BMEN 600
Biomedical Engineering Applications
Syllabus, Fall 2021-22

1. Course Administration

Course Coordinator: Dr. Jason Amatoury
Email: ja106@aub.edu.lb
Office: Raymond Ghosn Bldg (RGB) 413
Virtual Office: https://aub.webex.com/meet/ja106
Office hours: Wed/Thurs 3:15-4.30pm or by email appointment

2. Course Description [3 credits]

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, for instance, the development of biomaterials, diagnostic and therapeutic tools, modeling of biological systems, biological 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 area in biomedical engineering or biomedical sciences.

3. Prerequisites

Basic biology background

4. Course Schedule

Time: MW 2:00-3:15 pm
Room: IOEC 224C (upon return to campus)

In the first instance, course lectures will be delivered live online using Cisco WebEx (link available on Moodle), with recordings made available for subsequent access. Select sessions may also be pre-recorded. When AUB returns to on-campus teaching, sessions will move to the allocated classroom.

5. Course Material

- Lecture notes and other selected material will be made available via Moodle
- There is no required textbook for the course. However, a potentially useful reference is: *Enderle, John Denis, and Joseph D. Bronzino. Introduction to biomedical engineering. Academic press, 3rd edition, 2012.*

6. Course Learning Outcomes

By the end of this course, students should be able to:

- Define biomedical engineering and its associated subfields
- Demonstrate an understanding of fundamental concepts underlying select biomedical engineering subfields and their applications
- Explain how biomedical engineers contribute to healthcare and improved human wellbeing
- Research, critique and discuss literature related to biomedical engineering
- Identify and describe select areas of biomedical engineering practiced at AUB

7. Course Schedule (subject to change)

Date	Topic	Professor	*Department*
I Introduction			
30/08/2021	Introductory Session	Jason Amatoury	*BME*
01/09/2021	Introduction to biomedical engineering	Jason Amatoury	*BME*
06/09/2021	Introduction to biomedical engineering	Jason Amatoury	*BME*
08/09/2021	Writing in Engineering and Research	Niveen Abighannam	*MSFEA*
II Anatomy and Physiology			
13/09/2021	Anatomy and physiology: Fundamentals	Nada Lawand	*DACP (FM)*
15/09/2021	Anatomy and physiology: Fundamentals	Nada Lawand	*DACP (FM)*
20/09/2021	The Cardiovascular system	Ali Eid	*PT (FM)*
22/09/2021	The Cardiovascular system	Ali Eid	*PT (FM)*
III Physiological Modeling			
27/09/2021	Physiological Modeling: A multi-model approach	Jason Amatoury	*BME*
29/09/2021	Physiological Modeling: A multi-model approach	Jason Amatoury	*BME*
IV Biomaterials and Tissue Engineering			
04/10/2021	Biomaterials and Tissue engineering	Rami Mhanna	*BME*
06/10/2021	Biomaterials and Tissue engineering	Rami Mhanna	*BME*
V Neural Engineering			
11/10/2021	Neural Interfaces	Massoud Khraiche	*BME*
13/10/2021	Neural Interfaces	Massoud Khraiche	*BME*
18/10/2021	*Prophet's Birthday (no classes)*		
VI Nanotechnology and Drug Delivery			
20/10/2021	Nanotechnology and Drug Delivery	Walid Saad	*ChemE*
25/10/2021	Nanotechnology and Drug Delivery	Walid Saad	*ChemE*
VII Bioinformatics			
27/10/2021	Bioinformatics & genomic applications in biomedical research	Pierre Khoueiry	*BMG (FM)*

VIII Special Topic: COVID-19			
01/11/2021	SARS-COV-2:Variants,Vaccines & National Response	Nada Melhem	*FHS/FM*
03/11/2021	SARS-COV-2:Variants,Vaccines & National Response	Nada Melhem	*FHS/FM*
IX Biological Signal Processing			
08/11/2021	Biological Signal Processing	Fadi Karameh	*ECE*
10/11/2021	Biological Signal Processing	Fadi Karameh	*ECE*
X Biomedical Imaging			
15/11/2021	Biomedical Imaging	Jason Amatoury	*BME*
17/11/2021	Biomedical Imaging	Jason Amatoury	*BME*
22/11/2021	*Independence Day (no classes)*		
24/11/2021	Drug Delivery *(Module VI continued)*	Rami Mhanna	*BME*
29/11/2021	Putting it all together	Jason Amatoury	*BME*
02/12/2021	Putting it all together	Jason Amatoury	*BME*

Note that pre-lecture material will be made available for you to complete prior to most modules.

8. Student Assessment (subject to change)

Major Assignment	**35%**
Explanatory video & other assignments	**60%**
Participation (online discussion forums, in-class)	**5%**

9. Moodle

You are expected to check Moodle daily for course updates. Moodle will host all course related material, including course announcements, online lecture links, pre-lecture material, lecture handouts, assignments, discussion forums, etc.

10. Course Evaluation

Student feedback helps to continually shape and refine courses offered by the biomedical engineering program. A short anonymous on-line evaluation form may be provided to complete following select modules. Overall course evaluation will be requested at the end of the semester via AUB's Office of Institutional Research & Assessment (OIRA) system. You are highly encouraged to provide honest course evaluations and offer any additional comments and suggestions.

11. Academic Integrity

Any act of cheating or plagiarism will not be tolerated. An automatic zero will be applied to assessments where cheating or plagiarism are detected. Please refer to the student handbook on plagiarism for more information.

12.Academic Accessibility

AUB strives to make learning experiences as accessible as possible. If you anticipate or experience academic barriers due to a disability (including mental health, chronic or temporary medical

conditions), please inform me immediately so that we can privately discuss options. In order to help establish reasonable accommodations and facilitate a smooth accommodations process, you are encouraged to contact the Accessible Education Office: accessibility@aub.edu.lb; +961-1-350000, x3246; West Hall, 314.

13. Title IX, Non-Discrimination, and Anti-Harassment at AUB

AUB is committed to facilitating a learning environment that is free of all forms of prohibited discrimination. The University's non-discrimination policy and Title IX apply to, and protect, all students, faculty, and staff. Under Title IX, discrimination based on sex and gender, including sexual harassment, is prohibited. If you think you have experienced discrimination or harassment, including sexual misconduct, we encourage you to tell someone promptly. If you speak to a faculty or staff member about an issue such as harassment, sexual violence, or discrimination, the information will be kept as private as possible, however, faculty and designated staff are required to bring it to the attention of the University's Title IX Coordinator. Faculty can refer you to fully confidential resources, and you can find information and contacts at www.aub.edu.lb/titleix.
To report an incident, contact the University's Title IX Coordinator Mitra Taukat 01-350000 ext. 2514, titleix@aub.edu.lb, or a Deputy Title IX Coordinator (www.aub.edu.lb/titleix-people).
Reports may be submitted anonymously (or not) online through EthicsPoint at www.aub.ethicspoint.com.

By signing up for this course, you confirm that you have read and accepted the terms and provisions of AUB's Privacy Statement.