center (SMEC)
- 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
- Ford Foundation Endowment to the Center for Research on Population and Health

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 Youssef Lahoud Endowed Scholarship
- Abdel Rahim Mahfouz Scholarship for Medical Students
- Abdel Rahman Tabbara Scholarship
- Abdo and Sally Kadifa Scholarship
- Abdul Aziz Al-Bahar Scholarship
- Abdul Aziz Soueidan Endowed 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
- Act for Lebanon Scholarship
- ACTS Scholarship
- Adham El Khalil Scholarship
- Adib Bassatne Scholarship for Medical Students
- Advancement Scholarship for Online Students
- Aghnie Farouk Abi Rafeh Endowed Scholarship
- Agnes Varis Endowed Scholarship
- Ahmad Abdul Jabbar Endowed Scholarship Fund
- 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
- Akram Miknas Scholarship
- Al Kazzi Family Scholarship
- Al Reem Marble Scholarship
- Al-Anoud Afif Al-Mahmassani Scholarship
- Alarab Education Foundation Scholarship

- Alexander Ercklentz 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 for Assyrians
- Alice Michael Scholarship for Assyrians
- Allen Page McKee Endowed Scholarship
- ALMA Scholarship for Medical Students
- Alsaad General Contracting Endowed Scholarship
- Alumni Class Reunion Endowed Scholarship
- Amal and Farouk K. Jabre Endowed Scholarship Fund
- AMALAS Current Scholarship
- AMALAS Endowed Scholarship
- Amany Scholarship
- Ambassador Frank G. Wisner Scholarship
- Ambra Daouk Dabbous Scholarship
- Amer Zeitoun Scholarship
- Amina & Deeb Haidar Scholarship
- Amina and Deeb Haidar Endowed 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
- 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 Endowed Scholarship
- Arabia Insurance Nabih Faris Memorial Endowed Scholarship
- Archak & Maroun Senekjian Scholarship Fund
- AREC ’82 Endowed Scholarship
- AREC ’82 Scholarship - Current
- 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
- 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 Outdoors Scholarship
- AUB Scholarship Fundraising Committee
- AUB Scholarship Fundraising Committee Endowed Scholarship
- AUB Women Centennial Fund
- AUB4Students Scholarship
- Awni Toukan Endowed Scholarship
- Awni Toukan Scholarship
- Ayman Taji Farouki Scholarship Fund
- Azeez & Saleemeh Shaheen Scholarship Fund
- Aznive Etinoff Memorial Scholarship
- Bana Hilal Endowed Scholarship
- Bank Audi Scholarship
- BAPCO Endowed Scholarship
- Barakat-Sawabini Endowed Scholarship Fund
- Bashar Hassan Khayat Memorial Endowed 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
- BoB Finance Scholarship
- Bobst - Endowed Scholarships - Old
- Boodai Endowed Scholarship Fund
- Bushra Itani and Ahmad Issa Endowed 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 Endowed Scholarship
- 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 1974 Endowed Scholarship
- Class of MD 2000 Endowed Scholarship
- Class of MD 89 Endowed Scholarship
- Cleartag-Mirum Endowed Scholarship
- CMA CGM Excellence for Education
- Computer Science Alumni Chapter Endowed Scholarship
- Constantine Zurayk Endowed Scholarship
- Daniel & Emily Oliver Endowed Scholarship
- Daniel Bliss Scholarship
- Dar Al Wafaa Endowed 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
- Don and Nancy Mafrige Scholarship
- Donald C. Platten Scholarship
- Doris Dodge Endowed Scholarship
- Dorothy H. Rogers Memorial Endowed Scholarship
- Douma Ladies Charitable Society Endowed Scholarship
- Dr. Abdallah, Mohamad, and Shaikha Isa Endowed Scholarship
- Dr. Abderrahman Samih Toukan Endowed Scholarship
- Dr. Abderrahman Samih Toukan Scholarship
- Dr. Abdu George and Janice Hawwa 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. Anny P. Bakalian Scholarship
- Dr. Antoine Zahlan Endowed Scholarship

- Dr. Dimitri Bitar Endowed Scholarship
- 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 Endowed Scholarship
- Dr. Fawwaz Habbal Scholarship
- Dr. Fawzi N. Abu-Jamra Endowed Scholarship
- Dr. Fawzi N. Abu-Jamra Scholarship
- Dr. Francois and Jill Hamzé Scholarship in Medicine
- 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. Hanna C. and Ann K. Kutteh Endowed Scholarship
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- Dr. John I. Mirhij Scholarship
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- Dr. Marwan S. Abouljoud Scholarship
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- 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
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- 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. Samir and Cynthia Fakhry Endowed Scholarship
- Dr. Samuel White Endowed Scholarship
- Dr. Shahrokh Mokhtari Memorial Endowed Scholarship
- Dr. Varouj and Lena Altebarmakian Endowed Scholarship
- Dr. William Carslaw Memorial Scholarship
- Dr. Yakub Inati Scholarship
- Dr. Yusuf K. Hitti Endowed Scholarship
- Dr. Zoheir and Hana Abdelbaki Scholarship
- Dr. Zuhayr A. Moghrabi Scholarship
- Drs. Abdullah and Daoud Sulaiman Kassir Memorial Endowed Scholarship
- Drs. Adel and Larry Anna Afifi Endowed Scholarship
- Dunia Foundation Endowed Scholarship
- Dunia Foundation Scholarship
- 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
- Elias Khoury Excellence Award in Literary Studies and Humanities
- Elias Salloum Scholarship
- Elie Khalil Khouri Endowed Scholarship
- Elissar Farah and Assaad Antonios Endowed Scholarship
- Elsa and Stanley Kerr Scholarship
- EMBA Chapter Scholarship
- Emile and Helen Chartouni Endowed Scholarship
- Emile and Helen Murr Dabaghi Endowed Scholarship
- Enno and Hildegard Ercklentz Endowed Scholarship
- Evergreen Community School 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
- Faisal AlMutawa 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
- Fatima Hamdan Daher Endowed Scholarship
- Fatima Hamdan Daher Scholarship
- Fatimah Abu-Ghazaleh Scholarship
- Fawwaz Ulaby and Jean Cunningham Endowed Scholarship
- Fawzi and Lili Farah Endowed Scholarship
- Fawzi M. Yaqub Endowed Scholarship
- Fayette and Toufic Dabboussi Endowed Scholarship
- Faysal and May El Khalil Scholarship
- FEAMS Distinguished Student Endowed Award
- FFA Private Bank Scholarship
- Financial Aid to Medical Students
- Fingerprints Endowed Scholarship Fund
- Firas Jalloul Scholarship
- 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
- Gabrielle Faddoul Scholarship
- Gaza Endowed Scholarship
- General Scholarship Fund
- General Wissam Al Hassan Endowed Scholarship in Computer and Communication Engineering
- General-Centennial
- 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
- Ghaleb and Rima Daouk Endowed Scholarship
- Ghassan Abou-Alfa and Eileen O'Reilly Endowed Scholarship
- Ghassan Al-Mahasini Scholarship

- Ghassan and Manal Saab Endowed Scholarship
- Ghassan and Manal Saab 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
- Hadhramout Foundation - AUB Scholarship
- Hana Jabsheh 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 and Nehmat Saab 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
- Howard W. Page Endowed 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 and Leila Ammar Scholarship
- Husson Halabi Yassir Foundation Scholarship
- Ibrahim and Norma El-Chammas Endowed Scholarship
- ieng Impact Scholarship
- IFANCA Scholarship

- Ihsan Omar Baalbaki AUB Scholarship
- Imad Gholmieh Endowed Scholarship
- Imad Taher Current Scholarship
- Imad Taher Endowed Scholarship
- IMAR Trading and Contracting Scholarship
- Impact Scholarship
- Intermedic (Jean Farah & Co.) Sal Scholarship
- Irani-Schwartz Endowed Scholarship
- Isam Ibrahim Nubani and Khalil Ibrahim Noubani Endowed Scholarship
- Isam Salfiti Scholarship
- Issam and Najat Saliba Scholarship
- J.J. Arakelyan Endowed Scholarship
- Jabir Shibli Endowed Scholarship
- Jacques A. Nasser Endowed Scholarship
- Jad Moghaizel Endowed Scholarship
- Jalal and Gabrielle Saad Endowed Scholarship
- Jalal and Gabrielle Saad Scholarship
- Jamile Dagher Jureidini Endowed Scholarship
- Jassim Boodai 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
- Julian Farah Yazbek Current Scholarship
- Julian Farah Yazbek Endowed Scholarship
- Jusoor - AUB Scholarship
- Kamal and Nuha Hemady Endowed Scholarship
- Kamel Abdelrahman Endowed Scholarship
- Kamel Dajani Memorial Scholarship
- Kamel, Aliya, and Nassim Saidi Endowed Scholarship
- 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 10.8 President's Athletic 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 Barrage Family Endowed Scholarship
- Khalil Barrage Family Scholarship
- Khalil Bsheer Memorial Endowed Scholarship
- Khalil Tabet Memorial Endowed Fund
- Khawla Hobeika Rizk Endowed Scholarship
- Khushroo N. J. Patel Memorial Endowed Scholarship
- KPMG Middle East Impact Scholarship
- Kuzbari Family Scholarship
- Laila Al Zein Scholarship
- LASeR - AUB Graduate Scholarship
- Laurice Khoury Maalouf Scholarship
- Lea Foundation Scholarship
- Lebanese International Finance Executives (LIFE) - AUB Scholarship
- Leo and Arminé Aroian Merit Scholarship
- Lina Naaman Azhari Endowed Scholarship
- Liu Shiming Endowed Scholarship
- Liu Shiming Scholarship
- LNI - AUB Endowed Graduate Scholarship
- Loreen Rihani Scholarship
- Lulu Hasan 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 Dalal Endowed 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
- 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
- Marwan and Mary Abouljoud Endowed Scholarship
- Mary and Archie S. Crawford Scholarship
- Mary Bajada Memorial Scholarship for Women

- Mary R. Robinson Endowed Scholarship
- Marzouk Jassim Al Marzouk Scholarship
- Matiel Mogannam Endowed Scholarship
- May El Khalil Endowed Scholarship for Exceptional Athletes
- May El Khalil Scholarship for Exceptional Athletes
- 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
- Medical Students Scholarship
- Melhem and Tamani Zein Scholarship
- MEMA Scholarship for Medical Students
- Michael N. Malouf Endowed Scholarship
- Michel Alexandre Namour Memorial Endowed Scholarship
- Michel Rais Endowed Scholarship
- Micheline and Francois Nader Endowed Scholarship
- Micheline and Francois Nader Scholarship - Current
- Midis Group Scholarship Fund
- Mikati Foundation Scholarship
- Mikhail and June Nasrallah Endowed Scholarship
- Miles & Nancy Lovelace Scholarship
- Mindsets Scholarship
- MM Scholarship for Nursing
- Mohamad (Oliver) Zeitoun Endowed Scholarship
- Mohamad Ali Zameli and Dina Tabbara Endowed Scholarship
- Mohamad S. Dimashkieh Endowed Scholarship
- Mohamad-Kheir and Wahiba Salem Endowed Scholarship
- Mohammad Al Saadi Scholarship
- Mohammad Hassan El-Chaar Memorial Scholarship
- Moise Antun Khayrallah Endowed Scholarship
- Moise Antun Khayrallah Scholarship
- Mona Chemali Khalaf Endowed Scholarship
- 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
- Musa and Amal Freiji Endowed Scholarship
- Mustapha and Leila Bissat Endowed Scholarship
- Nabil & Billie Sakkab Scholarship
- Nabil Kobeissi Scholarship
- Nada Debs Endowed Scholarship
- Nada Mneimneh Scholarship
- Najeeb N. Meshaka Memorial Endowed Scholarship
- Najib Ibrahim Salha Scholarship
- Najjad Zeenni 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
- New Hope Scholarship
- Nicholas and Claudia Barakat Scholarship
- Nicola Ziadeh Endowed Scholarship Fund
- Nimr Tuqan Prize in Pathology
- Nizam Shammas Scholarship
- Nizar Banat Memorial Scholarship
- North Lebanon Scholarship Fund
- Nouhad and Rasha Daouk Scholarship
- Noura Hatem Juffali Endowed Scholarship
- Noureddine Ghaziri Scholarship
- Novus Aviation Capital Scholarship
- Odette Atalla Endowed Scholarship
- Odette Atalla Scholarship
- Oliver Maki Scholarship
- OSB General Scholarship
- OSB International Student Scholarship
- OSB International Student Scholarship
- Osmane Aidi Scholarship Fund
- Oussama Aboughazale Scholarship
- Palestinian Cultural Club Scholarship Fund
- Palestinian Students Emergency Scholarship
- Pauline Nadim Makdisi Memorial Scholarship
- Petrofac Fund for Engineers
- Philip and Mary G Hitti Endowed 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
- Quasi-Endowment - Restricted To General Scholarships Fund
- Quencia Capital Scholarship
- R. Bayly Winder Endowed Scholarship
- Rabih and Rana Hamze Endowed Scholarship
- Rabih Fakhreddine Endowed Scholarship
- Rada and Mutaz Sawaf Current Scholarship
- Rada and Mutaz Sawaf Endowed Scholarship
- Rafeek Program Scholarship
- Raffy Manoukian Scholarships
- Rafic Bawab Scholarship
- 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
- Rami Bitar Scholarships
- Ramsey U. Sheikh 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
- René Saade Scholarship
- Reverend Dr. Lois A. Aroian Endowed Scholarship
- Riad and Hassana Sadik Endowed Scholarship
- Riad Kamal Scholarship
- Riad Mneimneh Scholarship
- Ricardo and Youmna Karam Scholarship
- Rida Irani Memorial Endowed Scholarship
- Rima Abdul Jabbar Endowed Scholarship
- Rima Aiko and Maya Farah Makhoul Financial Aid Fund
- Rima Moussallem Otrakji Current Scholarship
- Rima Moussallem Otrakji Endowed Scholarship
- Robert and Mary B. Shea Endowed Scholarship

- Robert and Myrle Linnell Endowed Scholarship
- Rony Akiki Scholarship
- Roosevilt and Georgette Fattouh Endowed Scholarship Fund
- Roula and Fouad Tamer Scholarship
- RSM Endowed Scholarship
- Ruhi K. Hindawi Endowed Scholarship for Medical Students
- S. M. Minassian Endowed Scholarship
- S. Rayyis and A. Afifi Endowed Scholarship
- Saadat Hasan Endowed 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
- Salem Suleiman Al-Othman Memorial Endowed Scholarship
- Salim and Hafıza Arnaout Endowed Scholarship
- Salwa Es-Said Endowed Scholarship
- Samer and Hiba Al-Rayyes Endowed Scholarship
- Samer and Hiba Al-Rayyes Scholarship
- Sami Moussa Current Scholarship
- Sami Moussa Endowed Scholarship
- Sami Mubarak Endowed Scholarship
- Sami Sidawi Endowed Scholarship
- Samia Ghobril Endowed Scholarship
- Samia Nadim Abou Samra Scholarship
- Samia Taji Farouki Arts and Sciences Merit Scholarship
- Samih Alami Memorial Endowed Scholarship
- Samir & Salwa Khoury Scholarship
- Samir Ahmad Zaabri Scholarship
- Samir and Malak Abdulhadi Scholarship
- Samir El Khatib Current Scholarship
- Samir El Khatib Endowed Scholarship
- Samira AbdelKader Kalache Scholarship
- Samira Fadli Scholarship Fund
- Samira Kanso Sayegh Scholarship
- Samuel B. and Grace H. Kirkwood Scholarship
- Samuel Van Allan Undergraduate Scholarship
- Sana A. El-Hajj Career Readiness Program Merit Scholarship Endowed Fund
- Sana A. El-Hajj Career Readiness Program Merit Scholarship Fund - Current
- Sandouk El-Zakat Scholarship
- Sansabil AbuRaslan Current Scholarship
- Sansabil AbuRaslan Endowed Scholarship
- Saoud Gharizi 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
- Shireen Abu Akleh 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
- Stella B. Kern Endowed Scholarship
- Stephen A. Miller Endowed Scholarship
- Strategy& Endowed Scholarship
- Student Solidarity Scholarship
- Suad Joseph Endowed Scholarship
- Sudan Students Endowed Scholarship
- Sufyan Saleh Scholarship
- Suhayl Assaf Farah Endowed Scholarsip
- 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
- T.A.K. Scholarship
- Taawon Scholarship
- Talal and Roula El-Khalil Endowed Scholarship
- Talal Nasereddin Scholarship
- Taleb Scholarships
- Tamari Foundation Scholarship
- Tamim and Lamis Sahli Endowed Scholarship
- Teddy and Diana Abdo Endowed Scholarship Fund
- Teddy D. Abdo Scholarship
- Terry and Pierre Aboukhater Endowed Scholarship
- Teta Endowed Scholarship
- The Advancement of Women in Engineering Scholarship
- The Aisha Al Mana Endowed Graduate Scholarship for Women in Nursing and the Health Sciences
- 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 AUB4Students Scholarships
- The Bassam Hamdi Al Aker Scholarship in Agricultural and Biosystems Engineering
- The Brummana High School Cultural Society Endowed Scholarship
- The CFI 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 Khaireddine El Jisr Scholarship
- The Family of Late Najib Daoud Sahyoun Endowed Scholarship
- The George and Mary Farah Endowed Scholarship
- The Hassun Scholarship
- The Herter Endowed Scholarship
- The Holcim Scholarship
- The Houda Idriss Memorial Endowed Scholarship Fund
- The IC Alumni Association - AUB Scholarship
- The Karim El Arab Endowed Scholarship for Distinguished Athletes
- The Karim El Arab Scholarship for Distinguished Athletes
- The Khayreddine and Adel Abdul-Wahab Endowed Scholarship
- The Landscape Middle East 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 Sallaum Humanity Foundation 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 Wadih Jureidini Endowed Scholarship
- The Wellspring Learning Community Endowed Scholarship
- 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

- Unifert Endowed Scholarship
- USFC Endowed Fund
- Violette Haddad Kteily Memorial Endowed Scholarship
- Viviane Tabar Scholarship
- 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 - Northern California Chapter Endowed Scholarship
- WAAAUB - Oman Chapter Endowed Scholarship
- WAAAUB - Ottawa Chapter Scholarship
- WAAAUB - Philadelphia/Delaware Valley Chapter Endowed Scholarship
- WAAAUB - Qatar Chapter Current 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 - Dubai Chapter Student Aid Scholarship
- WAAAUB - Greater Los Angeles Chapter Endowed Scholarship Fund
- WAAAUB - Kuwait Alumni Chapter Athletics Scholarship
- WAAAUB - New England Chapter - Shukri Khuri Endowed Scholarship
- 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
- Wellspring Learning Community Employees Scholarship
- 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
- Wissam and Hiba Nesr Scholarship
- Women's Auxiliary Nursing Scholarship
- Women's League Scholarship
- Yasser and Lala Ezzedine Scholarship
- Yasser and Nouha Rabah Endowed Scholarship
- Yasser and Zeina El-Hajj Endowed Scholarship
- Youssef Matar and Madeleine Ghantous Matar Scholarship
- Yousuf Mansour Endowed Scholarship
- Yusef Abu Khadra Endowed Scholarship
- Yusuf and Najat Zarour Dubai Alumni Endowed Scholarship
- Yusuf Mansour Scholarship
- Zahra Bissat Endowed Scholarship Fund
- Ziad and Lana Halabi Endowed Scholarship
- 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
- Zoya Rais Endowed Scholarship

Fellowships

- Anonymous Pierre Amin Gemayyel Endowed Doctoral Fellowship in MSFEA
- Dr. Ibrahim Salti Endocrinology and Metabolism Fellowship
- Dr. John I. Makhoul Endowed Fellowship
- Dr. Ziad Salem and Mrs. Hana AbuKhadra Oncology Fellowship Endowed Award
- Ghana Kamel Abdel Rahman Endowed Fellowship in Metabolic Bone Disorders
- 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
- MSFEA Research Endowment
- Munib and Angela Masri Geriatric Medicine Fellowship Award
- Nayel Al Harith Endowed Fellowship
- Professor Maan Z. Madina Endowed Fellowship
- Shamma'a Gastroenterology Fellowship Endowed Fund
- The Medicals International Refractive Surgery Fellowship Award
- Zakhem Endowed Fellowship

University Prizes and Awards

Abdul Kader Sbaiti Spirit in Sports Endowed Award: Awarded to a student who is involved in varsity sports and shows exemplary team spirit, fair play, and integrity in sports.

Brummana High School Cultural Society Excellence Award: Awarded to the top graduate student who is a Brummana High School alumnus with a high average.

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.

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 percent financial aid to qualify for the award.

Farid Saab Student Athlete Award: Awarded to a full-time student who has been a varsity athlete for at least one year, maintains good academic standing, 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.

Mary Jones Memorial Award: Awarded to a graduating female student who exemplifies outstanding commitment to community service and volunteerism.

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.

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.

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, and demonstrates commitment to diversity, equity, and inclusion.

WAAAUB - Abu Dhabi Chapter Student Endowed Award: Awarded to the student with the highest GPA in each faculty and who graduated from a high school in Abu Dhabi.

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.

Aiman Suleiman Student Development Fund: Awarded to a student or a team who receive/s the highest ranking for the capstone project.

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).

Beit el Baraka & AUB Keepers of the Land Award: This award will be conferred on a final year project competition in agribusiness, agriculture, and nutrition and food science.

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.

Dean Edgecombe Memorial Prize: Awarded to the outstanding student in third year agriculture.

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 in accumulating the highest GPA over his/her graduate studies at AUB.

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.

Director Fawwak Slieman – Dean John Fischer Endowed Award: awarded to a graduating 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. Musa Najib Nimah Endowed Award for Academic Excellence: Awarded to an undergraduate student who has the highest cumulative GPA.

Dr. Yusuf Abou Jawdah Endowed Award: Awarded to third or fourth 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.

Joana Haidar Award: Awarded to an AREC student who is environmentally aware and interested in agricultural practices and development.

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.

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.

Faculty of Arts and Sciences

A. Karim and Soraya El Cheikh FAS Student Leadership Award: Awarded to a female graduating student from FAS with a high cumulative GPA and who either demonstrated leadership in an AUB student club/FAS society or is a member of a varsity team.

Abdallah Lahoud Foundation Endowed Award: Awarded to an undergraduate student with the highest average in history or archeology.

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.

Ahmad and Fadwa Dannawi Award: Awarded to graduate MA or diploma student in Islamic studies who has demonstrated academic excellence and commitment.

Amal Saidi Memorial Prize: Awarded to a graduating senior excelling in the subject of anthropology or sociology.

Antoun Saadeh Cultural Foundation Best Student Essay Endowed Award: Awarded to the outstanding student essay on social reform in the Arab World.

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.

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.

Dana Kambris Memorial Award: Awarded to a senior economics student leading community service through apolitical and a sectarian volunteering.

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.

Dr. Basil Fuleihan Excellence Award in Economics: Awarded to the graduating student with a BA degree in economics who succeeded in accumulating the highest GPA over his/her period of study.

Dr. Elaine Hagopian Endowed Award: Awarded to a graduate or undergraduate student who has excelled in their studies in sociology or anthropology and has demonstrated a commitment to the pursuit of social justice and human rights issues.

Dr. Fuad Said Haddad award in Education: Awarded to the graduate MA student in education with the best thesis as selected by the Department of Education of the Faculty of Arts and Sciences.

Dr. Kassim Shaaban Excellence Award in the Faculty of Arts and Sciences: Awarded annually to an undergraduate student from the Bekaa Valley with the highest average in the Faculty of Arts and Sciences.

Dr. Mohammad Chatah Excellence Award: Awarded to the graduating student with a BA degree in political studies who succeeded in accumulating the highest GPA over his/her period of study.

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.

Dr. Randa Antoun Annual Award for Public Service and Civic Engagement: Awarded to an outstanding senior student in PSPA.

Educators' Endowed Award in Education: Awarded to one or two outstanding in the Department of Education in acknowledgment of their achievement. These students should have known innovation, performed community service, and maintained good academic standing.

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.

Ghazi and Maya Nourallah Endowed Innovation Award: Awarded to undergraduate student(s) in computer science or electrical and computer engineering (ECE). This award follows a contest between the two departments, where each year, one team (up to three contestants per team) will win, either from the Computer Science (CMPS) department or the ECE Department.

Hana Jabsheh Endowed Award: Awarded to an undergraduate student majoring in the department of Fine Arts and Arts History, with the highest GPA.

Haykal Media Award in Arabic: Awarded to the top graduating student majoring in Arabic with the highest cumulative GPA during his/her undergraduate studies.

HE Ghassan Al-Rashash Excellence Award in Political Studies: Awarded to a graduating student with the highest GPA in the graduate program in political studies.

Hussein Oueini Memorial Awards: Awarded equally between a graduating senior student in PSPA with the highest GPA 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.

Jack and Hoda Afram Manok Endowed Award: Awarded to a graduating student in education with the highest GPA.

Kalim Bechara Award: Awarded to an undergraduate student majoring in studio arts who shows promise in artistic creativity.

Kamel Mrowa Award in Media Studies: Awarded to a graduating student with a master's degree in media studies who demonstrates outstanding academic achievement and successfully completes his/her end-of-year project or thesis with a topic revolving around the past, present, or future of journalism.

Khawla Hobeika Rizk Endowed Award in Education: Awarded to the top senior female student in education.

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.

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.

Majida Sanioura Memorial Prize in Humanities: Awarded to a top graduate senior in arts and humanities at 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.

Mansur H. Jurdak Excellence Award in Mathematics: Awarded to a graduating student majoring in mathematics at the Faculty of Arts and Sciences with top academic achievement.

Mark Sawaya Endowed Award: Awarded to the graduating senior student in computer science with the highest GPA.

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.

Mrs. Jinan Majzoub Excellence Award in English Literature: Awarded to a graduating student with the highest GPA in the graduate program in English literature.

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.

Muhanna Foundation in Mathematics Award of Excellence: Awarded annually to the most outstanding senior Lebanese student in the Department of Mathematics.

Murad al-Akl Awards: Awarded annually for the best essay, speech, or debate on a given subject by the Department of English.

Nabil Bukhaled Endowed Excellence Award in Computing: Awarded to a graduating student who has demonstrated an excellence in the field of computing. Established to honor the life and legacy Nabil Bukhaled, the Nabil Bukhaled Excellence Awards in computing will be conferred on a graduating student with very high academic achievements graduating with a degree in computer science and one in computer engineering.

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.

Nadia Cheaib Hoballah Award in Education: Awarded to a graduating female student majoring in education who has demonstrated a passion for the field of education and teaching.

Nadim Khalaf Endowed Award: Awarded to a senior economics student with the highest average.

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.

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.

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.

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.

Randa Azzam Khoury Endowed Award in Education: Awarded to a graduating education teaching diploma (TD) student, with a preference to elementary education.

Randa Bdeir Award in Gender Equity: Awarded to qualified undergraduate or graduate student(s) from the Department of Sociology Anthropology and Media Studies (SOAM) or the Center for Arab and Middle Eastern Studies (CAMES) who had authored the best paper on a topic related to gender studies.

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.

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.

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, promoted moral and academic excellence, tolerance, inclusivity, and innovation in education, and is on financial aid.

Samir Makdissi Award in Economics: Awarded to a graduate student in economics for the best project/thesis.

Selma Mirshak and Mohsen Slim Endowed Student Award: Awarded to a graduate student majoring in sociology who has conducted best field work research.

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.

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.

Suad Sabbagh Sanioura Memorial Prize: Awarded to a graduating student majoring in economics, in a very good academic standing.

Melhem and Tamani Zein Endowed Award in Fine Arts: Awarded to an undergraduate student majoring in fine arts, with the highest major average throughout his undergraduate years of study.

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.

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.

Yvonne Stead Nasr Award for Community Impact in Education: Awarded to a female graduate student who has completed a master's thesis and who has contributed or shown significant potential for community impact.

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.

William Van Dyck Endowed Award in Biology: Awarded to the graduating senior student with the highest GPA.

Maroun Semaan Faculty of Engineering and Architecture

Abdallah Darwiche Endowed Award: Awarded to a group of students who submit the best final year project in the Department of Electrical and Computer Engineering (ECE).

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.

Aline Daoud Award: Awarded to a female student pursing a degree in engineering who has excelled or provided a contribution to the topic of supply chain management.

Cesar P. Moukarzel Award for Urban Innovation and Sustainability: Awarded to encourage participants to present projects that would enable cities in Lebanon to be more livable, welcoming, sustaining people's needs and presenting a better quality of life in the long run.

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.

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.

Dr. Robert Saliba Award for Excellence in Urban Design and Research: Awarded to a student for excellence in thesis work done in the urban design graduate program or in architecture, on a topic that is on Beirut and on core to Professor Saliba's research such as modern heritage, infrastructural breaks, or reconstruction.

Farouk W. Agha Excellence Award: Awarded to a graduating student with a BE degree in mechanical or civil engineering who accumulated the highest GPA 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.

Ghazi and Maya Nourallah Endowed Innovation Award: Awarded to undergraduate student(s) in computer science or electrical and computer engineering (ECE). This award follows a contest between the two departments, where each year, one team (up to three contestants per team) will win, either from the Computer Science (CMPS) department or the ECE Department.

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.

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.

Nabil Bukhaled Endowed Excellence Award in Computing: Awarded to a graduating student who has demonstrated an excellence in the field of computing. Established to honor the life and legacy Nabil Bukhaled, the Nabil Bukhaled Excellence Awards in computing will be conferred on a graduating student with very high academic achievements graduating with a degree in computer and communication engineering.

Narine Bolghourjian Exemplary Engagement Endowed Award: Awarded to an undergraduate student in recognition of leadership, character, and contribution to the AUB life/community.

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.

Nicolas and Faride Moujaes Student Award in Engineering: Awarded to graduating student/students who presented the most innovative final year project.

Professor George and Frida Ayoub Endowed Award: Awarded to an engineering student, graduate or undergraduate, who creatively contributes to the environmental engineering field.

Resource Group Entrepreneurship Award: Awarded to students who present the best project in cybersecurity or privacy to support the establishment of a startup.

Toters Technology Innovation Award: Awarded for a senior project in electrical and computer Engineering that demonstrates outstanding creativity, originality, and impactful application of innovative technologies. It celebrates students who push the boundaries of tech to develop innovative solutions that address real-world challenges.

Youssef M. Salam Civil Engineering Excellence Award: Awarded to a graduating student with a BE degree in civil engineering who accumulated the highest GPA during her/his period of study at AUB.

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.

Dr. Musa Najib Nimah Endowed Award for Academic Excellence: 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.

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.

Integrative Learning Experience (ILE) Best Poster Award: A non-cash honorary award presented to the graduating MPH student who achieves the highest overall score in the ILE poster presentation, demonstrating outstanding synthesis and application of theory and practice, critical insight, and excellence in public health communication. The score is determined by a jury panel, and the poster presentation serves as the culmination of a year-long work on the project.

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.

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.

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.

Faculty of Medicine

Abdul Aziz and Jamileh Soueidan Excellence Endowed Award in Medicine: Awarded to a graduating student majoring in medicine with top academic achievement and demonstrated dedication to the profession.

Dr. Abdul-Latif H. Hamdan Endowed Award: Awarded to a chief resident who produced the best research paper in the field of otolaryngology and related-specialties.

Dr. Bassem Tanios Best Resident Teacher Endowed Award: Awarded to the best resident teacher.

Dr. Herbert R. Nassour Jr. Surgery Residency Award: Awarded to a medical doctor pursuing his/her residency training in general surgery.

Dr. Jamal Jawad Hoballah Surgical Residency Award: Awarded to a graduating resident in the Department of Surgery at AUBMC who demonstrates excellence in research.

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.

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.

Dr. Ralph Said Papas Endowed Award: Awarded to a resident or fellow in OBS/GYN who has been in very active, impactful, and demonstrated productive research as a first priority. As a second priority for a resident or fellow who exhibits excellence in teaching.

Dr. Roland Jamil Tannous Endowed Award: Awarded to a resident or fellow in OB/GYN who exhibits consistent compassionate care towards patients.

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.

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.

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.

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.

Professor Ibrahim Salti Award: Awarded to the best project by an endocrine fellow.

Rafic Hariri School of Nursing

Florence Nightingale Award: Awarded to an undergraduate senior student who meets the following criteria: academic achievement, professional integrity, and contribution to professional and university life.

Janet Jeries Haddadin Nursing Award: Awarded to an undergraduate student with the highest GPA.

Rouzan Al-Najjar Memorial Award in Nursing: Awarded to three 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.

Siham Rida Ali Endowed Nursing Award: Awarded to a top graduating senior student from the Rafic Hariri School of Nursing (HSON), who demonstrates excellence and high impact in a community project or engagement.

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, and a willingness to join AUBMC after graduation.

Suliman S. Olayan School of Business

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.

Arab Finance Corporation Excellence Award in Portfolio Management: Awarded to the best graduate student in portfolio management in the IMP program.

Dr. Emile Ghattas Memorial Award: Awarded to the best graduating student in the bachelor of business administration program.

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.

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.

John and Mary Saba Excellence Award in Accounting: awarded to a graduating student majoring in business administration with track concentration in accounting and with the highest academic achievement.

Mahmoud and Deeba Achour Endowed Award: The award is intended for graduate students and preferably MFIN students in recognition of academic merit and excellence of character.

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.

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.

Quantum Communications Award in Business: Awarded to one or more graduating students in business with the highest academic achievements.

Randa Bdeir Prize for Entrepreneurial Spirit and Practice: Awarded to a female student who has demonstrated distinctive and sustained entrepreneurial spirit and practice during the course of the DSA competition.

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.

Samiha Tannir Student Sustainability Endowed Award: Awarded to a graduating student who has demonstrated exceptional commitment and contributions to sustainability initiatives within our community.

Endowed Research Funds

- Dar Al-Handasah (Shair and Partners) Endowed Fund for Research in Engineering
- Dr. Abdul-Latif H. Hamdan Endowed Otolaryngology Research Award
- Dr. Robert Saliba Award for Excellence in Urban Design and Research
- 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 and Rayya Daouk Research Fund at FAS
- E.Terry Prontho Fund for Research in Psychology at FAS
- A. Karim and Soraya El Cheikh FAS Research Fund
- FAS Endowed research fund ERFASR
- Khaled Y. Daouk Research Fund
- Mikati Endowed Research Fund (CSR)
- Professor Fawwaz Ulaby MSFEA Endowed Research Fund
- Rockefeller Foundation Graduate Education and Research at FAS
- Salim A. Salam Endowed Fund
- Suad Joseph Endowment for Palestinian Studies Award
- 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; Pharmacology and Toxicology
- Daghir, Nuhad; PhD, Iowa State University; Emeritus Dean; Faculty of Agricultural and Food Sciences - Dean's Office

Professors Emeriti

- Ayoub, George M.; PhD, Imperial College London; Emeritus Professor; Maroun Semaan Faculty of Engineering and Architecture - Dean's Office
- 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, Faculté Française De Médecine; Emeritus Professor; Medical Dean's Office
- Jurdak, Murad; PhD, University of Wisconsin-Madison; Emeritus Professor; Education
- Kawar, Nasri; PhD, Pennsylvania State University; Emeritus Professor
- Kazarian, Shahe; PhD, University of Western Ontario; Emeritus Professor; Psychology
- Khairallah, Assaad; PhD, Princeton University; Emeritus Professor; Faculty of Arts and Sciences - Dean's Office
- 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; PhD, New York University; Emeritus Professor; Surgery
- Makdisi, Samir; PhD, Columbia University; Emeritus Professor
- Mavromatis, Harry A.; PhD, Princeton University; Emeritus Professor; Physics
- Muallem, Musa; MD, American University of Beirut; Emeritus Professor; Medical Dean's Office
- Muwafi, Amin; Emeritus Professor; Faculty of Arts and Sciences - Dean's Office
- Sabah, Nassir Hussni; PhD, State University of New York; Emeritus Professor; Electrical and Computer Engineering
- Sakkal, Fateh; Emeritus Professor; Maroun Semaan Faculty of Engineering and Architecture - Dean's Office
- Seeden, Helga; PhD, University of London; Emeritus Professor; Faculty of Arts and Sciences - Dean's Office
- Seikaly, Samir; PhD, University of London; Emeritus Professor; History and Archaeology
- Simaan, Joseph; MD, American University of Beirut; Emeritus Professor; Medical Dean's Office
- Zurayk, Huda; PhD, Johns Hopkins University; Emeritus Professor; Epidemiology and Population Health

Faculty Members

- 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, Hosn; PhD, University of Toronto; Lecturer; Arabic and Near Eastern Languages
- Abboud, Jacques; PhD; Lecturer; Industrial Engineering and Management
- Abboud, Miguel; MD, American University of Beirut; Chairperson and Professor (Tenure Appointment); Pediatrics and Adolescent Medicine
- Abdallah, Khaled; PhD, Barrington University (University of Atlanta); Lecturer; Suliman S. Olayan School of Business
- Abdallah, Maher; PhD, Université de Strasbourg; Lecturer; Computer Science
- Abdallah, Mohamad; LL.B, Lebanese University; Instructor; Suliman S. Olayan School of Business
- Abdallah, Nour; MS, American University of Beirut; Clinical Instructor; Hariri School of Nursing
- Abdallah, Reem; MD, Université Saint Joseph; Associate Professor of Clinical Specialty; Obstetrics and Gynecology
- Abdel Baki, Jasmine; Clinical Associate; Dermatology
- Abdel Rahman, Abdel Fattah; PhD, McGill University; Professor; Earth Sciences
- Abdelnabi, Reem; MD, Beirut Arab University; Clinical Associate; Pediatrics and Adolescent Medicine
- Abdelnoor, John; MD, American University of Beirut; Clinical Associate; Surgery
- Abdessater, Maher; MD, Holy Spirit University of Kaslik; Assistant Professor of Clinical Specialty; Surgery
- Abdo Mouawad, Amer; PhD; Assistant Professor; Computer Science
- Abdo, Elie; PhD, Temple University; Assistant Professor; Mathematics
- Abdul Hay El Khayat, Nadine; PhD, University of Sheffield; Senior Lecturer; Architecture and Design
- Abdul Malak, Mohamed-Asem; PhD, University of Texas at Austin; Visiting Professor; Civil and Environmental Engineering
- Abdul Nabi, Sarah; MD; Clinical Associate; Emergency Medicine
- Abdulrahim, Sawsan; PhD, University of Michigan - Dearborn; Professor (Tenure Appointment); Health Promotion and Community Health
- Abela, Joe-Pietro; MA, Berklee College of Music; Instructor; Fine Arts and Art History
- Abi Aad, Amine; PhD; Assistant Professor; Suliman S. Olayan School of Business
- Abi Abdallah Doumit, Myrna; PhD, Duquesne University; Professor (Tenure Appointment); Hariri School of Nursing
- Abi Akl, Pierre Richard; MD; Clinical Associate; Otorhinolaryngology - Head and Neck Surgery
- Abi Ammar, Rabih; MBA, Lebanese American University - Beirut; Instructor; Suliman S. Olayan School of Business
- Abi Chahine, Maya; MA, French Faculty of Medicine; Instructor of Practice; Faculty of Health Sciences - Dean's Office
- Abi Fakher-Saab, Faysal; Clinical Associate; Diagnostic Radiology
- Abi Fakhr, Lina; Ed.D, University of Phoenix; Clinical Associate Professor; Hariri School of Nursing
- Abi Ghanem, Alain; MD, Université Saint Joseph; Assistant Professor of Clinical Specialty; Diagnostic Radiology
- Abi Ghannam, Niveen; PhD, University of Texas at Austin; Assistant Professor of Practice; Maroun Semaan Faculty of Engineering and Architecture - Dean's Office

- Abi Hanna, Margherita; MA, University of Wales; Lecturer; Architecture and Design
- Abi Khuzam, Farouk; PhD, Syracuse University; Professor; Mathematics
- Abi Rached, Joelle; MD, American University of Beirut; Associate Professor of Medicine (Tenure Appointment); Internal Medicine
- Abi Rached, Marc; M.Arch, Académie Libanaise Des Beaux-Arts; Senior Lecturer; Architecture and Design
- Abi Rafi', Randa; MS, American University of Beirut; Instructor; Chemistry
- Abi Saad, George; MD, American University of Beirut; Professor of Clinical Specialty; Surgery
- Abiad, Firass; MD, American University of Beirut; Assistant Professor 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 Chabke, Joelle; MA, University of Balamand; Instructor; Sociology, Anthropology and Media Studies
- Abou Chebel, Naji; MD, Université 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; Instructor of Clinical Specialty; Pediatrics and Adolescent Medicine
- Abou Dalle, Iman; MD, Lebanese University; Assistant Professor of Clinical Medicine; Internal Medicine
- Abou Diwan, Ralph; MD, Université Saint Joseph; Instructor of Clinical Specialty; Diagnostic Radiology
- Abou Fadel, Carla; MD, American University of Beirut; Clinical Associate; Internal Medicine
- Abou Fayad, Antoine; PhD, University of St Andrews; Associate Professor (Tenure Appointment); 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 Hussein, Tarek; PhD, Harvard University; Assistant Professor; 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 Jaoudi, Nadim; Clinical Associate; Dentofacial Medicine
- Abou Jawdeh, Youssef; PhD, Faculté des Sciences Agronomiques; Professor (Tenure Appointment); Agriculture
- Abou Kassm, Rolande; MD; Clinical Associate; Diagnostic Radiology
- Abou Kheir, Wassim; PhD, Yeshiva University; Professor (Tenure Appointment); Anatomy, Cell Biology, and Physiology
- Abou Mjahed, Mirna; PhD, NEOMA Business School; Visiting Assistant Professor; Suliman S. Olayan School of Business
- Abou Nafeh, Nancy; MD, Université Saint-Esprit de Kaslik; Assistant Professor of Clinical Specialty; Anesthesiology and Pain Medicine
- Abou Rahal, Jihane; MD, American University of Beirut; Assistant Professor of Clinical Specialty; Dermatology
- Abou Samra, Clara; MPH, American University of Beirut; Instructor of Practice; Faculty of Health Sciences - Dean's Office

- Abou Samra, Nidal; BA, Université Saint-Esprit de Kaslik; Instructor; Fine Arts and Art History
- Abou Tanos, Barbara; DBA; Assistant Professor; Suliman S. Olayan School of Business
- Abou Zeid, Maya; PhD, Massachusetts Institute of Technology; Professor (Tenure Appointment); Civil and Environmental Engineering
- Abouchala, Nour; MA, Lebanese American University - Beirut; Instructor; English
- Abu Diab, Sara; MS, American University of Beirut; Instructor; Mathematics
- Abu Khuzam, Hazar; PhD, University of California; Professor; Mathematics
- Abu Saada, Nadi; PhD, University of Cambridge; Visiting Assistant Professor; Architecture and Design
- Abu Salem, Fatima; PhD, University of Oxford; Professor (Tenure Appointment); Computer Science
- Abu-Alfa, Ali; MD, American University of Beirut; Chairperson and Professor (Tenure Appointment); Internal Medicine
- Abunnasr, Yaser; PhD, University of Massachusetts; Associate Professor (Tenure Appointment), Convener and Director of NCC; Landscape Design and Ecosystem Management
- Abusamra, Murad; MD, Al-Quds University; Adjunct Assistant Professor; Diagnostic Radiology
- Abu-Sittah, Ghassan Soleiman; MD, University of Glasgow; Professor (Tenure Appointment); Surgery
- Acikgoz, Umit Firat; PhD, Rice University; Assistant Professor; Architecture and Design
- Adib, Salim; MD, Université Saint Joseph; Professor of Practice; Faculty of Health Sciences - Dean's Office
- Adnan, Hashem; MA, Lebanese University; Instructor; Critical Humanities for the Liberal Arts (CHLA)
- Adra, Abdallah; MD, American University of Beirut; Clinical Assistant Professor; Obstetrics and Gynecology
- Adra, May; MA, City University of New York; Instructor; English
- Afeiche, Nada; MD, University of Pennsylvania; Clinical Associate; Dentofacial Medicine
- Afiouni, Fida; PhD, Université Panthéon-Sorbonne - Paris I; Professor (Tenure Appointment); Suliman S. Olayan School of Business
- Agha, Saleh; PhD, University of Oxford; Lecturer; Philosophy, Critical Humanities for the Liberal Arts (CHLA)
- Agopian, Sarine; PhD; Assistant Professor; Psychology
- Ahmad, Mohammad Najib; PhD, Queen's University; Professor (Tenure Appointment); Bahaa and Walid Bassatne Department of Chemical Engineering and Advanced Energy
- Ahmed, Neveen; PhD, North Carolina State University; Visiting Assistant Professor; Suliman S. Olayan School of Business
- Akel, Samir; MD, American University of Beirut; Clinical Associate Professor; Surgery
- Akiki, Bassem; MD; Clinical Associate; Internal Medicine
- Akkawi, Yasser; MBA, École Supérieure des Affaires; Instructor; Suliman S. Olayan School of Business
- Akl, Christelle; MS, American University of Beirut; Instructor of Practice; Faculty of Health Sciences - Dean's Office
- Akl, Elie; MD, French Faculty of Medicine; Vice Provost for Research and Professor (Tenure Appointment); Internal Medicine, Office of Research
- Akoum, Rima; M.Law, Lebanese University; Instructor; Suliman S. Olayan School of Business
- Akoum, Walid; M.Law, Lebanese University; Instructor; Political Studies and Public Administration
- Akoury Dirani, Leila; PhD, Université Pierre et Marie Curie - Paris VI; Associate Professor of Clinical Specialty; Psychiatry
- Al Ayash, Randa; MA; Instructor; English
- Al Azwar, Ali; M.Res, Lebanese University; Instructor; Electrical and Computer Engineering

- Al Baalbaky, Ahmad; M.Arch; Lecturer; Architecture and Design
- Al Barazi, Rana O; MD, Kuwait University; Lecturer; Health Promotion and Community Health
- Al Barazi, Randa; MD, American University of Beirut; Associate Professor of Clinical Specialty; Otorhinolaryngology - Head and Neck Surgery
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