

**Faculty of
Medicine and
Medical Center
(FM/AUBMC)**

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Historical Background

Since 1867, the founding date of the Faculty of Medicine, both the Faculty of Medicine and the Medical Center have continuously been providing services in the realms of medical education, training and health care to their immediate constituencies in Lebanon and the Middle East region. To date, the Faculty of Medicine has graduated 4,225 physicians, and there is a large postgraduate training program of over 280 residents in most of the departments. The Faculty of Medicine programs have been approved by and registered in the Education Department of the State of New York on a continual basis since 1867. In 1957 the faculty became an institutional member of the Association of American Medical Colleges. It enjoyed this status until 1988, when the new rules of the association precluded membership of institutions outside the confines of the North American continent.

The AUB Medical Center has been accredited by the Joint Commission International (JCI) as of October 2007. Previously, the Medical Center was accredited by the US-based Joint Commission on Accreditation of Healthcare Organizations (JCAHO) from 1965 until 1983, when the civil war in Lebanon prevented review teams from continuing with their periodic site visits. The JCI is the international arm of the JCAHO. The National Board Examinations were administered to the faculty's undergraduate students for credit between 1966 and 1982. The faculty was a regional center for the administration of the examinations of the Educational Commission for Foreign Medical Graduates between 1959 and 1993. In addition, the faculty takes pride in having had very close links with prestigious American medical schools and centers including Columbia University from 1945 to 1955, Harvard School of Medicine from 1955 to 1965, and a formal affiliation with the Johns Hopkins School of Medicine from 1965 to 1975, which was supported by the Commonwealth Fund.

The Faculty of Medicine and the Medical Center have revived and established a number of links and affiliations with the following:

- Columbia University College of Physicians and Surgeons for student elective exchange (since 2002)
- University of George Washington School of Medicine in Washington, DC (as of September 8, 2004)
- Medical University of South Carolina (MUSC) (as of April 1, 2003) for an MD–PhD program that admits up to three medical students annually from AUB/FM
- Johns Hopkins University School of Medicine (as of May 10, 2004) for collaboration in research, education and the provision of medical services training
- University of Paris 7 Denis Diderot for cooperative cancer research (as of December 8, 2004)
- University of Poitiers (France) for cooperative neurosciences research (as of February 3, 2006)
- St. Jude Children's Research Hospital (as of April 19, 2000)
- Laval University in Quebec, Canada
- M.D. Anderson Cancer Center (as of June 6, 2007)
- Palermo University (as of April 23, 2007) for cooperation in research and higher education
- University of Montpellier (France) (as of August 3, 2007)
- The Faculty of Medicine and the Medical Center (FM/AUBMC) are currently accredited by the following American-based accreditation bodies:
- The Middle States Commission on Higher Education

- The Joint Commission International (JCI) for hospital accreditation
- Accreditation of AUBMC by the Lebanese Ministry of Public Health
- Accreditation of the School of Nursing by the Commission on Collegiate Nursing Education (CCNE)
- Accreditation of the Nursing Services at AUBMC by the American Nurses Credentialing Center (ANCC)
- The College of American Pathologists (CAP)
- In addition, the Faculty of Medicine, with its Medical Center, is a member of the following organizations:
- Alpha Omega Alpha (AOA) - 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

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.

Admission

The Faculty of Medicine was established to give properly qualified candidates, particularly from Lebanon and the Near East, the opportunity for sound education in both the art and science of medicine. All applicants must hold a bachelor's degree and must have completed the premedical requirements as well as the Medical College Admission Test (MCAT). Applicants in their senior year expecting to graduate with a bachelor's degree in June are eligible to apply provided they have completed the premedical requirements and have taken the MCAT by the end of the first of their senior year. For applicants holding (or expecting) a bachelor's degree, consideration for acceptance is limited to students with a minimum cumulative general average of 75 percent (GPA: 2.7) in each of the following: 1) all courses, 2) the required premedical core courses, and 3) major courses. For applicants from North American colleges, a minimum GPA of 3.2 is required. Applications from individuals holding (or expecting by June of the same year) a master's or a doctoral degree are encouraged. These applicants will be considered based upon their academic performance and their research productivity; in these cases, some of the premedical requirements may be waived depending on the field of study.

Interviews are granted to a selected group of applicants based on their MCAT scores and their academic achievement. Granting an interview does not necessarily imply that the applicant will be accepted. Students are accepted to medical school on the basis of their academic qualifications, their MCAT score and the results of their interviews. In addition, due consideration is given to the applicants' letters of recommendation from their teachers and mentors, their curriculum vitae, as well as their personal statements. Among the traits that the successful applicant will demonstrate are humanistic and ethical attitudes, good communication and interpersonal skills, emotional maturity, and personal integrity. Previous experience in research, community service and volunteer work are considered positive attributes.

The Faculty of Medicine at AUB does not discriminate on the basis of age, gender, nationality, ethnic origin or religion.

The minimal premedical requirements are summarized below:

A bachelor's degree in any field of study is required. Historically, the vast majority of applicants to the Faculty of Medicine have been holders of bachelor's degrees in biology or chemistry. In an effort to diversify the pool of applicants, graduates from other majors are strongly encouraged to apply as long as they complete the premedical core courses required for admission to the Faculty of Medicine. Students can take some of the premedical courses as electives in their respective majors.

Premedical core course requirements

The minimal premedical requirements include biology with laboratory (7 credits), chemistry with laboratory (15 credits including 8 credits of organic chemistry), physics and basic electronics with laboratory (8 credits), English (6 credits at AUB or exemption), social sciences and/or humanities (6 credits). To facilitate applications by non-science majors and from diverse fields of study, some courses taken in the Lebanese Baccalaureate Program may count towards fulfillment of the premedical core course requirements as detailed in Table 1. Table 2 presents the recommended courses depending on the major of study at AUB.

Table 1: Premedical core course requirements and credit equivalents according to Lebanese Bacallaureate Program Subject

Premedical Requirements	Required Premedical Credits	Lebanese Bacallaureate Credit Equivalents According to Program				Remaining Credits
		Life Sciences	General Sciences	Economics and Sociology	Literature and Humanities	
Biology	7	3	-	-	-	4-7
Chemistry	15	4	4	-	-	11-15
Physics	8	5	5	3	3	3-5
English	6 ¹	-	-	-	-	
CS/ Humanities	6 ¹	-	-	-	-	
Total	42	12	9	3	3	30-39

1) The new MCAT to be implemented in 2015 places significant emphasis on psychological and sociological concepts and on critical analysis and reasoning. Students planning to apply to medical school are advised to take PSYC 201 and SOAN 201, any two CVSP courses and PHIL 210.

Table 2: Recommended premedical core courses according to field of study at AUB

Premedical Requirements	AUB Courses	Biology Major	Chemistry Major	Physics Major	Other Majors
English (6 cr.)	ENGL 203 (3 cr.)				
	ENGL204 (3 cr.)	X	X	X	X
Humanities + Social Sciences (6 cr.)	Fulfilled by the general education requirements of the University, which include 6 credits in the humanities/6 credits in CVSP courses and 6 credits in the social sciences	X	X	X	X
Biology ¹ (7 cr.)	BIOL 101 (3 cr.) or equivalent	X	X	X	X
	BIOL 201 (4 cr.)	X	X	X	X
Physics (8 cr.)	PHYS 101 (4 cr.) PHYS 101L (1 cr.) or equivalent	X	X	X	X
	PHYS 204 (3 cr.) + PHYS 204L (1 cr.) or PHYS 205 (3 cr.) + PHYS 205L (1 cr.)	X			X
	PHYS 211 (3 cr.) + PHYS 211L (1 cr.)		X		
	PHYS 210 (3 cr.) + PHYS 210L (1 cr.)			X	
Chemistry (15 cr.)	CHEM 101 (3 cr.) + CHEM 101L (1 cr.) or equivalent	X	X	X	X
	CHEM 201 (3 cr.)	X	X	X	X
	CHEM 211 (3 cr.)	X	X	X	X
	CHEM 212 (3 cr.)	X	X	X	X
	CHEM 210 (2 cr.)	X		X	X
	CHEM 225 (4 cr.)		X		

MCAT. A competitive score in the MCAT, which may be taken twice only, is required. If taken twice, the higher score is considered. The MCAT score must be available at the time the application is submitted. Since 2015, a new MCAT has been implemented which contains, in addition to the biological and physical sciences, a new section on the social and behavioral sciences. Students are encouraged to review the content of the new MCAT and plan their studies accordingly, e.g., by taking additional courses in psychology, sociology and anthropology, and in biology, chemistry and physics, after consultation with their advisors.

1) Biology 200 is a very general course that does not prepare students well for the MCAT. Biology 201 and 202 provide better preparation, and students are advised to take both courses.

Applicants expecting to receive a bachelor's degree after the deadline for application should be aware of the following:

- Applicants must be in their senior year.
- The cumulative average of 70 credits or more (at the time of application) should be equal to or higher than 75 percent (GPA: 2.7) for students from AUB or its equivalent for those from other universities. All required core courses must have been completed by the end of the fall term of the senior year with an average of at least 75 percent or its equivalent (GPA: 2.7). The cumulative average in the major courses completed by the end of the fall term of the senior year must also be equal to or greater than 75 percent.
- Admission to medical school is contingent upon completion of graduation requirements and obtaining the bachelor's degree, which should be achieved by the end of the spring term of the student's senior year.
- Applicants expecting to receive a master's or doctoral degree after the deadline for application should be aware of the following:
 - A minimum cumulative grade average of 80 percent (GPA: 3.2) or its equivalent is required.
 - Admission to medical school is contingent upon completion of graduation requirements and obtaining the master's or doctoral degree, which should be achieved by the end of the spring term.

Conditional acceptance to the faculty is issued by the middle of April and is finalized upon completion of the requirements for the bachelor's, master's or doctoral degree.

Graduation Requirements

To be eligible for the degree of Doctor of Medicine, a student must satisfactorily complete the curriculum of the Faculty of Medicine and must be recommended by the Academic Committee. The degree may be granted with distinction to students who attain 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 credit hours in years 3 and 4, and who achieve a cumulative average \geq 88% in years 1 and 2, with no failures in any course or clerkship.

The Faculty of Medicine offers post-graduate training positions in the various academic departments at AUBMC to AUB and non-AUB medical graduates. However, these positions are limited and are granted on a highly competitive basis.

Dean's Honor List

To be placed on the dean's honor list, a student must be full-time and must not be repeating the year. The dean's honor list is those ranking in the top 15 percent of the class and is offered in years 3 and 4 of the medical program only.

Academic Rules and Regulations

See General University Academic Information on page 51.

Attendance

Regular attendance is required at lectures, laboratories, clerkships, examinations and other assigned duties. Credit is not given for work not performed. Students absent on account of illness or other valid reasons are requested to confer with course or clerkship coordinators or the Director of Student Affairs. The committees concerned will review prolonged or repeated absences and decide on the appropriate course of action.

Language Requirement

The language of instruction is English. However, students must have speaking knowledge of Arabic before entering the third year. This requirement may be waived by special vote of the Academic Committee.

Promotions and Deficiencies

In the first and second years, the performance of students is evaluated as either pass or fail based on absolute standards of grading, with no ranking. Numerical grades will be kept in the students' records for reference, and may be used for providing a descriptive account of student performance and for recommendation letters by the Dean's Office. Numerical grades may be used to decide on graduating students with distinction, granting of awards (e.g. Penrose Award, Alpha Omega Alpha Honor Medical Society) and if requested by students for scholarship or financial aid granting bodies that require them. In the third and fourth years, absolute standards are used to determine the Pass-Fail margin. For those who pass, performance is evaluated as Excellent (E), Good (G), or Pass (P), based on normative grading. In this case, the distribution of grades in a class is as follows: the top 10-15 percent are granted an "E", the following 35-40 percent a "G", and the remaining 50 percent a "P". The evaluation of the student in each subject is based on his/her total performance and not solely on the results of examinations.

The student's performance is evaluated by appropriate class teaching committees, which make recommendations to the Academic Committee. The action of the Academic Committee is final. The class teaching committees and Academic Committee give due consideration to a general evaluation of fitness for a career in medicine. Only those students who, in the opinion of the committees, give promise of being a credit to themselves, the faculty and the medical profession are advanced.

To be promoted, a student must attain a grade of Pass or better in all courses or clerkships and must be recommended by the committees concerned. However, a student with a grade of Pass in all courses or clerkships may, at the discretion of the committees, be promoted on probation, be asked to do remedial work and pass the re-examinations in designated courses or clerkships or repeat the year.

In order to pass a clerkship in the third or fourth year, a student must demonstrate competence in both clinical performance and knowledge of the discipline. Failure of either component is considered a failure of the clerkship. Normally, a student in the first or second year who fails 25 percent or more credits in that year may be asked to repeat the year or withdraw from the faculty. A student who fails less than 25 percent of credits may be asked to do remedial work and pass the re-examination, repeat the year or leave

the faculty. At the discretion of the committees concerned, and in exceptional cases, a student repeating the year may be asked to repeat all or some of the courses.

A student in the third or fourth year who fails 50 percent or more of clerkship hours may be asked to repeat the year or withdraw from the faculty. A student who fails less than 50 percent of clerkship hours may be asked to do remedial work and pass the re-examinations, repeat a clerkship, repeat the year or leave the faculty. At the discretion of the committees concerned, a student repeating the year may be asked to repeat all or some of the clerkships.

A student who is repeating a year and fails any course or does not attain a grade of Good or better, or its equivalent in years 1 and 2 in 50 percent of credits may be asked to withdraw from the faculty.

A student who is placed on probation cannot graduate unless probation has been removed.

Specific guidelines for clinical clerkships:

Decisions regarding failed clerkships or parts of clerkships are normally made at the end of the year, when the overall performance of the student is reviewed. Below are guidelines that describe potential courses of action, but the final decision is made by the Academic Committee based on an overall assessment of the student's performance and fitness for promotion or graduation. The following guidelines apply to students who fail less than 50% of clerkship hours in a year.

- In clinical clerkships in years 3 and 4, in order to pass the clerkship, students must demonstrate acquisition of adequate clinical performance and skills, as shown by performance evaluations, OSCE scores and other assessment measures defined by the specific clerkship, AND an appropriate fund of knowledge as demonstrated primarily by a passing grade on the final written examination (usually an NBME examination). Failure of either component is considered a failure of the clerkship.
- If a student fails both the clinical performance and the final written examination of a clerkship, he/she will be required to repeat it in its entirety: the clinical components and a repeat final written examination.
- If a student fails only the final examination of a clerkship, he/she will be required to repeat it. If the student fails a second time, he/she will be required to repeat it in its entirety: both the clinical components and a repeat final written examination.
- If a student fails only the clinical performance component, he/she will be asked to repeat the clinical components of the rotation (totally or partly as determined by the department concerned). If the student fails the clinical component a second time, he/she will be required to repeat it in its entirety: both the clinical components and a repeat final written examination.
- If a student is found to have failed 50% or more of the clerkship hours in the year, he/she will be asked to repeat the year or withdraw from the program at the discretion of the Academic Committee.

Courses

Numbers Preceding Course Titles

Courses required for the Doctor of Medicine degree are numbered 200 to 299 as follows:

- 200 to 239 indicate courses given in first and second year medicine.
- 240 to 259 indicate courses given in third year medicine.
- 260 to 279 indicate courses given in fourth year medicine.
- 280 to 299 are reserved for clinical clerkships during the year of internship.

For the first and second years, odd numbers refer to first term courses and even numbers to second term courses. Year courses are indicated by a hyphen between the two numbers.

Graduate courses leading to the Master and Doctor of Philosophy degrees are numbered 300 to 399.

Regular medical courses approved for graduate work (MS and PhD programs) have two numbers.

Numbers preceded by the letters ID (Interdepartmental) or FM (Faculty of Medicine) indicate integrated courses taught by two or more departments together.

Numbers Following Course Titles

The first number following the title of a course indicates the total number of lectures, conferences, and discussion hours given, except where otherwise stated.

The second number indicates the total laboratory or clinical practice hours, except where otherwise stated.

The third number indicates the number of term credit hours. Credit hours are used in conjunction with first and second year courses only.

Course Descriptions

All the following courses, except those listed as electives, are required of students working toward the degree of Doctor of Medicine. The electives designated may be chosen with the consent of the instructor. Detailed course descriptions are available under individual departments.

Curricula

First Year		No. of Weeks	Lecture and Clinical Recitation	Laboratory or Clerkship Hrs.	Total Hrs.	Credits
IDTH 201	Cellular and Molecular Basis of Medicine	15	90	40	118	7
IDTH 202	Clinical Anatomy	15	38	110	148	6
IDTH 203	The Immune System in Health and Disease	8	37	28	75	3
IDTH 204	Basic Pathological Mechanisms	8	29	14	43	2
IDTH 205	Microbiology and Infectious Diseases	9	56	44	100	5
IDTH 210	Fundamentals of Medical Research	9	30	20	50	3
IDTH 211	The Blood	4	30	30	60	3
IDTH 225	The Liver and Gastrointestinal System	4	40	40	80	4
IDTH 229	The Skin	2	20	20	40	2
IDTH 213	Becoming a Doctor 1: Clinical Skills -I	45	20	80	100	4
IDTH 214	Becoming a Doctor 2: Physicians Patients and Society - I	16	16	16	32	2
IDTH 215	Becoming a Doctor 3: Global Health and Social Medicine	21	21	21	42	2
IDTH 216	Becoming a Doctor 4: Learning Communities	45	0	36	36	1
				Total	924	44

Second Year		No. of Weeks	Lecture and Clinical Recitation	Laboratory or Clerkship Hrs.	Total Hrs.	Credits
IDTH 226	The Cardiovascular System	4	40	40	80	4
IDTH 227	The Respiratory System	4	40	40	80	4
IDTH 228	The Kidneys and Urinary System	4	40	40	80	4
IDTH 212	Endocrinology and Reproduction	6	46	36	80	4
IDTH 230	Brain and Cognition	8	80	80	160	8
IDTH 230	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
Total					790	37

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	10	100	450	550	–
FMMD 242	Physicians, Patients and Society III	2	16	24	40	–
NEUR 247	Clinical Clerkship	2		90	90	
ANES 247	Clinical Clerkship	3	15	120	135	
INMD 254	Infection Control	–	6	34	40	–
PSYT 252	Clinical Clerkship	4	25	180	205	–
OBGY 247	Clinical Clerkship	8	47	360	407	–
PEDT 246	Clinical Clerkship	8	35	360	395	–
SURG 246	Clinical Clerkship	9	45	405	450	–
PHRM 333	Clinical Pharmacology	1	16	–	16	–
Total					2568	

Fourth Year	No. of Weeks	Lecture and Clinical Recitation	Laboratory or Clerkship Hrs.	Total Hrs.	Credits
Clinical Conferences	46	–	240	240	–
INMD 262 Clinical Clerkship	10	–	450	450	–
NEUR 262 Clinical Clerkship	2	–	90	90	–
EMMD 262 Clinical Clerkship	6	–	279	279	–
PEDT 267 Clinical Clerkship	4	–	180	180	–
2 selectives in any of the following: Dermatology, Radiology, Ophthalmology, Otolaryngology or Surgical Specialty	8	–	360	360	–
Elective in any department	8	–	360	360	–
IDTH 268 Clerkship in Preventive Medicine and Public Health	2	10	80	90	–
FMMD 262 Clinical Clerkship	4	30	150	180	–
IDTH 262 Capstone Course	1	10	40	45	–
			Total	2274	

Interdepartmental Courses – Medical Program

First and Second Years

- IDTH 201 Cellular and Molecular Basis of Medicine 90.40; 7 cr.**
 An interdisciplinary course that presents the cellular and molecular concepts and principles that underlie the normal structure and function of the human body. It covers cellular structure and function, including mechanisms and regulation of gene expression, protein synthesis, structure and function, signaling mechanisms, membrane transport, energy metabolism, contractility, and excitability, and the basic principles of drug action. Clinical examples and correlations are presented to illustrate the relevance of cellular and molecular function to medicine.
- IDTH 202 Clinical Anatomy 38.110; 6 cr.**
 A regional dissection of the entire human body supplemented by embryology, clinical lectures and discussions. The student is also introduced to radiographic anatomy based on various imaging modalities in addition to computer-assisted instruction.
- IDTH 203 The Immune System in Health and Disease 37.28; 3 cr.**
 A course that deals with the immune system's responses in states of normalcy and disease, from the molecular to the clinical level, and covers the pathophysiology, clinical manifestations, diagnosis and management of major rheumatologic diseases.
- IDTH 204 Basic Pathological Mechanisms 29.14; 2 cr.**
 The course covers the basic pathological mechanisms of disease at the cellular and molecular levels, their microscopic, gross and clinical manifestation, and some pharmacological interventions that apply to them.
- IDTH 205 Microbiology and Infectious Diseases 56.44; 5 cr.**
 The course provides the principles and concepts of basic and medical microbiology. Emphasis is placed on the basic properties, pathogenesis, preventive measures and laboratory diagnosis of bacteria, viruses, parasites and fungi, and the clinical outcome, management and treatment of patients infected by these etiologic agents.
- IDTH 210 Fundamentals of Medical Research 40.10; 3 cr.**
 The course provides first year medical students with their first exposure to research methodology. Fundamental principles and concepts of evidence-based medicine, epidemiology and biostatistics are presented and discussed.
- IDTH 211 The Blood 30.30; 3 cr.**
 An integrated course that covers the anatomy, histology, physiology, pathology, pathophysiology and pharmacology related to the blood and lymphatic systems. Concepts in social medicine and global health, preventive medicine, epidemiology and medical ethics are explored in relation to diseases of the blood.

IDTH 212 Endocrinology and Reproduction 46.36; 4 cr.

An integrated course that covers the anatomy, histology, physiology, pathology, pathophysiology and pharmacology related to the endocrine and reproductive systems. Concepts in social medicine and global health, preventive medicine, epidemiology and medical ethics are explored in relation to diseases of the endocrine and reproductive systems.

IDTH 213 Becoming a Doctor 1: Clinical Skills – I 20.80; 4 cr.

The course introduces students to the art of medicine: communication skills, history taking, physical examination and clinical reasoning. The course runs throughout the year and is closely integrated with the organ-system based courses being studied by the students to integrate clinical and basic science knowledge and skills.

**IDTH 214 Becoming a Doctor 2:
Physicians Patients and Society – I 19.19; 2 cr.**

The course explores the place of medicine, illness, suffering and the human body in human culture expressed through art, literature and history of medicine, and through close encounters with patients.

**IDTH 215 Becoming a Doctor 3:
Global Health and Social Medicine 21.21; 2 cr.**

The course introduces students to central issues in the practice of social medicine and global health and the connection between them. It examines how social forces become embodied as pathologies, how political, economic, and historic trends influence the distribution of disease among different populations, and how new trends in the organization of care affect the most vulnerable members of society.

IDTH 216 Becoming a Doctor 4: Learning Communities 0.36; 1 cr.

The course covers topics and issues important for the personal and professional development of students, with emphasis on reflection. Students are encouraged to make use of experiences for shared learning and to develop a sense of community and belonging, thus promoting well-being.

IDTH 225 The Liver and Gastrointestinal System 40.40; 4 cr.

An integrated course that covers the anatomy, histology, physiology, pathology, pathophysiology and pharmacology related to the liver and gastrointestinal tract. In addition, concepts in social medicine and global health, preventive medicine, epidemiology and medical ethics are explored in relation to diseases of this system.

IDTH 226 The Cardiovascular System 40.40; 4 cr.

An integrated course that covers the anatomy, histology, physiology, pathology, pathophysiology and pharmacology related to the cardiovascular system. In addition, concepts in social medicine and global health, preventive medicine, epidemiology and medical ethics are explored in relation to diseases of this system.

IDTH 227 The Respiratory System 40.40; 4 cr.

An integrated course that covers the anatomy, histology, physiology, pathology, pathophysiology and pharmacology related to the respiratory system. In addition, concepts in social medicine and global health, preventive medicine, epidemiology and medical ethics are explored in relation to diseases of this system.

IDTH 228 The Kidneys and Urinary System 40.40; 4 cr.
 An integrated course that covers the anatomy, histology, physiology, pathology, pathophysiology and pharmacology related to the kidneys and urinary system. In addition, concepts in social medicine and global health, preventive medicine, epidemiology and medical ethics are explored in relation to diseases of this system.

IDTH 229 The Skin 20.20; 2 cr.
 This course integrates the anatomy, histology, physiology, pathology, pathophysiology and pharmacology related to the skin. Basic concepts are presented in which students are expected to learn the scientific basis of the normal physiology and pathology of the skin and its appendages including hair and nails as well as mucosal surfaces. Mechanisms of disease causation are illustrated with clinically relevant examples. Concepts in preventive medicine, epidemiology and medical ethics are explored in relation to diseases of the skin.

IDTH 230 Brain and Cognition 80.80; 8 cr.
 This course is intended to provide preclinical medical students with an integrated approach to the structure and function of the nervous system. Basic principles of neuroanatomy, neurocytology, neuroembryology, neuroradiology, neurophysiology and neurology will be related to the function of the normal and diseased human nervous system, and the action of drugs. Concepts in social and preventive medicine, epidemiology and medical ethics are explored in relation to diseases of the nervous system.

IDTH 231 Human Development and Psychopathology 40.40; 4 cr.
 This is a multidisciplinary course that integrates human development, psychopathological processes and their underlying neural circuitries along with basic and clinical psychopharmacology and relevant ethical, professional and public health issues. It teaches psychopathology through a lifespan approach and uses a variety of teaching/learning techniques such as didactics, team based learning, case studies and workshops.

IDTH 232 Research Design and Development 10.80; 3 cr.
 The aim of the course is to provide the opportunity to learn and apply research methods to investigate a local health problem. It will provide a hands-on research experience, building on the basic knowledge and skills learned in the Fundamentals of Medical Research course in year 1. Students will learn the phases of the research process from conception to design to implementation. Through a combination of class sessions, meetings with research advisors and independent work, students, in groups, will identify a local health problem that is of particular interest to them, and will design and conduct a study relevant to it.

IDTH 233 Physicians Patients and Society – II 20.20; 2 cr.
 This course explores medicine, illness and suffering as seen through the lens of bioethics, spirituality in medicine, palliative care and the nursing experience. It will bring together information related to the biophysical, psychological, humane, spiritual and social factors of illness - a holistic approach that focuses on the patient as a person.

MS Disciplines

- Biochemistry Refer to page 572
- Human Morphology Refer to page 567
- Microbiology and Immunology Refer to page 582
- Pharmacology and Therapeutics Refer to page 607
- Physiology Refer to page 568
- Neurosciences (Interfaculty) Refer to page 664
- Biomedical Engineering (Interfaculty) Refer to page 553
- Scholar HeAlth Research Program (SHARP) (Clinical) Refer to page 618
- Orthodontics (Clinical) Refer to page 595

Admission to MS Programs

- Admission as a regular student Refer to page 34
- Admission on probation Refer to page 45

Course and Thesis Requirements

Students must complete a minimum of 21 credits of graduate course work with a minimum general average of 80 (GPA: 3.2). Graduate students who intend to apply to the medical program should complete 21 credits of graduate courses, 10 credits of which are not integral to the structured medical curriculum. Medical students and medical graduates who wish to join the MD–MS program are required to complete a minimum of 10 credits of graduate courses not integral to the structured medical curriculum and earn a minimum general average of 80 (GPA: 3.2). Those with a degree in dental or veterinary medicine are required to complete a minimum of 15 credits of graduate course work. In addition, all students must pass a comprehensive examination and complete a thesis project equivalent to 9 credits. The thesis must be presented and defended to the satisfaction of the examining committee.

Students following the non-thesis master's program are required to take a minimum of 30 graduate credit hours, 3 credits of which may be a project and should follow a course of study approved by the department/program and the concerned faculty Graduate Studies Committee.

PhD Program

Mission

The mission of the Doctoral Program in Biomedical Sciences (DBMS) is to provide excellent educational and research opportunities for students to develop into independent researchers and educators who will enrich the research and teaching output from Lebanon, the Middle East and beyond. The program will provide the students with the theoretical foundations and the special skills and attitudes that will allow them to develop their critical thinking and creative potential, conduct high caliber research in the biomedical sciences, contribute to the advancement of science, uphold the principles of intellectual honesty and become leaders in their chosen fields of study.

Program Objectives

Students are expected to:

- design and pursue pertinent research in biomedical science questions by devising and implementing a research plan to test a novel hypothesis,
- generate and analyze data critically, and utilize such analysis in devising, revising and/or refining a research plan,
- communicate findings, in both oral and written formats, through presentations at scientific meetings, publications in peer-reviewed journals and tutoring of junior students,
- demonstrate knowledge and integration of the fundamental principles of the various biomedical sciences,
- demonstrate theoretical and practical expertise in a specific field of research in the biomedical sciences,
- appreciate the complexity and volume of emerging new scientific information and its technical components, and be able to cope with it and manage one's learning efficiently and effectively,
- and appreciate the importance of openness, teamwork and integrity in the advancement of knowledge through research.

PhD Disciplines

- Biochemistry and Molecular Genetics
- Biomedical Engineering
- Cell Biology of Cancer
- Microbiology and Immunology
- Neurosciences Program
- Nutrition (Interfaculty)
- Pharmacology and Toxicology
- Physiology

Academic Governance

Oversight of the DBMS Program occurs at three levels: at the PhD Program Committee level with faculty representation from the department and program of study and the coordinator of the PhD Program, at the Faculty of Medicine Dean's Office represented by the Faculty of Medicine Graduate Studies Committee and at the university level through the Board of Graduate Studies.

Admission Requirements

Admission to the program will be on a competitive basis. Students eligible for admission to the DBMS must have a sound academic record (85% (GPA: 3.7) or its equivalent in the major field of study), a demonstrated, genuine interest in biomedical research and, preferably, research experience.

Minimum requirements for admission into the program are the following:

- Students with a BS degree or its equivalent in mathematics, biology, physics or chemistry in the Faculty of Arts and Sciences, as well as advanced courses in other medical science disciplines, and preferably with research experience, are eligible to apply (accelerated track PhD). Applicants with other degrees such as master's (MS), Medical Doctor (MD), Pharmacist (Pharm D or equivalent), Veterinarian Doctor (VMD), Dental Doctor (DMD, DDS), will also be considered for admission into the program (regular track PhD).
- Students should provide three letters of recommendation.
- General Graduate Record Examination (GRE), which is less than 5 years old, is required (applicant can use unofficial scores in the application and send the official copy after the application submission deadline). Total score of minimum 304 (equivalent to 1100 converted old GRE score) in the verbal and quantitative reasoning sections of the GRE test is required.
- Applicants to the graduate program, other than AUB graduates and graduates of colleges or universities recognized and located in North America, Great Britain, Australia and New Zealand, must meet the Readiness for University Studies in English (RUSE). Refer to catalogue section on Readiness for University Studies in English on page 41.
- Provide a personal statement (500 words maximum).
- Students should be interviewed by the PhD Committee members.
- Students should be recommended for admission by the PhD Committee.

FM accepts applications for the PhD program during fall.

Financial Support

The PhD program offers, on a competitive basis, substantial support which fully covers tuition and includes a monthly stipend and housing. In return, students are expected to help in teaching and in proctoring exams.

Program Requirements

50 credit hours of course work beyond the bachelor's program or 29 credit hours of course work beyond the master's program are required. To fulfill course requirements, 16 required core courses (34 credits), in addition to elective courses, are offered. A maximum of 21 credit hours may be transferred from the master's work if considered within the scope of the program. Students are expected to register for 24 credits of thesis.

Upon admission into the program, each student will be advised by the coordinator of the PhD program. After the first year, each student will have selected a thesis advisor who will design the set of elective courses to meet the student's research interests and career goals. Each student's course of study will be designed individually in light of the student's interests and career goals. All the duties of the coordinator of the PhD program will be transferred to the student's thesis advisor, who must be selected no later than the end of the first year for students entering into an MS program.

Core Courses

First Year		Credits	
BIOC 321	Nucleic Acids and Basic Genetics	1	Required
BIOC 322	Protein Biochemistry	1	Required
BIOC 323	Cellular Metabolism and Regulation	2	Required
PHYL 310	Cell Physiology and Biophysics	3	Required
BIOC 325	Receptor and Signal Transduction	2	Required
HUMR 305	Cell and Tissue Biology	3	Required
EPHD 310	Biostatistics	3	Required
BIOM 491	Laboratory Rotation	1	Required
HUMR 310	Methods in Biomedical Sciences	3	Required
PHRM 315	Principles of Pharmacology	2	Required
BIOM 385	Research Ethics	1	Required

Second Year		Credits	
MBIM 309 or MBIM 310	Basic Microbiology Basic Immunology	3 3	Required
HUMR 314	Seminar and Journal Club	1	Required
BIOM 375	Principles of Learning and Assessment	2	Required
IDTH 301	Scientific Communication	2	Required
PHYL 302 ¹	Cardiovascular Physiology	2	Elective
IDTH 308A ¹	Neuroanatomy	3	Elective
IDTH 308B ¹	Neurophysiology	3	Elective
PHYL 300 ¹	Pulmonary – Renal	2	Elective
PHYL 304 ¹	GL – Endocrine – Reproductive	3	Elective

For other elective courses, refer to MS disciplines.

- BIOC Courses Refer to page 572
- HUMR Courses Refer to page 566
- PHYL Courses Refer to page 568
- IDTH Courses Refer to page 570
- PHRM Courses Refer to page 607
- MBIM Courses Refer to page 582

Course Descriptions

BIOM 375 Principles of Learning and Assessment 28.0; 2 cr.

This course provides students with the theoretical background and approaches to teaching science at the university level with emphasis on the nature of science and learner cognition. In addition, students are expected to apply principles and techniques of teaching and assessment of science in a teaching context. This is a core course for PhD students in Biomedical Sciences and is an elective for MS students. *First term.*

BIOM 385 Research Ethics 15.0; 1 cr.

This course introduces the fundamentals of responsible conduct of research, emphasizing the ethical practice of human research. The course recaps history of ethical principles and the development of research codes of conduct and ethical practices, familiarizes students with different kinds of ethical issues that they might come across throughout their careers and allows scholars to reflect critically about what it means to be an ethical and responsible researcher. *Summer term.*

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

All students admitted to the PhD program must successfully complete a comprehensive examination. The purpose of the comprehensive exam is to ascertain the student's knowledge in his/her field of specialization and related areas. The exam will cover major topics from within the concentration area and related fields.

Students who do not pass the comprehensive exam may, upon the recommendation of the thesis committee, take it for a second time in the following term. Failure on the second attempt will result in the student's discontinuation from the PhD program.

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

All students must successfully complete a qualifying examination, which is to be taken at least two terms prior to the final defense of the PhD thesis. The qualifying exam, administered by the thesis committee, is an oral exam in which the student presents his/her research proposal.

The objective of the oral exam is to determine whether the candidate's proposal and methodology are adequate for a PhD thesis. The candidate must show positive preliminary results and considerable promise of original research. It is the responsibility of the student to inform and update the thesis committee members about his/her research progress, especially during the period between the comprehensive and qualifying exams. Students who do not pass the qualifying exam are allowed to take it for a second time in the following term. Failure on the second attempt will result in the student's discontinuation from the graduate program.

BIOM 491 PhD Laboratory Rotations 0.30; 1 cr.

During the first year of study, PhD students in Biomedical Sciences must take a minimum of two laboratory rotations (1 credit each) in different faculty research laboratories within the Faculty of Medicine. Students may also enroll in the summer in a third elective laboratory rotation (1 credit). This course aims to familiarize students with potential thesis mentors and expose them to different research environments. Open to PhD students in Biomedical Sciences. *First and second terms and summer.*

**BIOM 499
A/B/C/D/E****PhD Thesis****24 cr.**

In partial fulfillment of the requirements for the degree of Doctor of Philosophy, a student must submit a thesis (equivalent to 24 credit hours) that is expected to make a significant and original contribution to his/her field of research.

PhD Thesis Requirements

Thesis Committee

The PhD Thesis Committee should consist of at least five members. Two members should be from outside AUB, and the chair of the PhD Thesis Committee should be a faculty member holding the rank of a full professor and different from the thesis advisor. Refer to PhD Thesis Committee under General University Academic Information, page 71.

Thesis Defense

After qualifying as a PhD candidate, the student will focus on the doctoral research with continued participation in seminars. The doctoral research, once completed, will be presented publicly and defended immediately after in front of the PhD Thesis Committee. Prior to the defense, all major revisions to the thesis must be completed. The decision of the committee will be by consensus. Refer to PhD Thesis Defense under General University Academic Information, page 65.

Publication Requirements

PhD students should have published or have in press one journal publication and one abstract in an international conference related to their thesis topics.

Candidacy and Residency Requirements

All students admitted to the PhD program must successfully complete the qualifying exam part I (written) and qualifying exam part II (oral defense of thesis proposal).

To satisfy the minimum residency requirements for the PhD degree, all students must register and be in residence for at least three years beyond the completion of the master's degree. The requirements for the degree of Doctor of Philosophy must be completed within a period of 5 years after joining the PhD program. Extension beyond the 5-year period will require Graduate Council approval upon the recommendation of the faculty Graduate Studies Committee.

Graduation Requirements

To earn a PhD degree in Biomedical Sciences, a student must fulfill the following graduation requirements:

- attain a minimum cumulative average of 85 (GPA: 3.7) at the PhD level
- pass qualifying exams part I and II
- pass the PhD thesis defense
- satisfy the minimum residency requirements
- have a publication in a leading international journal, based on the PhD research
- have at least one accepted abstract in an international conference, based on the PhD research
- satisfy all pertinent AUB regulations

In addition to the AUB general requirements for graduate study, the Faculty of Medicine graduate study requirements and regulations are as follows:

- **Application and Notification of Acceptance:** For application submission deadlines and admissions decision notifications, refer to Application Procedures under Admissions section on page 41.
- **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 session.
- **Transfer Students:** See Transfer of Credits into a PhD Degree Program under General University Academic Information section on page 58.
- **Categories of Graduate Students:** The categories applicable at the university in general are also applicable in the Faculty of Medicine with the following modifications: Students are given a regular graduate student status when they have a cumulative undergraduate average in the major field of study of at least 80 (GPA: 3.2) or its equivalent, and they are given a graduate on special status when they have a cumulative undergraduate average in the major field of study or an overall average of 75 (GPA: 2.7) or higher but lower than 80 (GPA: 3.2) or equivalent. Graduates on probation status are transferred to regular status upon achieving an overall average of at least 80 (GPA: 3.2) in 9 credits of graduate courses within two terms.
- **Visiting Graduate Students:** is a status applicable to students who pay a fee to attend a period of 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

See Leave of Absence under General University Academic Information section on page 53.

Interdepartmental Courses – Graduate Program

IDTH 301	Introduction to Medical Science Literature	16.32; 2 cr.
A multidisciplinary approach to the use of medical science publications. Open to beginning graduate students in the Faculty of Medicine.		
IDTH 302	Methods	16.64; 3 cr.
Theory and practice of techniques used in various disciplines of medical sciences.		

IDTH 303/304/305/306 Integrated Graduate Course I–IV 32.0; 2 cr. (each)

An integrated lecture seminar course introducing graduate students to the thinking in various medical science disciplines (required of all PhD students in the Faculty of Medicine). *Four terms. One two-hour session a week each.*

IDTH 307 Biomedical Electronics 32.16; 3 cr.

An introductory course in electricity and electronics as applied to biology and medicine. *Alternate years.*

IDTH 308A Neuroanatomy 31.27; 3 cr.

A course similar to the first part of 208, offered to graduate students, covering the normal structure of the human nervous system. See Department of Human Morphology. *Three weeks.*

IDTH 308B Neurophysiology 31.27; 3 cr.

A course similar to the second part of 208, offered to graduate students, covering the function of the human nervous system. See Department of Physiology. *Three weeks.*

IDTH 309 Biology of Nerve and Muscle 48.0; 3 cr.

A multi-disciplinary study of anatomy, physiology, biochemistry, pharmacology, and pathology of nerve and muscle. *Alternate years.*

IDTH 310 Basic Pathological Mechanisms 29.14; 2 cr.

The course covers the basic pathological mechanisms of disease at the cellular and molecular levels; their microscopic, gross and clinical manifestation; and some pharmacological interventions that apply to them.

IDTH 311 Foundations of Biomedical Science 90.40; 7 cr.

An interdisciplinary course that presents the cellular and molecular concepts and principles that underlie the normal structure and function of the human body. It covers cellular structure and function, including mechanisms and regulation of gene expression, protein synthesis, structure and function, signaling mechanisms, membrane transport, energy metabolism, contractility and excitability, and the basic principles of drug action.

IDTH 317 Perspectives in Medical Sciences 32.0; 2 cr.

A course of selected readings and seminars in the history, philosophy and methodology of medical and related sciences.

IDTH 319/320 Integrated Research Seminars 16.0; 1 cr. (each)

Participation of all PhD students and professors.

IDTH 330 Medical Pedagogy 3 cr.

A tutorial in teaching methods and practical experience under supervision. *Open to PhD candidates only.*

IDTH 333/334 Projects 2 cr. (each)

Two months half-time in a department other than the student's major occurring toward the end of the PhD candidate's residency.

Biomedical Engineering Graduate Program

Coordinator:	Dawy, Zaher (Electrical & Computer Engineering, MSFEA)
Co-coordinator:	Jaffa, Ayad (Biochemistry & Molecular Genetics, FM)
Coordinating Committee Members:	Amatoury, Jason (Biomedical Engineering, MSFEA)
	Daou, Arij (Biomedical Engineering, MSFEA)
	Darwiche, Nadine (Biochemistry & Molecular Genetics, FM)
	Khoueiry, Pierre (Biochemistry & Molecular Genetics, FM)
	Khraiche, Massoud (Biomedical Engineering, MSFEA)
	Kobeissy, Firas (Biochemistry & Molecular Genetics, FM)
	Mhanna, Rami (Biomedical Engineering, MSFEA)
	Oweis, Ghanem (Mechanical Engineering, MSFEA)

Background

The Biomedical Engineering Graduate Program (BMEP) is a joint MSFEA and FM interdisciplinary program that offers two degrees: Master of Science (MS) in Biomedical Engineering and Doctor of Philosophy (PhD) in Biomedical Engineering. The BMEP is housed in the MSFEA and administered by both MSFEA and FM via a joint program coordinating committee (JPCC).

The mission of the BMEP is to provide excellent education and promote innovative research enabling students to apply knowledge and approaches from the biomedical and clinical sciences in conjunction with design and quantitative principles, methods and tools from the engineering disciplines to address human health related challenges of high relevance to Lebanon, the Middle East and beyond. The program prepares its students to be leaders in their chosen areas of specialization committed to lifelong learning, critical thinking and intellectual integrity.

The curricula of the MS and PhD degrees are composed of core and elective courses balanced between biomedical sciences and engineering and between fundamental and applied knowledge.

The curricula include the following three research focus areas:

- **Biomedical Systems:** This focus area includes research directions such as devices, instrumentation, biomechanics, biomaterials, drug delivery systems and tissue engineering.
- **Biomedical Cybernetics:** This focus area includes research directions such as biomedical and health informatics, computational biology, biomedical signal/image processing and biomedical systems engineering.
- **Cardiovascular and Pulmonary Engineering:** This focus area includes research directions such as fluid mechanics, modeling, simulation, imaging, devices, and implants related to both human cardiovascular and pulmonary systems.

A student may select his/her courses to satisfy the requirements of one of the three focus areas.

The MS and PhD degrees are open to students holding degrees from relevant fields of study including basic sciences, biomedical sciences, computer science, engineering, health sciences, and mathematics. Due to the interdisciplinary nature of the program, eight remedial undergraduate courses in sciences, math and engineering have been identified to cover the needed prerequisite knowledge; the remedial courses required by each admitted students are customized on a case-by-case basis depending on the student's undergraduate degree. Remedial undergraduate courses do not count as credit towards the MS or PhD degree completion. Grades on these remedial courses will appear on the transcript as Pass/Fail with a passing grade of 70/100 (C+).

Master of Science in Biomedical Engineering

The BMEP offers a Master of Science (MS) degree in Biomedical Engineering with two options: thesis option and non-thesis option.

Admission Requirements

The application procedures and admission requirements to the MS program follow AUB's General University Academic Information as documented in the Graduate Catalogue. To be considered for admission, applicants must hold a bachelor's degree in a relevant field of study from AUB or its equivalent, or from a recognized institution of higher learning.

Accepted students in the thesis option are eligible to apply to the Graduate Fellowship and Assistantship Program (GFAP). GFAP support cannot be used to cover the tuition for remedial undergraduate courses.

Course Requirements

The MS program consists of 30 credits. The curriculum design is divided into core courses and elective courses in addition to a master's thesis for the thesis option. This program does not provide credit towards New York State licensure.

Core graduate courses: 18 credits of core courses from biomedical sciences and engineering.

Required core courses (18 cr.)		Credits
BIOC 321	Nucleic Acids and Basic Genetics	1
BIOC 322	Protein Biochemistry	1
BMEN 600	Biomedical Engineering Applications	3
BMEN 601	Computational Modeling of Physiological Systems	3
BMEN 672	Hospital Lab Rotation	0
BMEN 673L	Biomedical Engineering Lab	1
EPHD 310	Basic Biostatistics ¹	3
HUMR 310 (A, B, or C)	Biomedical Research Techniques	1
HUMR 314	Research Seminar	1
PHYL 346	Human Physiology	4

1) EPHD 310 can be replaced by another advanced level statistics course based on JPCC's approval.

Restricted elective graduate courses: 6 credits restricted elective courses customized per focus area and required by both thesis and non-thesis options.

Restricted elective courses (6 cr.)		Credits	Systems	Cyber- netics	Cardio- vascular
BIOC 325	Receptors and Signal Transduction	2		X	
BIOC 326A	Bioinformatics Tools and Applications in Genomics	1		X	
BMEN 603	Tissue Engineering	3	X		X
BMEN 604	Engineering of Drug Delivery Systems	3	X		X
BMEN 605	Biomedical Imaging	3		X	X
BMEN 606	Nanobiosensors	3	X	X	
BMEN 607	Biomechanics	3	X		
BMEN 608	Biomaterials and Medical Devices	3	X		X
BMEN 609 or EECE 605	Computational Neuroscience or Neuromuscular Engineering	3	X	X	
BMEN 610	Micro and Nano Neural Interfaces	3	X		
BMEN 611	Computational Modeling in Biomechanics	3	X	X	X
EECE 601 or EECE 602	Biomedical Engineering I or Biomedical Engineering II	3	X	X	X
EECE 603	Biomedical Signal and Image Processing	3		X	X
EECE 633 or EECE 663 or EECE 667 or EECE 693	Data Mining or System Identification or Pattern Recognition or Neural Networks	3		X	
HUMR 305	Cell and Tissue Biology	3	X		
PHYL 302	Cardiovascular Physiology	2			R
PHYL 300A	Pulmonary Physiology	1			R

Free elective graduate courses for the non-thesis option: 6 credits additional elective courses. These courses should be taken from engineering and should be approved by the student's advisor and the coordinator of the joint program coordinating committee.

Master thesis for the thesis option: 6 credits master's thesis in biomedical engineering. The thesis requirements follow AUB's General University Academic Information as documented in the Graduate Catalogue.

PhD in Biomedical Engineering

Admission Requirements

The application procedures and admission requirements to the PhD program follow AUB's General University Academic Information as documented in the Graduate Catalogue. To be considered for admission, applicants must hold a bachelor's or master's degree in a relevant field of study from AUB or its equivalent, or from a recognized institution of higher learning.

Acceptance into the PhD program is determined by academic performance as well as an assessment of readiness, potential and ability to develop into independent researchers as judged by interviews by faculty members, a written statement, letters of recommendation, GRE scores, and other means of assessment such as publications and industrial experience.

Accepted students are eligible to receive scholarships that fully cover their tuition fees and provide a monthly stipend.

Degree Requirements

General requirements for master's degree holders: Based on AUB's guidelines, a minimum of 48 credit hours beyond those required for the master's degree, of which a minimum of 18 credit hours must be in graduate level course work and a minimum of 24 credit hours of thesis work, must be taken. Requirements also allow a maximum of 3 credit hours out of the 18 credits of coursework as tutorial course and include a 0-credit comprehensive examination preparation course and a 0-credit thesis proposal preparation course.

General requirements for bachelor's degree holders: Based on AUB's guidelines, a minimum of 78 credit hours beyond those required for the bachelor's degree, of which a minimum of 36 credit hours must be in graduate level coursework and a minimum of 30 credit hours of thesis work, must be taken. Requirements also allow a maximum of 6 credit hours out of the 36 credits of coursework as tutorial courses and include a 0-credit comprehensive examination preparation course and a 0-credit thesis proposal preparation course.

To earn a PhD degree in Biomedical Engineering, the student must complete the following requirements:

- Satisfy the course and research credit requirements
- Satisfy the residence requirement and all other pertinent AUB regulations
- Have at least one international refereed journal article based on the PhD thesis
- Have at least one refereed conference paper based on the PhD thesis
- Have a cumulative average of 85 (3.7) or above
- Pass the comprehensive and oral qualifying examinations
- Successfully defend the PhD thesis

The following are the graduate level course requirements for students admitted with a bachelor's degree. The total number of credits is at least 36 credits divided among core, restricted elective and free elective courses. Students admitted with a master's degree can waive as many courses as possible without going below the minimum required 18 credits of coursework.

Core graduate courses: 21 credits of core courses from biomedical sciences and engineering.

Required core courses (21 cr.)		Credits
BIOC 321	Nucleic Acids and Basic Genetics	1
BIOC 322	Protein Biochemistry	1
BIOM 385	Research Ethics	1
BMEN 600	Biomedical Engineering Applications	3
BMEN 601	Computational Modeling of Physiological Systems	3
BMEN 671	PhD Lab Rotation ¹	1+1
BMEN 672	Hospital Lab Rotation	0
BMEN 673L	Biomedical Engineering Lab	1
BMEN 675	Approved Experience	0
EPHD 310	Basic Biostatistics ²	3
HUMR 310 (A, B, or C)	Biomedical Research Techniques	1
HUMR 314	Research Seminar	1
PHYL 346	Human Physiology	4

Restricted elective graduate courses: 9 credits restricted elective courses customized per focus area.³

Restricted elective courses (9 cr.) ³		Credits	Systems	Cyber- netics	Cardio- vascular
BIOC 325	Receptors and Signal Transduction	2		R	
BIOC 326A	Bioinformatics Tools and Applications in Genomics	1		R	
BMEN 603	Tissue Engineering	3	X		X
BMEN 604	Engineering of Drug Delivery Systems	3	X		X
BMEN 605	Biomedical Imaging	3		X	X
BMEN 606	Nanobiosensors	3	X	X	
BMEN 607	Biomechanics	3	X		
BMEN 608	Biomaterials and Medical Devices	3	X		X
BMEN 609 or EECE 605	Computational Neuroscience or Neuromuscular Engineering	3	X	X	
BMEN 610	Micro and Nano Neural Interfaces	3	X		
BMEN 611	Computational Modeling in Biomechanics	3	X	X	X
EECE 601 or EECE 602	Biomedical Engineering I or Biomedical Engineering II	3	X	X	X

1) 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).

2) EPHD 310 can be replaced by another advanced level statistics course based on JPCC's approval.

3) Courses marked as "R" are required, and courses marked as "X" are possible elective options.

EECE 603	Biomedical Signal and Image Processing	3	X	X
EECE 633 or EECE 663 or EECE 667 or EECE 693	Data Mining or System Identification or Pattern Recognition or Neural Networks	3	X	
HUMR 305	Cell and Tissue Biology	3	R	
PHYL 300A	Pulmonary Physiology	1		R
PHYL 302	Cardiovascular Physiology	2		R

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

Course Descriptions

BMEN 600 Biomedical Engineering Applications 3 cr.
Biomedical engineering is an interdisciplinary domain which applies principles of engineering to find solutions for biological and health problems. Biomedical engineering aims to improve our fundamental understanding of biological processes and develop approaches for optimized therapeutic/diagnostic healthcare procedures. The field of biomedical engineering involves the development of materials to replace or enhance the operation of damaged or malfunctioning biological entities, development of diagnostic and therapeutic tools, modeling of biological systems, signal processing and bioinformatics. This course will introduce students to biomedical engineering and provide insight into the various applications in the biomedical engineering field. The course will be divided into modules, and each will be given by a specialist in a certain biomedical engineering area.

BMEN 601/ Computational Modeling of Physiological Systems 3 cr.
MECH 635
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 and PHYL 346, or consent of instructor.*

BMEN 602 Computational Modeling of Cardiovascular 3 cr.
and Pulmonary Systems
The need for better understanding the mechanics and tools for computational modeling of cardiovascular and respiratory systems in healthy and diseased conditions is constantly increasing. This is a result of the enormous advances made in the science and engineering of both surgical and therapeutic medicine. This course covers the modeling and simulation of cardiovascular and respiratory systems. It will provide the students with a thorough understanding of the anatomy, physiology and mechanics of cardiovascular and respiratory systems as well as the computational tools for modeling and simulation of cardiac, circulatory and respiratory systems in healthy and diseased conditions.

**BMEN 603/
CHEN 675** **Tissue Engineering** **3 cr.**

In a world of aging population, an ever-increasing demand for improvement of healthcare services and need for replacement organs and tissues are arising. The limited pool of donors together with the problem of donor organ rejection is a strong driver for engineering tissues and other body parts. Tissue engineering is an interdisciplinary field that uses cells, biomaterials, biochemical (e.g. growth factors) and physical (e.g. mechanical stimulation) signals, as well as their combination to generate tissue-like structures. The goal of tissue engineering is to provide biological substitutes that can maintain, restore or improve the function of damaged organs in the body. This course will introduce interested students to the new field of tissue engineering and provide insight 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 the limitations of each imaging procedure, while being exposed to their vast applications in the clinic and research.

BMEN 606 **Nanobiosensors** **3 cr.**

This course will provide a comprehensive analysis of the field of nanoengineering with a focus on biosensors including common modalities, basic theoretical considerations for sensor operation, physics of detection and applications in research and medical diagnostics. The course will cover the major types of electronic nanobiosensors for biological signal detection (potentiometric, amperometric, and mass based sensors) and their applications in the fields of neural engineering, DNA sequencing and cardiovascular early disease detection. The course will enable students to have a strong grasp of fundamentals of biosensor design, select sensors for various applications and evaluate new and emerging technologies. *Prerequisites: EECE 210 (or equivalent) and BIOL 210 (or equivalent); or consent of instructor.*

**BMEN 607/
MECH 633** **Biomechanics** **3 cr.**

A course on the study of the biomechanical principles underlying the kinetics and kinematics of normal and abnormal human motion. Emphasis is placed on the interaction between biomechanical and physiologic factors (bone, joint, connective tissue, and

muscle physiology and structure) in skeleto-motor function and the application of such in testing and practice in rehabilitation. The course is designed for engineering students with no previous anatomy/physiology. *Prerequisites: CIVE 210, MECH 320 or CIVE 310; or consent of instructor.*

BMEN 608/ MECH 634 Biomaterial and Medical Devices 3 cr.

A course that examines the structure-property relationships for biomaterials and the medical applications of biomaterials and devices. The first part of the course focuses on the main classes of biomaterials, metal, ceramic, polymeric and composite implant materials, as well as on their interactions with the human body (biocompatibility). The second part of the course examines the various applications of biomaterials and devices in different tissue and organ systems such as orthopedic, cardiovascular, dermatologic and dental applications. Experts from the medical community will be invited to discuss the various applications. *Prerequisite: MECH 340 or consent of instructor.*

BMEN 609 Computational Neuroscience 3 cr.

The human brain, perhaps the most complex, sophisticated, and complicated learning system, controls virtually every aspect of our behavior. The central assumption of computational neuroscience is that the brain computes. What does that mean? Generally speaking, a computer is a dynamical system whose state variables encode information about the external world. In short, computation equals coding plus dynamics. Some neuroscientists study the way that information is encoded in neural activity and other dynamical variables of the brain. Others try to characterize how these dynamical variables evolve with time. The study of neural dynamics can be subdivided into two separate strands. One tradition, exemplified by the work of Hodgkin and Huxley, focuses on the biophysics of single neurons. The other focuses on the dynamics of networks, concerning itself with phenomena that emerge from the interactions between neurons. Therefore computational neuroscience can be divided into three sub-specialties: neural coding, biophysics of neurons, and neural networks. This course will introduce engineers, physicists, computational scientists, mathematicians and other audiences to the neurosciences from the cellular level and the network level as seen from computational lenses. *Prerequisite: BIOL 201 (or equivalent) and Math 202, or consent of instructor.*

BMEN 610 Micro and Nano Neural Interfaces 3 cr.

Neural interfaces are micro and nano devices that form the connection between the biological neural tissue and the external electronic devices. These devices are designed for mapping, assisting, augmenting, or repairing neural pathways. The course will focus on physical, chemical and neurophysiological principles of neural interfaces, theoretical and functional basis for their design, micro and nano fabrication techniques and applications in neural prosthesis for Brain Machine Interface. Topics covered in class will include; Neural Engineering, Brain Machine Interface, Microfabrication, Nanofabrication, Soft-lithography, Electrokinetics, Electrochemistry, Neural probes, Biocompatibility, Microelectrodes, NeuroMEMS (neuro microelectromechanical systems, BioMEMS (biomedical microelectromechanical systems).

BMEN 611 Computational Modeling in Biomechanics 3 cr.

This course provides students with a glimpse into the world of computational finite element modeling and simulation in biomechanics to investigate and solve biomedical problems. Students will take a journey through the processes involved in producing a computational finite element model in the biomedical field; starting at construction of model geometry, particularly from medical imaging data (CT/MRI), through to model

Department of Anatomy, Cell Biology and Physiological Sciences

Chairperson:	Eid, Assaad, A.
Emeritus Professor:	Bikhazi, Anwar
Professors:	Al-Chaer, Elie D.; Barada, Kassem; Bazarbachi, Ali; Birbari, Adel; Eid, Assad, A.; El-Sabban, Marwan; Jurjus, Abdo; Mourad, Fadi
Associate Professors:	Abou-Kheir, Wassim; Daoud Georges; Nasr, Rihab; Saab, Raya; Saade, Nayef
Assistant Professors:	Lawand, Nada B.; Nassar, Dany; Obeid, Makram; Zeidan, Youssef
Associates:	Alok, Khaled; Darwish, Hala; Husari, Ahmad; Kibbi, Abdul-Ghani; Kahhale, Joseph; Rebeiz, Abdallah
Adjunct:	Massaad, Charbel; Oueidat, Doureid; Saad, William

The department offers three disciplines of study, which are Human Morphology, Physiology, and Neuroscience. Each discipline provides courses to medical, graduate, nursing, nutrition, paramedical and undergraduate students.

The graduate program is broad, leading to a master's degree (MS) or doctoral degree (PhD) in Biomedical Sciences. Students with a BS degree or its equivalent in mathematics, biology, physics, or chemistry, as well as advanced courses in physiology and other medical science disciplines, are eligible to apply. The department may ask for specific prerequisites in certain disciplines, such as biology and chemistry as deemed necessary.

Anatomy and Cell Biology

Required courses for the discipline of Human Morphology include: PHYL 310 (3 cr.), HUMR 305 (3 cr.), HUMR 306 (3 cr.), HUMR 308 (3 cr.), HUMR 314 (1 cr.) and HUMR 310 (A&C, 2 cr.).

HUMR 244 Introduction to Human Biology 32.0; 2 cr.

An introductory course that meets the needs of a diverse group of students who are preparing for careers in allied health sciences, medical technologies or other nonmedical careers like psychology or biomedical sciences; it introduces students to the very basic terms and concepts in anatomy, histology and physiology. The course covers the basic biology of the cells, tissues and organs of the human body.

HUMR 246 Human Morphology for Paramedical and Undergraduate Students 32.32; 3 cr.

An introduction to basic gross anatomy and histology. Offered to Nurses and other undergraduate students.

- HUMR 248 Human Anatomy and Physiology 60.30; 5 cr.**
A course that aims to provide a strong foundation for understanding the structural complexities of the human organism and the related physiological functions. The course, as conceived, will integrate structure and function and offer practical advantages in fine-tuning the balance between anatomy, histology and physiology. 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.**
- HUMR 310B Genomics and Proteomics 10.15; 1 cr.**
- HUMR 310C Mouse Models and In Vivo Studies 8.16; 1 cr.**
- 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.**
Presentation and discussion of timely research topics designated by members of the department.

HUMR 346 Human Morphology for Graduate Students **48.32; 4 cr.**
A course that includes the embryology component of HUMR 307, HUMR 246 and an experimental anatomy part.

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

HUMR 399 MS Thesis **9 cr.**
A/B/C/D/E
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.*

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.**
- PHYL 300B Renal Physiology 10.15; 1 cr.**
- 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 MS Thesis **9 cr.**
A/B/C/D/E
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/ Elective in Basic Neuroscience **0.180-360 cr.**
PHYL 261
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

Interim Chairperson:	Aouad-Maroun, Marie
Professor Emeritus:	Muallem, Musa
Professors:	Aouad-Maroun, Marie; Ayoub, Chakib; Jabbour-Khoury, Samar; Kanazi, Ghassan; Khatib, Mohammad; Siddik-Sayyid, Sahar
Associate Professors:	Kaddoum, Roland; Taha, Samar
Assistant Professors:	Dabbous, Aliya; Nauphal, Maud; Rizk, Marwan; Zeeni, Carine
Instructors:	Beresian, Jean; El Yahchouchi, Christine; Foz, Carine; Karam, Cynthia; Yamout, Rana
Clinical Associates:	Abdul Kader, Hachem; Abou Nafeh, Nancy; Louis, Faek; Moukadem, Farah; Rouhana, Corine; Sarkis, Sarine; Toukhtarian, Aline

The Department of Anesthesiology offers a clinical clerkship to third-year medical students. At the graduate level, it offers a four-year residency program and a one-year clinical fellowship in cardiovascular anesthesia.

ANES 247 Clinical Clerkship

A clinical clerkship offered to third year medical students, consisting of instructive lectures given by 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 and postoperative complications.

ANES 268 Elective in the Subspecialties of Anesthesia

Residents focus on all aspects of anesthesiology, such as general anesthesia, regional anesthesia, ICU rotations and pain management. They are exposed to difficult airway management, vascular access, as well as invasive monitoring. They learn the different subspecialties of Anesthesia including Cardiac, Pediatric, Neuro, Obstetric, Regional Anesthesia, Pain Management, Non Operating Room Anesthesia and Perioperative Medicine. Residents also attend the didactic lectures of the department.

Department of Biochemistry and Molecular Genetics

Chairperson:	Usta, Julnar
Professors:	Boustany, Rose-Mary; Darwiche, Nadine; Dbaibo, Ghassan; Habib-Abdul Karim, Aida; Jaffa, Ayad; Usta, Julnar; Ziyadeh, Fuad
Associate Professors:	Kobeissy Firas; Kurban, Mazen; Refaat, Marwan
Assistant Professor:	Khoueiry, Pierre
Associates:	Darwish, Hala; Karam, Pascale

The Department of Biochemistry and Molecular Genetics offers undergraduate courses to Nursing students and to Health Profession students enrolled in the Medical Laboratory Sciences Degree Program.

It also offers graduate level courses to medical students and to graduate students in the graduate program leading to a master's degree in Biomedical Sciences, MSc Biochemistry and a doctoral degree (PhD) in Biomedical Sciences or Biomedical Engineering.

The requirements for admission to the graduate program are a BA with prerequisites in chemistry and biology courses or a BS degree from a university and an academic record with a cumulative average of 80 and above. Students should have a background in chemistry, biology, or a related medical science degree. Students will spend a minimum of two years in the graduate program during which they must complete 21 credits of graduate courses, pass a comprehensive exam (BIOC 395 A/B), and submit a thesis (9 credits, BIOC 399 A/B/C/D/E) based on independent research. The 21 credits of graduate courses include a total of 14 credits of required core courses and 7 credits of elective courses.

Required MSc courses in Biomedical Sciences track Biochemistry include: BIOC 302 (1 cr); BIOC 305 (1 cr) ; BIOC 321 (1 cr.); BIOC 322 (1 cr.), BIOC 323 (2 cr.), BIOC 325 (2 cr.); BIOC 326 (2 cr); BIOC 330 (2 cr) and IDTH 301 (2cr).

Required PhD courses in Biomedical Sciences are listed on page 545 of the Graduate Catalogue.

Undergraduate courses

BIOC 246 Biochemistry for Nursing 60.0; 4 cr.
 A course that provides an introduction to basic concepts in biochemistry. It discusses the main biochemical pathways in the cell and defines the interrelations between the different metabolic pathways. The course is composed of three units: (a) general chemistry (b) organic chemistry (c) biochemistry. Offered to BS Nursing and is open to undergraduates in related sciences. *First term.*

BIOC 255 Biochemistry for MLSP 45.0; 3 cr.
 A course that provides an overview of structure, function, and metabolism of basic biological micro/macro molecules; a general review of the genetic makeup; and emphasizes the clinical relevance by correlating disease to basic information. The course is an introductory biochemistry course offered to undergraduate students in the Medical Lab Technology Program and related fields. *Second term.*

Graduate courses

Courses in the graduate program are open to all graduate students enrolled in the various Biomedical Sciences departments and in Biomedical Engineering as well as to science major graduates, such as Biology, Chemistry or related sciences upon the consent of the coordinator.

Required Courses

BIOC 302 Genetic Pathways in Organogenesis 15.0; 1 cr.
 A course that aims at drawing all the pathways involved in early organogenesis in mammals. The students will be exposed to all the techniques that helped in understanding these pathways. Detailed mechanisms governing cell differentiation and tissue-specific gene regulation will be explained for select organs. Genetic networks involving genes encoding growth factors and transcription factors will be exposed and contrasted between the different organs. Examples of Mendelian inherited disorders caused by mutations in these genes will be discussed at the end. *Required. Prerequisites: BIOC 321 and BIOC 322, or consent of the coordinator. Second term.*

BIOC 305 a, b, c Biochemistry Research Seminars 0.30; 1 cr.
 A required course that spreads over three terms. During their residency in the master's program, graduate students will register for: BIOC 305 a (0 cr.) during the second term of their first year; BIOC 305 b (0 cr.) during the first term of their second year; and BIOC 305 c (1 cr.), following their completion of a and b, during the second term of their second year.

Each of BIOC 305 a, b, c will emphasize one or two biochemical or genetic themes. Students will be asked to present published research or literature reviews on a specific topic as advised by the different coordinators. *Required from MS Biochemistry students.*

BIOC 321 Nucleic Acids and Basic Genetics 15.0; 1 cr.
 This course discusses the principles of nucleic acids structure and function in eukaryotes. It includes the information for basic genetics in terms of genome structure as well as the diversity of gene regulation. Required from MS and PhD students in Biomedical Sciences. *Requires consent of coordinator for other graduate disciplines. First term.*

BIOC 322 Protein 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 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. 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 inter- and intracellular communication, from the generation of signaling molecules through the cellular responses. *Required from MS and PhD students in Biomedical Sciences. Requires consent of coordinator for other graduate disciplines. First term.*

BIOC 326 A, B Bioinformatics Tools and Applications in Genomics 32.0; 2 cr.
 This two-module course (1 credit/module) introduces students to the new field of Next Generation Sequencing (NGS). It covers different NGS applications involved in basic research and precision medicine. Students will learn about modern methods, concepts and techniques that are widely used in the field. The hands-on sessions will allow students to acquire basics of bioinformatics and genomics data analysis using state of the art tools and methods. Cases from the literature on genetics, cancer genomics and diseases in general will be discussed. *Open to all graduate students from FM, FAS, FHS, FAFS and FEA. Both modules are required for the students of the Biochemistry and Molecular Genetics Department. Required. Prerequisite: Consent of coordinator. Second term.*

BIOC 326A Bioinformatics Tools and Applications in Genomics: 1 cr.
A focus on the Basics of Next Generation Sequencing

BIOC 326B Bioinformatics Tools and Applications in Genomics: 1 cr.
Next Generation Sequencing analysis for functional genomics and precision medicine

BIOC 330 Translational Genetics and Genomics 32.0; 2 cr.
 This course discusses the different types of genetic and genomic aberrations often encountered in human disease. The course also explores the spectra of genetic and genomic alterations in the pathobiology of various human diseases including congenital heart disease, diabetes, adult and pediatric cancer as well as cardiovascular, neurological, dermatological and autoimmune disorders. The course also discusses the translation of human disease genomics to improved precision medicine such as risk assessment, early detection, diagnosis and personalized 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 4 credits with an average of 80 and consent of advisor.

BIOC 399 MS Thesis 9 cr.
A/B/C/D/E

A 9 credit-hour course in which students conduct original research under faculty supervision. Faculty research focus includes: molecular mechanisms of inflammation, vascular biology, congenital heart problems, metabolism, metabolic disorders, mitochondrial toxicology, phenotype-genotype studies, Wilson's disease, diabetes and its complications (microvascular and macrovascular), atherosclerosis, sphingolipid metabolism, genetics of autism, dermatological disorder, cancer, cell death, herbal medicine, natural product remedies, liver injury, inflammation, traumatic brain injury causes and mechanisms, proteomics, bioinformatics.

Elective Courses

BIOC 303 a, b Molecular Biology of Cancer a) 15.0; 1 cr ; b) 30.0; 2 cr.
 A 2-module course composed of BIOC 303 a (1 cr.) and BIOC 303 b (2 cr.) that is open to MSc. and or Ph.D.

BIOC 303 a: A course that deals with the regulatory mechanisms of tumor cell growth and cancer formation at the cellular, molecular, genetic and epigenetic levels. This course includes a discussion of recent developments in the intra- and/or inter-cellular mechanisms involved in cellular proliferation, cell death and resistance to cancer therapeutics. *The 1-credit elective course is open to all graduate students in basic Biomedical Sciences, Biomedical Engineering and Biology. Second term.*

BIOC 303 b: A course that deals with more advanced topics in tumor biology, such as invasion and metastasis, cancer stem cells and animal models. The 2-credit elective course is recommended for graduate students whose research interest can benefit from a thorough knowledge of tumor biology. *BIOC 303 is a prerequisite for BIOC 303 b. Students can register for both BIOC 303 a and BIOC 303 b. Second term.*

BIOC 306 Mediators in Vascular Biology and Inflammation 32.0; 2 cr.
 An elective course that describes the different mediators and their role in vascular biology and inflammation. *Elective. Open to graduate students in basic Biomedical Sciences and Biology, and to medical doctors. Second term; alternating years.*

BIOC 310 Molecular Basis of Genetic and Metabolic Disorders 16.32; 2 cr.

A course that deals with the molecular basis of genetic and metabolic disorders. This course presents a detailed overview of the molecular basis of known genetic diseases. Students also learn the methods used to map chromosomal aberrations or DNA mutations implicated in congenital diseases. A PhD elective course. *Open to all graduates in Biomedical Sciences or related fields of study. Prerequisites: BIOC 321 and BIOC 322, or a background in biology. Second term; alternating years.*

BIOC 314 Mitochondria: Genetics, Protein and Disease 15.0; 1 cr.

A course that provides a clear understanding of the biochemistry, molecular genetics and bioenergetics of the mitochondria (mt). It emphasizes the role of the mitochondrial dysfunction (mt-DNA mutations, environmental toxins) in the pathogenesis of mitochondrial diseases. *Elective course open to all graduate students in basic Biomedical Sciences and Biology. Second term or summer; alternating years.*

BIOC 316 Bioinformatics 0.30; 1 cr.

A course that introduces students to the latest bioinformatics literature. The format is a journal club in which recent journal articles are circulated and discussed. Guest lecturers are invited to present research related to the field. Students are also given an orientation on software currently available in the Computational Science and Bioinformatics Lab. *Elective. Open to both basic Biomedical Sciences as well as Arts and Sciences graduate students. Prerequisites: Consent of instructor and graduate standing.*

BIOC 317 (a-j) Special Topics in Biochemistry and Genetics 15.0; 1 cr.

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

BIOC 327 Cancer Genomics 15.0; 1 cr.

This course explores genetic and genomic alterations in cancer and their role in the onset and progression of various malignancies. The course also discusses how understanding cancer genomes is advancing precision cancer medicine via molecular-based risk assessment, early detection, diagnosis and targeted personalized therapy. Lastly, the course also explores emerging concepts in cancer genomics including intratumoral heterogeneity and immunogenomics. *Elective. Prerequisite: Consent of coordinator. Open to MS and PhD students in Biomedical Sciences. Requires coordinator approval for other graduate disciplines. First term.*

DERM 277 Selective in Dermatology

9.90-180.

Dermatology is the study of skin in health and disease. The goal of this selective is to share with fourth year medical students our enthusiasm for the subject of dermatology and to administer a well-organized, informative and focused course. During this rotation, the essentials of morphology, diagnosis and management will be underscored. By the end of the course, students are expected to acquire basic clinical dermatology and to work up and manage patients with skin, hair, nail and mucous membrane disorders. A final exam is offered at the end of the year for all students. This course is offered only to fourth year medical students enrolled in AUB. *Four weeks.*

DERM 287 House Staff

9.131-262.

Same as DERM 267; offered to straight and rotating interns and residents of other departments on an elective basis. *One month.*

Weekly Conferences

Journal club, journal club for electives, grand rounds/case discussion, basic science seminar, clinical slides/differential diagnosis, genodermatoses lecture series, dermatopathology conferences, Bologna book review, dermoscopy seminar, laser lecture series and dermatologic surgery conference.

Monthly Conferences

Consultation review, attending staff lecture, research meeting, and basic science journal club. For further details, visit the Department of Dermatology website at <https://www.aub.edu.lb/fm/Dermatology/Pages/default.aspx>

Department of Diagnostic Radiology

Chairperson:	Hussain, Hero
Professors:	Al-Kutoubi, Aghiad; Haddad, Maurice; Hourani, Mukbil; Khoury, Nabil; Hussain, Hero
Associate Professors:	Birjawi, Ghina; Haidar, Mohamad; Hourany-Rizk, Roula; Naffaa, Lena
Assistant Professors:	Atweh, Lamy Ann; Moukaddam, Hicham; Mourany, Bassem; Nassar, Lara
Instructors:	Abi Ghanem, Alain; Baydoun, Serine; Khoury, Tatiana; Muallem, Nadim
Clinical Associates:	Abi Fakher-Saab, Faysal; Natout, Mustafa; Wadih, Antoine

The Department of Diagnostic Radiology offers selective clerkships to medical students, electives to interns and residents, and a five-year residency training program.

DGRG 267 Selective in Diagnostic Radiology 22.158

This selective involves attending morning tutorials, reporting and scientific activities within the department. *Open to fourth year medical students. 4 weeks.*

DGRG 268 Elective in Diagnostic Radiology 0.180

Similar to selective in Radiology, open to fourth year medical students within and outside AUB who would like to consolidate their knowledge in radiology or were not granted radiology selective. *4 weeks.*

DGRG 287 Student Internship 0.262-1048

Elective clerkship open to interns and residents. This internship involves attending tutorial and read out sessions. *Duration 1-2 months. 1 month (Non-radiology interns & residents). 2 months (AUB future radiology residents).*

Weekly Conferences

The Department of Diagnostic Radiology organizes teaching activities divided into 13 organ based blocks: General Radiology, Emergency Radiology, Ultrasound, Breast, Gastrointestinal Radiology, Genitourinary Radiology, Neuro Radiology, Vascular Intervention Radiology, Musculoskeletal Radiology, Pediatric Radiology, Nuclear Medicine, Cardiothoracic Radiology and Cardiac Imaging.

Department of Emergency Medicine

Chairperson:	Hitti, Eveline
Professors:	Kazzi, Amin ; Hitti, Eveline; El Sayed, Mazen
Associate Professors:	Abou Dagher, Gilbert; Mufarrij, Afif ; Bou Chebl, Ralph
Adjunct Associate Professor:	Kazzi, Ziad
Assistant Professors:	El Majzoub, Imad; El Zahran, Tharwat; Sawaya, Rasha; Zgheib, Hady
Instructors:	Faris, Nagham (Clinical)
Clinical Associates:	Alameddine, Kawsar; Anka, Mariam; Chalhoub, Sana; El Mais, Amro; Ghanem, Mario; Ghalayini, Nisrine; Gheha, Mirabelle; El Asmar, Alain; El Assaad, Rim; Fares, Sobhi; Hoballah, Hassan; Hage, Sandrine; Hakim, Michel; Helbawi, Ali; Ismail, Ali; Itani, Ziad; Kanso, Mohamad; Khaddaj, Wajdi; Kreidieh, Ibrahim; Laham, Sami; Maatouk, Ali; Mahmassani, Dina; Moukhaiber, Jihane; Ozoor, Khodor; Rammal, Abdallah; Romani, Diala; Skoury, Assaad

The Department of Emergency Medicine (EM) at AUBMC is one of the busiest Emergency Departments (ED) in Lebanon seeing 5-year-average annual volume of 54000 patient visits. ED physicians, nurses and ancillary staff are highly experienced and trained in emergency medical care and provide timely, high quality care to patients with acute illnesses or injuries. The ED has full-time, round-the-clock, attending level physician coverage by physicians trained in the treatment of all acute care illnesses from medical and surgical cases to pediatric and obstetrics acute care.

Educational Programs

In June 2012, the Department of Emergency Medicine established its first properly supervised EM training program in Lebanon. The program is a four-year curriculum with five categorical positions. All core faculty are emergency medicine trained physicians. Trainees are exposed to the spectrum of acute care illnesses in adult and pediatric patients and have structured, didactic sessions and hands-on workshops. In addition to a robust clinical experience, the program offers integrated research and administrative rotations that are meant to develop skills required to become leaders in the field. *In the fall of 2015, the program earned its ACGME-I accreditation, and thus became the first Emergency Medicine Graduate Education Program in the country and one of a few in the region to receive this prestigious certification.*

EMMD 262 Clinical Clerkship in Emergency Medicine

A clinical clerkship in which fourth year medical students will learn and work in the AUBMC Emergency Department (ED). Students will play an active role in the ongoing care of the ED patient and will be responsible for the initial evaluation of assigned patients. They will obtain a thorough history and perform a focused physical exam, formulate a differential diagnosis, suggest diagnostic workup and treatment plan, and determine a disposition for each of their assigned patients under the direction of senior residents and faculty. They will be required to complete a total of five weeks of clinical rotation during which they are expected to be present for up to 17 shifts and to attend and contribute to the educational sessions taking place in the department. Students will acquire important procedural skills by being exposed to and encouraged to participate in the supervised performance of a wide variety of procedures in the ED. The weekly clerkship conference series runs over four weeks and includes a wide variety of topics and workshops that are pertinent to EM practice. Students will sit for the NBME examination for Emergency Medicine at the end of their fourth medical year.

Department of Experimental Pathology, Immunology and Microbiology

Chairperson:	Matar, Ghassan
Professors:	Khoury, Samia; Matar, Ghassan; Sayegh, Mohamed
Associate Professor:	El Hajj, Hiba; Rahal, Elias; Zaraket, Hassan
Assistant Professors:	Abou Fayad, Antoine; Al-Awar, Ghassan; Massaad, Michel; Shirinian, Margret
Instructor:	Saba, Esber

The Department of Experimental Pathology, Immunology and Microbiology offers courses to medical laboratory sciences (MLSP) students as well as to nursing, medical and graduate students. It offers a graduate program (discipline of Microbiology and Immunology) leading to a master's degree (MS) or doctoral degree (PhD) in Biomedical Sciences.

The requirements for admission to the graduate program are stated on page 34 of this catalogue.

IDTH 203 The Immune System in Health and Disease 37.28; 3 cr.
See Interdepartmental Courses.

IDTH 205 Microbiology and Infectious Diseases 37.28; 5 cr.
See Interdepartmental Courses.

MBIM 223 Parasitology for MLSP Students 39.39; 4 cr.
Second term.

MBIM 237 Microbiology and Immunology 32.64; 3 cr.
for Nursing Degree Students

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.**
- MBIM 315 Tutorial in Bacteriology 32.0; 2 cr.**
- MBIM 316 Tutorial in Virology 32.0; 2 cr.**
- MBIM 317 Tutorial in Parasitology-Mycology 32.0; 2 cr.**
- 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, mode of action of novel anti-infectives in addition to early pharmacokinetics and pharmacodynamics properties. *Second term. Prerequisite course: BIOC322*
- MBIM 320 Microbiology and Immunology 3 cr.**
A course on the fundamental aspects of basic and medical microbiology and immunology offered to non-Microbiology & Immunology graduate students at the MS and PhD levels. *First term*
- MBIM 326 Applied and Advanced Basic and Medical Immunology 32.64; 1 cr.**
A treatise on advances in immunological diseases, their molecular mechanisms and their laboratory diagnosis. *Second term. Alternate years.*
- MBIM 327 Advanced Basic, molecular and Medical Bacteriology 32.64; 1 cr.**
A treatise on advances in the epidemiology, pathogenesis, immune response, diagnosis and prevention of bacterial infections, with particular emphasis on bacterial genetics and antimicrobial resistance. *Second term. Alternate years.*

MBIM 328	Applied and Advanced Basic, molecular and Medical Parasitology	32.64; 1 cr
A treatise on advances in the epidemiology, pathogenesis, immune response, diagnosis and prevention of parasitic infections. <i>Second term. Alternate years.</i>		
MBIM 329	Applied and Advanced Basic, molecular and Medical Virology	32.64; 1 cr.
A treatise on advances in the epidemiology, pathogenesis, immune response, diagnosis and prevention of parasitic infections. <i>Second term. Alternate years</i>		
MBIM 330	Molecular Microbiology	32.64; 3 cr.
A course on molecular applications on the identification of infectious agents. <i>Second term. Alternate years.</i>		
MBIM 331	Infection Control	16.0; 1 cr.
A treatise on the prevention of infections in the laboratory. <i>Second term.</i>		
MBIM 390	Seminar	0.32; 1 cr.
<i>Annually.</i>		
MBIM 394	Journal Club	0 cr.
<i>Annually.</i>		
MBIM 395A/B	Comprehensive Exam	0 cr.
<i>Prerequisite: Consent of advisor.</i>		
MBIM 399 A/B/C/D/E	MS Thesis	9 cr.

Department of Family Medicine

Interim Chair:	Musharrafieh, Dr. Umayya
Professors:	Musharrafieh, Umayya; Saab, Bassem; Usta, Dr. Jinan
Associate Professors:	Antoun, Jumana; Mufarrij, Afif
Assistant Professors:	Assaf, Georges; Romani, Maya; Osman, Mona; Sakr, Carine; Shararah, Nabil; Zahran, Tharwat
Instructors:	Khaddaj, Wajdi; Khater, Beatrice; Khattar, Joe; Moukheiber, Sami; Naous, Jihane; Rahme-Ballan, Diana; Razzouk, Jibrayil
Clinical Associates:	Alayan, Nour; Badr, Samia; Chalhoub, Wissam; El Ashkar, Khalil; Hleis, Sani; Jalloul, Salam; Lakkis, Najla; Maalouf, Grace; Makarem, Nisrine; Makhlouf-Akel, Madeleine; Naji, Fadila; Rahimi, Rose Maria; Sarkis Habib Ishak, Hala; Shaarani, Issam; Toufeili, Zeinab; Zeidan, Randa

The Department of Family Medicine offers a clinical clerkship and specialty electives to fourth year medical students. It also offers a postgraduate training program to physicians at the end of which they are eligible to sit for the Arab Board of Family Medicine.

Residency Program

The Department of Family Medicine offers a three-year training program. Residents who like to sit for the Arab Board will have an extra year. The goal of training is to produce competent, community-oriented family physicians capable of providing high-quality care to their patients. The program consists of rotations in the different clinical departments of the Faculty of Medicine, as well as ambulatory primary health care experience in the Family Medicine Clinics, emergency services at AUBMC, and satellite centers. All residents are required to sit for the In-training Examination of the American Board of Family Medicine during the first three years.

FMMD 262 Clinical Clerkship

0.180.

The purpose of this clerkship is to expose students to the philosophy, principles and practice of family medicine, emphasizing the bio-psychosocial model. It upgrades the medical students' knowledge of common problems and their skills in the application of preventive medicine in the ambulatory care setting. Students see patients under supervision in the Family Medicine Clinics and other satellite clinics in the community. They also conduct site visits to community based health programs to gain exposure to the various resources available in the community. Offered to fourth year students. *One block; 4 weeks.*

FMMD 267 Elective

0.180.

An elective in family medicine which can be tailored to the needs of the resident/student and their program requirements including introduction to integrative health and wellness.

Teaching Activities

The department holds topic conferences, core content lectures, journal clubs, morning reports, research forums, patients from our practice and guest lectures.

Family Medicine Added Qualifications Fellowships

The Department offers, jointly with other academic unit at AUB, a fellowship in Primary Care Sports Medicine, Employee Health and Integrative Health. These are offered based on funding availability.

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 NGOs and governmental and private organizations in managing their primary care clinics. It is currently sending residents to two different community-based NGO clinics.

Department of Internal Medicine

Chairperson:	Ziyadeh, Fuad
Professor Emeritus:	Cortas, Nadim (Dean Emeritus)
Professors:	Abchee, Antoine; Abu-Alfa, Ali; Akl, Elie; Alam, Samir; Arnaout, Samir; Azar, Sami; Badr, Kamal; Barada, Kassem; Bazarbachi, Ali; Berbari, Adel; Bouakl, Imad (Clinical); Bou Khalil, Pierre; Dakik, Habib; El-Hajj Fuleihan, Ghada; Ghazzal, Ziyad; Husari, Ahmad; Jabbour, Elias (Adjunct); Kanj-Sharara, Souha; Khuri, Fadlo; Mallat, Samir; Mohty, Mohamad (Adjunct); Mourad, Fadi; Saghir, Naji; Salti, Ibrahim; Sawaya, Jaber (Clinical); Sayegh, Mohamed; Shaib, Yasser; Shamseddine, Ali; Sharara, Ala'; Soweid, Assaad; Taher, Ali; Tamim, Hani; Tfayli, Arafat; Uthman, Imad; Ziyadeh, Fuad
Associate Professors:	Abi-Saleh, Bernard; Arabi, Asma; Assi, Hazem; Arawi,Thalia; Assi, Hazem;Bassil, Nazem; Chami, Hassan; Daouk, Majida; Daniel, Fady (Clinical); El Cheikh, Jean; El-Kebbi, Imad; Francis, Fadi; Hajjar, Ramzi; Isma'eel, Hussain; Kanafani, Zeina; Khoury, Maurice; Medawar, Walid; Mukherji, Deborah; Nasrallah, Mona; Rebeiz, Abdallah; Refaat, Marwan; Salem, Ziad (Clinical); Skouri, Hadi; Tabbarah, Zuhayr (Clinical); Temraz, Sally; Zeineldine, Salah
Assistant Professors:	Abou Dalle, Iman; Abdel Azim, Hatem (Adjunct); Al-Awar, Ghassan; Al Hashash, Jana; Bizri, Abdel-Rahman; Chakhtoura, Marlene; Choucair, Mahmoud; El Bejjani, Martine; Finianos, Antoine; Gharzuddine, Walid; Ghusn, Husam (Adjunct, Clinical); Kanj, Nadim; Karam, Marilyn; Koubar, Sahar; Masri, Abdul-Fattah (Clinical); Merashli, Mira; Osman, Hibah (Adjunct); Sawaya, Fadi; Rizk, Nesrine; Zakhem, Aline
Instructors:	Harbieh, Bernard (Adjunct)
Clinical Associates:	Abboud, Diana; Badreddine, Samar; Bou Fakhreddine, Hisham; Costa, Rana; El Asmar, Noel; El-Imad, Zuhayr; Farah, Karim; Moukadem, Hamdan, Omar; Harb, Wissam; Hilal, Nadeen; Hiba; Njeim, Carlos; Saleh, Munzer; Salem, Rana; Sukkariyeh, Ismail; Tanios, Bassem

The Department of Internal Medicine offers courses, clinical clerkships and specialty electives to medical students. It also offers clinical post-graduate training to MD graduates including residency and subspecialty fellowships. The Residency Program offers two tracks, which are a 1-year training (Preliminary Track) and a 3-year training (Categorical Track). The Fellowship training following the residency period is offered in the subspecialties that include cardiology, endocrinology, gastroenterology, nephrology-hypertension, hematology-oncology, infectious diseases, rheumatology, and pulmonary medicine and critical care.

IDTH 221/222 Introduction to Medicine 108.72; 9 cr.
 An introductory course given to Med II students annually over a 36-week period. A multidisciplinary and integrated approach to mechanisms of disease based on the organ systems, stressing pathophysiology and introducing the clinical presentation of diseases. This course is given in the form of lectures, discussion sessions and Moodle-based learning. Students are introduced to clinical cases in light of pathophysiology.

IDTH 223/224 Physical Diagnosis 36.72; 3 cr.
 An introduction to the principles of history-taking and physical examination. This course is given over a 36-week period to Med II students in the form of lectures, practical sessions and physician shadowing in which history and physical examination are demonstrated on actual patients at AUBMC.

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 to prepare and participate in clinical discussions.

INMD 254 Infection Control 6.34; 1 cr.
 A course given to Med III students to increase their awareness and expertise in infection control as it relates to the protection of patients as well as the health-care worker from iatrogenic infection. The course aims to ensure that students understand their responsibility in infection control and apply scientifically acceptable infection control principles. This course is given as an online presentation followed by a series of questions. Students should also pass a written examination.

INMD 262 Clinical Clerkship in Internal Medicine 0.540
 A clinical clerkship in which fourth year medical students work in their capacity as junior interns (sub-internship) on the medical floors of the hospital. They are responsible for admission work-up of patients, and their follow-up under the supervision of the attending physician and team resident. They are also required to attend clinical conferences, present at the student report activity, and prepare and participate in clinical discussions.

INMD 267 Elective in Internal Medicine Subspecialties 0.180-360.
 An elective is offered to fourth year medical students in one or more of the subspecialties of internal medicine, including cardiology, endocrinology and metabolism, nephrology, pulmonary and critical care medicine, rheumatology, gastroenterology, hematology-oncology, and infectious diseases.

Weekly Conferences

The Department of Internal Medicine organizes general Internal Medicine conferences including Mortality and Morbidity conferences, Core Curriculum Lectures, Morning Report, as well as weekly Medical Grand Rounds. In addition to the general Internal Medicine conferences, Med III students are also required to attend lectures during their OPD outpatient rotations, and Med IV students are required to attend Chairman's Rounds, Student Reports and Board Review Sessions. The residents attend other conferences, such as ICU Conferences, Journal Club, Ambulatory Report, EKG Course, Joint Internal Medicine/Radiology Rounds and Board Review Sessions. In addition, each division runs a weekly or bi-weekly conference and journal review session in their subspecialty.

Agreements

A joint program of academic cooperation between the Department of Internal Medicine at AUBMC and Ayn Wa Zein community hospital in the Shouf mountains began June 15, 2002, whereby residents serve during a rotation through the program as part of their training in Geriatrics.

Another program with the Makassed General Hospital (MGH) was inaugurated in the fall of 2012, whereby interns, residents and Med IV students rotate through the clinical program as part of their in-patient training in Internal Medicine.

In addition, at the start of the Academic Year 2017-2018, a cooperation agreement was made between the Department of Internal Medicine at AUBMC and the Makhzoumi Foundation, whereby residents pass through clinical rotations during their outpatient training in Internal Medicine.

Department of Neurology

Chairperson:	Atweh, Samir
Professors:	Atweh, Samir; Beydoun, Ahmad; Khoury, Samia; Sawaya, Raja; Yamout, Bassem (Clinical)
Associate Professors:	Salameh, Johnny; Tabbal, Samer
Assistant Professors:	El Ayoubi, Nabil; Khoury, Riad; Lawand, Nada; Makki, Achraf; Nasreddine, Wassim; Rebeiz, Tania (Adjunct Clinical)
Clinical Instructor:	Doumiati, Hassan; Rebeiz, Tania

The Department of Neurology, established in July 2011, offers clinical clerkships and electives to MED IV students. The department also participates in teaching preclinical students the Basic Neuroscience course. The department offers a 4-year post-graduate residency training program in Clinical Neurology as well as post-residency fellowships in Epilepsy, Neuromuscular Diseases and Multiple Sclerosis. Residents sit for the RITE examination offered by the American Academy of Neurology.

NEUR 262 MED IV Clinical Clerkship in Neurology 90.90

MED IV students rotate for 2 weeks on the inpatient neurological service and the neurological intensive care, and 2 weeks on the Neurology consult service and the Emergency room. They have daily attending teaching rounds and lectures, as well as attending daily neurology clinics and neurology grand rounds.

NEUR 267 Elective in Neurology 0.180

Elective rotations are offered to MED IV medical students and housestaff where they rotate for 4 weeks on the consult service and outpatient clinics. They attend daily rounds, lectures and weekly grand rounds.

IDTH 230 Brain and Cognition Course 80.80

This course is intended to provide preclinical medical students with an integrated approach to the structure and function of the nervous system. Basic principles of neuroanatomy, neurocytology, neuroembryology, neuroradiology, neurophysiology and neurology will be related to the function of the normal and diseased human nervous system, and the action of drugs. Concepts in social and preventive medicine, epidemiology and medical ethics are explored in relation to diseases of the nervous system.

Weekly Conferences

The Department of Neurology organizes general neurology conferences including Neurology Grand Round, Mortality and Morbidity conferences, Core Curriculum Lectures, Neuroscience Reading Club, Journal Club, as well as a weekly Multiple Sclerosis (MS) conference.

Department of Obstetrics and Gynecology

Chairperson:	Nassar, Anwar
Professors:	Abu-Musa, Antoine; Awwad, Johnny; Hannoun, Antoine; Karam, Karam (Clinical); Khalil, Ali (Clinical); Mroueh, Adnan (Clinical); Nassar, Anwar; Seoud, Muhieddine; Usta, Ihab
Associate Professors:	Bazi, Toni; Ghazeeri, Ghina; Mirza, Fadi
Assistant Professors:	Abdallah, Reem; Adra, Abdallah; Aswad, Najji (Clinical); Chamsy, Dina; Hobeika, Elie
Clinical Associates:	Adra, Abdallah; Atallah, Sandrine; El Kak, Faysal; Malas, Salah; Yared, Georges; Zoghbi, Samer

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. Five categorical postgraduate year 1 (PGY1) students are accepted yearly. All residents sit for a yearly examination of the Council for Resident Education in Obstetrics and Gynecology administered by the American College of Obstetrics and Gynecology. The Program is ACGME-I accredited and is recognized by the Arab Board of Medical Specialties. The Department of Obstetrics and Gynecology has initiated a 2-year fellowship program in Reproductive Endocrinology and Infertility as of June 2014. One fellow is accepted every year.

OBGY 247 Clinical Clerkship 47–360.

A clerkship is offered to third year 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
- **Weekly:** Morning Report and Case Discussion, Chart Review Conference, Grand Round, Chairman's Round, Resident Education Conference, Core Curriculum Lecture, Tumor Board and Journal Club
- **Monthly:** Joint Perinatal Neonatal Conference, Joint Radiology OB/GYN Conference and Ultrasound Course Lecture

Department of Ophthalmology

Chairperson:	Noureddin, Baha'
Professors:	Awwad, Shady; Bashshur, Ziad; Mansour, Ahmad (Clinical); Noureddin, Baha ;Salti, Haytham
Associate Professors:	Haddad, Christiane; Hamam, Rola; Jabbur, Nada (Adjunct); Ma'luf, Riad (Clinical)
Assistant Professors:	Alameddine, Ramzi; Farah, Nadim (Clinical); Haddad, Randa; Jurdi Kheir, Wajiha; Saadeh, Joanna
Instructors:	Bou Ghannam, Alaa
Clinical Associates:	Massoud, Vicky; Shahin, Hasan; Allam, Souha; Younis, Mohammad

The Department of Ophthalmology offers clinical clerkships/selectives and specialty electives to medical students. It also offers clinical postgraduate training to MD graduates, including internship, residency and fellowship programs. The internship program is a one or two month rotation offered to categorical interns in other disciplines or to family medicine residents. The residency program is an ACGME-I accredited three-year specialty training in ophthalmology, including rotations in cornea, glaucoma, oculoplastics, pediatrics, neuro-ophthalmology, vitreo-retinal, intra-ocular / refractive surgery, and ocular oncology/pathology. The residency training in ophthalmology is recognized by the International Council of Ophthalmology (ICO). The primary part of the Royal College of Ophthalmologists examination can be taken at the beginning of the second year of residency, while the final part can be taken any time after that. The same recognition is also granted by the Arab Board of Ophthalmology under similar terms. Two fellowships are offered: a one-year medical retina fellowship, which is a 12-month training with clinical exposure to pathologies of the posterior segment from diabetic retinopathy to age-related macular degeneration, also comprising all posterior uveitic conditions. The second one is a cornea/refractive fellowship with exposure to all the classic and most recent cornea and refractive lasers, procedures, and pathologies.

Finally, the department offers a Pre-Residency Research Fellowship. Twelve months are spent in actively contributing to and running the ongoing clinical research projects in the department.

OPHT 267 Clinical Clerkship Offered as a Selective 0.120.
Clinical training and seminars. Students are clinically required to master the use of the direct ophthalmoscope and identify optic nerve abnormalities through the pupillary light reflex, identifying problems which need referral for ophthalmic assessment. Offered to fourth year medical students. *Four weeks.*

OPHT 268 Elective in Ophthalmology 0.180.
Exposure to Ophthalmology. (Same as OPHT 267). Students and interns are required to get acquainted with use of the different diagnostic ophthalmic tests. *Open to interns and fourth year medical students. One month.*

OPHT 287 Internship 0.262-524.
An elective in the Outpatient Department (OPD), hospital wards and seminars. *Same as OPHT 268. One to two months.*

Department of Otorhinolaryngology and Head and Neck Surgery

Interim Chairperson:	Zaytoun, George
Professors:	Fakhri, Samer (Tenure); Fuleihan, Nabil (Adjunct Clinical); Ghafari, Joseph (Tenure); Geha, Hassem (Adjunct Clinical); Hadi, Usamah (Clinical); Hamdan, Abdul Latif; Zaytoun, George
Associate Professors:	Macari, Anthony ; Tabet, Kristel; Moukarbel, Roger; Saadeh, Maria (Adjunct)
Assistant Professors:	Alam, Elie; Barazi, Randa; Haddad, Ramzi; Korban, Zeina; Natout, Mohammad Ali (Clinical); Zeno, Kinan
Instructors:	Abou Chebel, Naji (Clinical); Ammoury, Makram (Adjunct Clinical), Chalala, Chimene (Adjunct)
Clinical Associates:	Abou Jaoude, Nadim; Abou Assi, Samar; Abou Obeid, Fares; Afeiche, Nada; Anhoury, Patrick; Barakat, Nabil; Chedid, Nada; Chidiac, Jose; El Chekie, Michelle; Feghali, Roland; Ghogassian, Saro; Hanna, Antoine; Itani, Mohammad; Kassab, Ammar; Kasty, Maher; Metni, Hoda; Makary, Christian Pierre; Rezk-Lega, Felipe; Sabri, Roy

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 9 months rotating in relevant general surgical specialties, radiology, and emergency medicine and 3 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 Otolaryngology, 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 also services are often invited as speakers. Residents also contribute and learn from the monthly activities of the department, which include the Grand Rounds, Tumor Board, Mortality and Morbidity, Pathology conferences, Radiology conferences and Journal Clubs. To ensure a busy clinical load, residents rotate in affiliated hospitals with diverse exposure to different areas of the country. These include Clemenceau Medical Center and Bikhazi Hospital. In-service examination, is given on a yearly basis to assess the residents' 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.

Master of Science in Orthodontics

The Division of Orthodontics and Dentofacial Orthopedics in the department offers post graduate residency training to dental graduates. The specialty program lasts 36 months and is designed to carry clinical activities in a scholarly environment where basic science and clinical orthodontics are integrated. The major part of the postdoctoral program consists of clinical education and training with a spectrum of treatment ranging from childhood to adulthood, including patients who require orthognathic surgery. In addition, residents are enrolled in the Master of Orthodontics program. The completion of a research project and defense of a corresponding thesis, related to clinical or basic sciences, is a requirement toward certification. Under specific conditions related mainly to the research thesis PGY II and PGY III residents are allowed to spend a period of one month per year in approved US programs under appropriate conditions of attendance in the program.

Program and Curriculum

The curriculum leading to the degree of Master of Science in Orthodontics and a residency certificate is structured after the scientist-practitioner model with dual emphasis on the scientist and practitioner aspects of the profession. The program covers, in addition to achieving competence in clinical practice, two essential requirements (also stipulated for accreditation by the American Dental Association's Commission on Dental Accreditation) which are the following:

- The inclusion of core credits of basic science courses (e.g. somatic, craniofacial growth and development biomechanics of tooth movement, research design and statistics)
- The conduct of original research and the corresponding successful defense of a written thesis

The degree is pursued concurrently with the clinical specialty training, which is also subject to defined requirements for clinical certification.

Basic knowledge courses include material on growth and development of the craniofacial complex and body, anatomy, anthropology, imaging of the head, scientific method, biostatistics, dental materials and biomechanics.

Daily seminars and classes are scheduled in a planned sequence over the three years and cover the basic topics as well as those related to orthodontics and other specialties necessary for multidisciplinary treatment, such as periodontics, restorative and cosmetic dentistry, minor oral and orthognathic surgery, temporomandibular dysfunction and pediatric dentistry.

Technical clinical courses and actual treatment requirements are non-credit activities commensurate with the AUBMC residency requirements. The clinical sessions include treatment delivery in the dentofacial clinic, encompassing specific requirements for the correction of malocclusions in children, adolescents and adults, as well as discussions of treatment planning, treatment progress and case reports. Practice is based on scientific evidence interpreted to the individual conditions of each patient.

The degree is awarded after successful completion of both didactic coursework and research.

Admission

Admission is offered on a highly selective basis only to students who have shown distinct academic ability and success on the entrance examination. The applications to the Residency and Master of Science in Orthodontics are separate. The application process will follow the conditions that are presently used at AUB and AUBMC for the Master of Science degrees and the Residency. Final acceptance in the MS program will be through the Graduate Committee (MS requirements) and the Graduate Medical Education Committee (Residency), then through the institutional process.

The specific prerequisites for acceptance in the MS program include, in addition to the AUBMC general conditions for admission in an MS program, the following:

- Only applicants possessing the doctoral degree in Dental Medicine or its equivalent (Dental Surgery, Dentistry) from a recognized institution in Lebanon or abroad are accepted. The course requirements are designed to build upon the basic biological sciences common to those required for the dental doctoral degree.
- A cumulative average in dental school of at least 80 percent or its equivalent (GPA: 3.2) is required if ascertained by a school using a different grading system. The candidate may be accepted on probation if the grades are between 75 and 80.
- Passing the entrance examination that includes practical (wire bending), written exam, and an oral exam is a must. 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 (refer to the requirements listed in the Graduate Studies section of the AUB graduate catalogue) by passing the English Language Proficiency Requirement or its equivalent as required by AUB.
- Applicants will also be interviewed.

Courses and Credits

The total number of credits required for the proposed MS in Orthodontics is 30. The Graduate Studies Committee may waive a maximum of 6 credits of graduate course work taken as part of the candidate's dental graduate studies upon the proposal of the Orthodontic Admissions Committee. Accordingly, a total of 24 credits including the 9 research thesis credits represent the minimal requirement. Elective courses are offered as part of the core courses within the scope of potential research topics from clinical to interdisciplinary research. Didactic courses make up nearly a third of the curriculum. they include lectures, seminars, literature review sessions, journal club, research presentations and case discussions.

Typically, the core courses and related course work will be completed within the first two years of the program. The clinical specialty training will span over the three years of study. Most of the research will take place in years two and three, with a major focus on the research project and thesis defense in the third year. The degree will be awarded no earlier than three years after matriculation in the program.

Clinical Curriculum

The clinical component encompasses a spectrum of treatments ranging from childhood to adulthood, including management of patients who require orthognathic surgery and those with craniofacial anomalies (e.g. cleft lip/palate). Trainees will be exposed to a variety of disorders and training experiences. Each resident will have a range of problems to treat that cover a full scope of malocclusions and craniofacial anomalies, as well as a spectrum of treatment approaches and mechanics, including orthognathic surgery of skeletal dysplasias. Supervised clinical activities are supplemented with classroom activities (seminars, case presentations, literature review).

Research

The research project may be clinical or basic. Each student will have the opportunity to develop strong research skills and conduct a research 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 and aims, research design, and statistical analyses that should provide them with the skills required to complete theses of publishable quality.

Collaborative projects between AUB faculties foster the concept of inter-professional cooperation, bringing together medical/dental disciplines with not only public health (most natural alliance) and business (e.g. medical management, third party pay and insurance development), but also engineering (e.g. biomedical engineering developments) and education (e.g. education policy, higher education management). Participation of mentors from other faculties/departments is based on mutual interests between the specialties and actual professors from both sides.

Faculty

All faculty members in the program are full-time or part-time associated faculty. Depending on the courses and instruction they provide, their role is either in the basic studies, the clinical program or both. Credentials of the teaching faculty are distinguished including clinicians with certification from highly recognized orthodontic programs, including the AUB program.

Course Descriptions

The Division of Orthodontics and Dentofacial Orthopedics offers postgraduate courses to dentists specializing in Orthodontics at the American University of Beirut Medical Center/Faculty of Medicine. The course required for the Master of Science in Orthodontics are listed below. They do not include elective courses listed in the catalogue of graduate FM, FHS and other AUB faculties.

ODFO 301 Craniofacial Growth and Development 48; 3 cr.
 This course focuses on basic growth concepts and mechanisms (including underlying biological and cellular growth events), the main craniofacial components (cranial base, maxilla and mandible, and their interrelationships at different stages of growth), the tissues involved in facial growth (bone, cartilage, muscle and teeth), the relationship between main somatic and facial growth, and the development of growth deformities. *Lectures, seminars, review of key articles and presentations by residents of selected assignments.*

ODFO 302	Craniofacial Imaging Craniofacial Imaging I Principles and applications of advanced radiology Craniofacial Imaging II Cephalometric method and science	48.0; 3 cr. 8.0; 0.5 cr. 30; 1.9 cr.
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This multifaceted series includes lectures and laboratory applications through assignments to impart knowledge on correspondence of cephalometric radiographs to anatomy, assessment of craniofacial growth and maxillofacial orthopedic treatment, visualization of orthodontic/orthognathic surgical treatment, simulation of growth and treatment outcome. *Lectures, seminars, review of key articles and presentations by residents of selected assignments.*

	Craniofacial Imaging III Applications of 3D Imaging in Orthodontics	10.0; 0.6 cr.
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This advanced knowledge series encompasses current and developing methods utilizing 3D technology related to: diagnosis and treatment planning of specific conditions (e.g. impacted canines, orthodontic- surgical treatment, airway assessment, placement of mini-implants); biologic boundaries of tooth movement; use of CBCT in orthodontic research (e.g. volume assessment of palate and chin); assessment of treatment changes upon 3D cephalometric and palatal rugae superimpositions; modelling and prediction of tooth movement, including the utilization of finite element analysis.

Lectures, seminars, review of key articles and presentations by residents of selected assignments.

ODFO 303	Biology and Mechanics of Tooth Movement and Properties of Wire	48; 3 cr.
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Biological responses to and physical principles of tooth movement. *Lectures, seminars, review of key articles and presentations by residents of selected assignments.*

ODFO 304	Research Science: Method, Design and Conduct	26.12; 2 cr.
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A guided laboratory course in methods used as aids in morphologic research. *Lectures, seminars, review of key articles and presentations by residents of selected assignments.*

ODFO 305A/ ODFO 305B	General and Maxillofacial Medicine	16; 1 cr.
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Issues in dentistry and medicine.

Lecture series by invited speakers from various medical and dental fields pertinent to the science of orthodontics and medical/dental care (e.g. nose anatomy and physiology, pediatric Otorhinolaryngology, head and neck pathology, genetics principles, counseling and prenatal diagnosis, sleep apnea, practical concepts on general anesthesia, pharmacology and pain management).

ODFO 306	Journal Club	1 cr.
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Weekly.

ODFO 307	Craniofacial Seminar	1 cr.
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Monthly over 3 years.

ODFO 395	Comprehensive Exam	0 cr.
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ODFO 399 MS Thesis **9 cr.**
Original research under staff supervision leading to the MS degree.

Clinical Residency Sections

ODOC 3800/ Clinical Clerkship **0 cr.**
ODOC 3900
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 3015 Community Service Project **0 cr.**
Development of, or involvement in, project that benefits the community.

Residency and Master of Science in Clinical Orthodontics

Orthodontics Postgraduate Courses

Core Courses (ODFO)		Year	Credit Hrs.
Craniofacial Biology and Imaging			
ODFO 301	Craniofacial Growth and Development	1	3 cr.
ODFO 301A	Craniofacial Development		
ODFO 301B	Somatic Growth		
ODFO 301C	Development of the Dentition		
ODFO 301D	Facial Musculature in Orthodontics		
ODFO 302	Craniofacial Imaging		
ODFO 302A	Craniofacial Imaging I: Basics of Radiographic Imaging	1	0.5 cr.
ODFO 302B	Craniofacial Imaging II: Cephalometrics	1	1.9 cr.
ODFO 302C	Applications of 3D Imaging in Orthodontics	1	0.6 cr.
ODFO 303A	Biology of Tooth Movement		
ODFO 303B	Mechanics of Tooth Movement		
ODFO 303C	Properties of Wires		

General and Maxillofacial Medicine			
ODFO 305	General and Maxillofacial Medicine – Issues in Dentistry and Medicine	1/2/3	
ODFO 305A	Comparative mammal anatomy (2), nose anatomy and physiology (2), pediatric Otorhinolaryngology (2), overview of head and neck anatomy pathology and treatment (4), speech pathology (2), sleep apnea (4)		1 cr.
ODFO 305B	Genetics principles, counseling and prenatal diagnosis (2); practical concepts on general anesthesia (3), pharmacology (3), pain management (4), overview of adolescent medicine (2), jurisprudence and patient privacy (2)		1 cr.
Scientific Methods and Reviews			
ODFO 304	Research Science: Method, Design and Conduct <i>Scientific Method and Research Design</i>	1	2 cr.
ODFO 306	Journal Club	2/1	1 cr.
Craniofacial Anomalies			
ODFO 307	Craniofacial Seminar	1/2/3	1 cr.
Elective Courses			
	Credits in the existing AUB FM/FHS/other faculties graduate programs, if deemed relevant to the field of individual research and upon recommendation by the research adviser.		2 to 6 cr.
ODFO 399	Thesis	3	9 cr.

Department of 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; Kfoury-Baz, Elizabeth; Ahdab-Barmada, Mamdouha (Adjunct Clinical)
Assistant Professors:	Aoun, Jessica; El-Khoury, Riyad; Tabbarah, Abeer
Instructors:	Assaf, Nada ; Jurdi, Nawaf
Clinical Associates:	Abadjian, Gerard; Fakhreddine, Najla; Salti, Ibrahim; Sinna, Sara; Zahed, Leila

The Department of Pathology and Laboratory Medicine offers courses to medical students and undergraduate courses to students in the Medical Laboratory Sciences program (Faculty of Health Sciences). The department also offers four-year residency training programs in pathology and laboratory medicine.

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 other clinical departments.

IDTH 221/222 Introduction to Medicine

See Department of Internal Medicine.

PATH 260 Elective in Pathology 0.180.

This one-month elective is open to Med IV students. The purpose of this elective is to expose students to the general principles of surgical pathology and cytopathology. During this rotation, the student will participate in the daily teaching activities of the department, learn basic dissection skills at the grossing bench, and learn histologic features of common pathologic processes during multi-headed microscope sign-out sessions. Additionally, the student is required to make a presentation on a topic of interest and is encouraged to participate in an investigative research project.

LABM 262 Elective in Laboratory Medicine 0.180-360.

A clerkship offered to Med IV students. This clerkship consists of daily practical training, supplemented by lectures and seminars to cover the disciplines of clinical chemistry, clinical microbiology and immunology, clinical hematology, blood banking and transfusion medicine, molecular diagnostics and cytogenetics. This elective is available in these various disciplines of laboratory medicine and may be adjusted according to the interest of the candidate. During the rotation, the student is required to make a presentation on a topic of interest and is encouraged to participate in an investigative research project. *One to two months.*

LABM 287 Internship 0.180-360.

Same as LABM 262. Offered to rotating interns. *One to two months.*

Clinico-Pathology Conferences

Med III, IV, and staff in collaboration with the departments of Surgery, Internal Medicine, Pediatrics, Obstetrics and Gynecology, Diagnostic Radiology, and Otolaryngology-Head and Neck Surgery.

Courses Offered for Medical Laboratory Sciences Students

LABM 201/202 Clinical Chemistry I and II 2.0; 3 cr.

Clinical Chemistry courses I and II are designed to acquaint students with fundamentals of clinical chemistry, including basic physiological and biochemical processes, instrumentation, principles of analytical procedures, and methods used for reliable determination of clinical analytes. Correlation of laboratory results with clinical manifestation is also an integral part of these courses. These courses cover all aspects of routine clinical chemistry such as carbohydrates, electrolytes, acid-base balance, blood gases, nitrogen metabolites, proteins, enzymes, lipids and lipoproteins, calcium metabolism and liver function. LABM 202 also includes some advanced topics like hormones, therapeutic drug monitoring, toxicology; and specialized techniques like chromatography (HPLC, GC/MS and so on).

LABM 210 Cytology and Histological Techniques 24.16; 2 cr.

A course that includes a series of lectures, demonstrations and hands on training on cell biology, a review of normal histology of various human organs, examples of pathological changes, lectures and hands on training on techniques of tissue handling, preparation, staining and studying of sections and smears for cytological material. Department of Anatomy, Cell Biology and Physiological Sciences.

LABM 220 Clinical Chemistry and Endocrinology 0.128; 4 cr.

Practical experience in Clinical Chemistry that includes two parts. The manual procedures covered give students a thorough understanding of test principles and basic laboratory preparations and measurements. The clinical laboratory rotation covers all areas from specimen handling, to overview of automated clinical chemistry analyzers and other specialized areas like electrophoresis and amino acid analysis as well as patient test management. *Six weeks.*

LABM 230 Clinical Hematology and Phlebotomy 0.128; 4 cr.
 Practical experience in clinical hematology and phlebotomy. This course covers technical aspects of diagnosis of hematological disorders including peripheral blood smears and bone marrow aspirates examination. In addition, laboratory testing for coagulopathies work-up is exposed in a variety of tests monitoring that take hemostatic characteristics of a case in consideration. *Six weeks.*

LABM 231 Clinical Laboratory Quality Systems 1 cr.
 This course is intended to give Medical Laboratory Sciences students a thorough understanding of the quality systems used for implementation of total quality management in the clinical laboratories. The course covers all the basic elements and tools required to implement the quality system essentials across all phases of the laboratory workflow: preanalytical, analytical, postanalytical. In addition, it will include focused lectures related to quality and safety standards required in specialized areas such as blood bank, clinical microbiology and molecular diagnostics. Practical examples from the laboratory setting will be part and parcel of the lectures to help students relate theory to practice.

LABM 233 Genetics and Molecular Biology 2.0; 2 cr.
 A course that includes an introduction to human genetics, comprising the structure and function of DNA and the classification of genetic disorders, as well as the application of genetic testing in the laboratory and clinical differential diagnosis of a variety of disorders. Diagnostic techniques in human genetics (cytogenetics, biochemical and molecular) will be covered, as well as state-of-the-art molecular techniques applied in pathology, oncology, immunology and microbiology.

LABM 235 Medical Mycology 1.0; 1 cr.
 A course that covers the different kinds and types of fungi (yeast and mold). This course discusses their disease spectrum, mode of infection, growth requirements, and cultural and non-cultural methods of identification and diagnosis as well as antifungal drugs and susceptibility testing of fungi.

LABM 240 Clinical Microbiology 0.128; 4 cr.
 Practical experience in clinical microbiology conventional, automated, and non-culture rapid testing. The diagnostic methods encompass: aerobic and anaerobic bacteria, mycobacteria, fungi, media preparation, quality control, specimen management, microbial identification, antimicrobial susceptibility testing and interpretation of findings. *Six weeks.*

LABM 250 Clinical Parasitology and Urinalysis 0.64; 2 cr.
 Practical experience covering conventional and automated approaches in clinical microscopy pertaining to parasitology, urinalysis, spermogram, occult blood, calprotectin lactoferrin, Sudan III fat in stool, and RBC morphology, as well as in the use of different types of microscopic methods for diagnosing particulate material in synovial fluid and others. *Prerequisite: MBIM 223. Three weeks.*

LABM 260 Serology 0.64; 2 cr.
 Practical experience in clinical immunology and various automated and manual serodiagnostic techniques used for the diagnosis of infectious and non-infectious diseases. *Three weeks.*

Department of Pediatrics and Adolescent Medicine

Chairperson:	Abboud, Miguel
Professors:	Abboud, Miguel; Badr, Lina (Adjunct); Bitar, Fadi; Boustany, Rose-Mary; Chelala, Claude (Adjunct); Dbaibo, Ghassan; Eissa, Mona (Adjunct); Mikati, Mohamad (Adjunct); Mroueh, Salman; Muwakkit, Samar; Nabulsi-Khalil, Mona; Yunis, Khalid
Professor Emeritus:	Najjar, Samir
Associate Professors:	Arabi, Mariam (Clinical); Bulbul, Ziad; Charafeddine, Lama; Hanna-Wakim, Rima; Karam, Pascale; Majdalani, Marianne; Musallam, Salim (Clinical); Saab, Raya; Sharara-Chami, Rana; Sinno, Durriyah; Tfayli, Hala; Yazbeck, Nadine
Assistant Professors:	Aoun, Bilal; Assy, Jana; Hamideh, Dima; Maalouf, Faouzi; Munla, Nabil (Clinical); Obeid, Makram; Sawaya, Rasha; Tarek, Nidale; Zakhour, Ramia
Instructor:	El Taoum, Katia
Clinical Associates:	Abou Jaoude, Ramzi; Abdelnabi, Reem; Abu Reslan, Walid; Al Ali, Razan; Akel, Samir; Al Araj, Alia; Bechara, Elie; Borghol, Ralph; Charafeddine, Fatme; El Bitar Mohamad Khalil; El Rassi, Issam; Farah, Antoine; Ismail, Ali; Karam, Marilyn; Moubarak, Yaacoub; Nasrallah, Mona; Noun, Dolly; Romani, Diala; Sanjad, Sami; Shamseddine, Fadi; Soubra, Maher; Yazbek, Soha

The Department of Pediatrics and Adolescent Medicine offers clerkships to medical students. The clerkships concentrate on those aspects of children and adolescent healthcare that are important to any physician, including the management of healthy and sick children; peculiarities of disease in infancy, childhood and adolescence; and nutrition growth and development. These clerkships also concentrate on the importance of combining preventive with curative medicine. Graduate training is offered to physicians leading to specialization (residency) in pediatrics over a three-year period.

PEDT 246 Clinical Clerkship 35.360.
Daily assignments in the Outpatient Department (OPD) (general Pediatrics and subspecialty clinic) for 6 weeks and a 2-week inpatient rotation in the normal nursery and Neonatal Intensive Care Unit. *Offered to third year students. Two months.*

PEDT 267 Clinical Clerkship 0.360.
A clerkship consisting of daily assignments in the inpatient general Pediatric ward for 2 weeks and in the Children Cancer Center for 2 weeks. *Offered to fourth year students. One month.*

PEDT 268 Elective in Pediatrics

0.180-360.

Clinical electives are open to fourth year medical students. Laboratory research electives are open to students at all levels. Exposure of students to laboratory research in neurogenetics, molecular biology, infectious diseases, and basic cardiology; or to a special area of clinical pediatrics of the student's choice, including pediatric cardiology, neurology, hematology-oncology, infectious diseases, pediatric critical care and neonatal intensive care. *One to two months.*

PEDT 287 Internship

0.786.

A two- to three-month rotation each in the hospital wards, ambulatory services or newborn nursery.

PEDT 288 Straight Internship

0.2882.

Interns spend 11 months in the Department of Pediatrics and Adolescent Medicine at the hospital (PL-1) and in affiliated hospitals.

Weekly Conferences

Ward rounds (daily), radiology conferences, journal clubs, pediatric grand rounds, morbidity and mortality conferences, core curriculum lectures and specialty conferences (adolescent medicine morbidity review, hematology/oncology, neonatology, infectious diseases, critical care and pediatric cardiology).

Department of Pharmacology and Toxicology

Chairperson:	Sabra, Ramzi
Professor:	Sabra, Ramzi
Professor Emeritus:	Cortas, Nadim; Simaan, Joseph
Associate Professor:	Khoueiry-Zgheib, Nathalie
Assistant Professors:	Eid, Ali; El-Yazbi, Ahmed; Itani, Hana; Zouein, Fouad

The field of pharmacology embraces knowledge of the history, sources, physical and chemical properties, compounding, biochemical and physiological effects, mechanisms of action, absorption, distribution, biotransformation, excretion, and therapeutic and other uses of drugs. The Department of Pharmacology and Toxicology offers mainly graduate courses for students in the medical, biomedical and nursing fields. Only one undergraduate course is available, specifically designed for students pursuing a BS in Nursing.

Graduate courses include those offered to medical students, graduate students in the biomedical sciences pursuing either a MS or PhD, degree, and graduate students in the MS in Nursing program. With the complete integration of the preclinical years in the medical program, pharmacology teaching occurs throughout the first two years of medical training within integrated, mostly organ-system based, courses. In addition, sessions in clinical pharmacology are offered during the third year of medical school as a separate 1-credit course.

The MS graduate program in the department (in the discipline of Pharmacology and Therapeutics) consists of a minimum of two years of didactic and research training leading to the degree of Master of Science. Students who wish to enroll must have a BS and must have taken undergraduate courses in biology, chemistry (including organic chemistry) and physics. Required courses within the program include courses within the disciplines of biochemistry, physiology and cell biology, and the PHRM 300 course (see below) for a total of 21 credits, followed by a thesis (PHRM 399).

The PhD in Pharmacology and Toxicology is offered within the PhD program in biomedical sciences (refer to Faculty of Medicine and Medical Center - PhD Program in this catalogue).

PHRM 240 Pharmacology and Therapeutics 48.0; 3 cr.

A presentation of the chemistry, pharmacological effects, and therapeutic usefulness and toxicity of drugs. Designed to meet the requirements of the BS in nursing.

PHRM 300 Pharmacology and Toxicology 9 cr.

A general course dealing with the chemistry, general properties, pharmacological effects on the various systems, therapeutic usefulness and toxicity of drugs. A separate section deals with toxicology. *Offered to graduate students.*

PHRM 303/304 Pharmacological Methods 0.96; 3 cr. (each)

Methods of animal surgery, bioassay and biochemistry. *Prerequisite: PHRM 300.*

PHRM 305/306	Enzymological Bioassays	0.96; 3 cr. (each)
<i>Prerequisite: BIOC 211.</i>		
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)
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. <i>Prerequisites: PHRM 240 (or its equivalent) and NURS 504.</i>		
PHRM 260	Elective in Pharmacology	0.180-360.
An introduction to biochemical and physiological methods in use in pharmacology, offered to 4 th year medical students as an elective clerkship. <i>One to two months.</i>		
PHRM 315	Principles of Pharmacology	19.21; 2 cr.
A course that covers the basic principles of drug action including pharmacokinetics, pharmacodynamics, pharmacogenetics, drug resistance, tolerance and toxicity, and pharmacovigilance; and explores mechanisms of drug action through readings of the scientific literature.		
PHRM 333	Clinical Pharmacology	16; 1 cr.
This course is offered to third year medical students. It covers rational prescribing and prescription writing in outpatients and special populations. The goal is to prepare medical students for the practice of safe and effective pharmacotherapy.		
PHRM 395 A/B	Comprehensive Exam	0 cr.
<i>Prerequisite: Consent of advisor.</i>		
PHRM 399 A/B/C/D/E	MS Thesis	9 cr.

Department of Psychiatry

Chairperson:	Maalouf, Fadi
Associate Professors:	Akoury Dirani, Leyla; Khani, Mounir; Khoury, Brigitte; Maalouf, Fadi; Talih Farid
Assistant Professors:	Barakat, Marc; El Khoury, Joseph; Ghossoub, Elias; Shamseddeen, Wael
Instructors:	Ayna, Dinah; Bizri, Maya; Dandan, Nadia Tina; Shabb, Olivia Salwa
Clinical Associates:	Bazzi, Zeinab; Bosqui, Tania; Darwish, Hala; Farhood, Laila; Hachem, Dory; Ismail, Ghina

The Department of Psychiatry offers a course to Med II students and a clinical clerkship to Med III students, a post-graduate residency training program in Psychiatry as well as clinical electives to interns and residents.

PSYT 227 Human Development and Psychopathology 32.36; 3 cr.
 This course covers psychopathology through a lifespan approach. It specifically covers social, emotional and cognitive aspects of human development in addition to the psychopathology of major psychiatric disorders (neurodevelopmental, mood, anxiety, psychosis and substance use disorders, etc.). It also introduces pharmacological and non-pharmacological approaches to management of patients. A variety of teaching/learning techniques are implemented including didactics and team-based learning.

PSYT 252 Clinical Clerkship in Psychiatry 0.180.
 A clinical clerkship in which third year medical students spend one month working 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 dealing with psychopathology, case presentations and discussions, interview techniques and basic psychotherapy, as well as psychopharmacology. One month.

Clinical Psychology Training Program

The AUBMC Department of Psychiatry offers a Clinical Psychology Training Program leading to a certificate of training in clinical psychology. Students are admitted only if they intend to complete the two academic year program.

During the first year, students follow 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 an average grade of 80 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 2, 2022 -April 30, 2022.**

Prerequisite Courses

- Graduate course in Psychopathology
- Graduate course in Psychotherapy Theories
- Graduate course in Developmental Psychology (for those who are interested in the child track)
- Graduate course in Psychological Testing and Assessment

English Requirement

Applicants to the graduate program, other than AUB graduates and graduates of colleges or universities recognized and located in North America, Great Britain, Australia and New Zealand, must meet the Readiness for University Studies in English (RUSE). For more information, refer to page 40.

The program consists of 4 courses (one per term) taken in sequence

The courses are as follows:

1st year:

PSYT 300 Clinical Psychology Practicum I: 4.0 cr.
Immersion and Observation

The clinical training in this course includes observation of patient interviews, and participation in clinical interviews conducted in a group format, assessment and treatment of patients from different age groups (adult, adolescents and children) and backgrounds and with a variety of presenting problems. Trainees will also be able to practice clinical interviewing and diagnoses with patients they will see. Clinical training will be under the direct supervision of qualified clinical academic faculty.

PSYT 301 Clinical Psychology Practicum II: 4.0 cr.
Diagnosis and Treatment Plan

The second course of the clinical training will involve direct patient contact for trainees who will be assigned a certain load of patients. They will formulate a diagnosis and establish a treatment plan based on the patient's needs. They will learn to practice in a bio-psychosocial model of treatment. Advanced clinical training will be under the direct supervision of qualified clinical academic faculty.

2nd year:

PSYT 302 Clinical Psychology Practicum III: 6.0 cr.
Psychotherapy I

During this course, trainees will carry their own load of individual patients, which they will follow in weekly psychotherapy sessions. They will be trained in Cognitive Behavioral therapy and Psychodynamic therapy. They will also be introduced to inpatient care. Introduction and training in group therapy is possible at this level with psychology interns being co-moderators within groups. Advanced clinical training will be under the direct supervision of qualified clinical academic faculty.

PSYT 303 Clinical Psychology Practicum IV: 6.0 cr.
Psychotherapy II

During this course, trainees will carry their own load of individual adult or child patients, which they will follow in weekly psychotherapy sessions. They will also be participating in in-patient care of patients admitted to the Psychiatry unit as well as conducting psychological assessment and testing whenever needed. Advanced clinical training will be under the direct supervision of qualified clinical academic faculty.

Department of Radiation Oncology

Interim Chairperson:	Eid, Toufic
Professor:	Geara, Fady
Associate Professor:	Zeidan, Youssef
Assistant Professors:	Ayoub, Zeina; Eid, Toufic; Jalbout, Wassim; Shahine, Bilal; Youssef, Bassem
Instructor:	Hilal, Lara
Clinical Associate:	Mahmoud, Dima

RADO 260 Introduction to Radiation Oncology 0.180
An elective clerkship that introduces the student to the basic principles, techniques and application of radiation oncology. *One month.*

RADO 287 Internship 0.262-1.048
An elective in radiotherapy. *Open to interns. One to four months.*

RADO 288 Residency Training in Radiation Oncology
Open to interns after graduation and one year internship in any clinical specialty. The program extends over four years with short elective rotations in pathology, medical oncology, radiology, pediatric oncology and research.

RADO 290 Clinical Training in Medical Physics
Short intensive course open to medical physicists who need to acquire skills in modern radiotherapy physics and clinical training on modern equipment.

RADO 291 Medical Physics to Medical Residents
Medical physics courses open to Medical Radiation Oncology residents to prepare them for their Radiation Oncology exam/certification.

RADO 292 Medical Physics Residency Training in Radiation Oncology (Program under construction)
Open to Medical Physics program graduates. The program extends over two years and includes didactic as well as clinical training.

Introduction to Radiobiology: Introducing short course to Radiation Oncology residents, addressing biological principles of radiation oncology. *Over a period of two months.*

Weekly Conferences

Multidisciplinary Tumor Board: GU MDT, GI MDT, Breast MDT, Thoracic MDT, Head and Neck MDT, GYN MDT, Malignant Hematology/BMT, Rare tumors MDT. In addition to the Multidisciplinary radiation oncology case reviews and Journal Clubs. The department participates in the teaching activities of the oncology section of the Department of the Internal Medicine.

Department of Surgery

Chairperson:	Hoballah, Jamal
Professors Emeriti:	Khalil, Ismail; Obeid, Sami; Shehadi, Sameer
Professors:	Al-Halees, Zohair (Adjunct Clinical); Abi Saad, Georges; Atiyeh, Beshara (Clinical); Bulbul, Mohamad (Clinical); Haidar, Rachid; Hoballah, Jamal; Khalifeh, Mohammad; Khauli, Raja; Khoury, Ghattas (Clinical); Obeid, Mounir; Sawaya, Raymond; Skaf, Ghassan
Associate Professors:	Abbas, Jaber (Clinical); Akel, Samir (Clinical); Alami, Ramzi; Bakhach, Joseph; Faraj, Walid; Haddad, Fady; Haddad, Raja (Clinical); Ibrahim, Amir; Najjar, Marwan; Omeis, Ibrahim; Saghieh, Said; Sfeir, Pierre; Sfeir, Roger (Clinical)
Assistant Professors:	Al Taki, Muhyeddine; Bachir, Bassel; Baddoura, Omar (Clinical); Borgi, Jamil; Darwish, Hussein; Deeba, Samer (Clinical); Doughan, Samer (Clinical); El Hajj, Albert; El-Rassi, Issam; Hussein, Maher (Clinical); Kreidieh, Ibrahim (Clinical); Lakkis, Suheil (Clinical); Nasr, Rami; Sagherian, Bernard; Sbaity, Iman; Sheikh Taha, Abdel Majid; Sidani, Mustafa (Clinical); Soubra, Maher; Tayim, Ahmad; Wazzan, Wassim (Clinical); Zaghal, Ahmad
Instructors:	Abiad, Firass
Clinical Associates:	Abdelnoor, John; Bazi, Tony; Bitar, Elias; Dajani, Omar; Dibo, Saad; Hamade, Bachar; Harakeh, Ayman; Hushaymi, Ibrahim; Jassar, Yehya; Msheik, Mayyas; Nassereldine, Rakan; Rahhal, Salim; Rustom, Jurji; Salameh, Joseph; Sakr, Ghazi; Sayyed, Khaled

The Department of Surgery offers courses, graduate clerkships, and specialty electives to medical students. It also offers post-graduate training to MD graduates including residency and subspecialty fellowships.

Post-Graduate Training

The Department of Surgery offers two tracks of residency training which include a one-year of internship in preliminary track required for any further specialization and a categorical track for residency training in General Surgery, Neurosurgery, Orthopedic Surgery, Plastic Surgery and Urology. Trainees are selected during or after their last year of medical school.

The training programs in the categorical track consist of a five-year training program in general surgery, a seven-year training program in neurosurgery, including two prerequisite years of general surgery, a six-year training program in orthopedic surgery and urology, including prerequisite one year in general surgery and a second year of other surgical and non-surgical rotations, and a seven-year training program in plastic surgery including three prerequisite years in general surgery.

All residency programs are structured to conform to the requirements of the Lebanese Order of Physicians, Arab Board of Surgery, and the Accreditation Council for Graduate Medical Education-International (ACGME-I).

All the surgical residents in the General Surgery training and rotations participate in the didactic curriculum established by the Surgical Council on Resident Education (SCORE).

All junior surgical residents are enrolled in the ACS Fundamentals of Surgery Curriculum. In addition, an elaborate skills lab curriculum including basic and advanced open and laparoscopic skills is provided.

All first year categorical residents are required to join the institutional Fellowship and Residency Research Program (FRRP) and to carry out one research project throughout their residency or fellowship period.

All residents are required to take and maintain their BLS and ACLS certification offered at AUBMC. They are also required to take the Advanced Trauma Life Support (ATLS) course, which is currently offered by AUB and the American College of Surgeons-Lebanon Chapter. All senior general surgery and urology residents are required to get FLS certification offered at the AUBMC-Department of Surgery that is an approved international FLS test center.

All surgical residents 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 Plastic Surgery Education Network (PSEN) 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 FRCSI after they fulfill needed requirements. The General Surgery Residency program and the Plastic Surgery residency program received accreditation by the ACGME-I in 2016 and 2017 respectively.

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 a two-year fellowship training program in Trauma and Surgical Critical Care, a one-year fellowship training program in Surgical Critical Care, and a two-year fellowship training program in Vascular Surgery.

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 student to the principles of caring for the surgical patient. This goal is accomplished by allowing the student to participate in the care of patients at the various stages of evaluation and treatment by the surgical faculty and their teams. These stages include, but are not limited to, the preoperative office or clinic visit, inpatient admission, operative procedures, and inpatient and outpatient recovery.

The clerkship is structured on the principle that learning is an active process, which can be accomplished only by the student. The role of the faculty and Housestaff 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 toward bedside teaching rather than didactic teaching. A quality improvement conference is held biweekly in most divisions. Didactic teaching conferences are held each Tuesday and Thursday at 6:45 am to cover the surgical curriculum, pathology and journal club reviews.

Pathology and Journal Club Reviews

Special lectures are delivered as the occasions arise, especially with visiting professorship lectures. Journal clubs are held monthly in all specialties.

Affiliations

Currently there are several affiliations with the Department of Surgery based on agreements of cooperation:

- Makassed Hospital (since March 4, 1982)
- Rafic Hariri University Hospital (since June 9, 2005 for urology, since July 2017 for Plastic Surgery)
- Notre Dame Liban – Jounieh (since September 2008)
- Al Janoub Hospital – Saida (since May 2009)
- Clemenceau Medical Center (since July 2009)
- Notre Dame Liban – Zgharta
- Mount Lebanon Hospital (since August 2010)
- Najjar Hospital (since February 2010)
- Wahib Nini Hospital (2012)
- 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.