Department of Anatomy, Cell Biology and Physiology

Chairperson: Al-Chaer, Elie D.
Emeritus Professor: Jabbur, Suhayl
Professors: Al-Chaer, Elie D.; Barada, Kassem; Bazarbachi, Ali; Birbari, Adel; El-Sabban, Marwan; Jurjus, Abdo; Mourad, Fadi; Muhtasib, Hala;
Associate Professors: Eid, Assaad; Nasr, Rihab; Saab, Raya
Assistant Professors: Abou-Kheir, Wassim; Daoud, Georges; Lawand, Nada B.; Nassar, Dany; Zeidan, Asad
Associates: Kibbi, Abdul-Ghani; Husari, Ahmad; Rebeiz Abdallah

The Department offers three disciplines of study: Anatomy and Cell Biology, Physiology, and Basic Neuroscience. Each discipline provides courses to medical, graduate, 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 Anatomy and Cell Biology include: BIOC 323 (2 cr.); PHYL 310 (3 cr.); HUMR 309 (5 cr.); HUMR 308 (3 cr.); HUMR 314 (1 cr.); HUMR 310 (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 non-medical careers like psychology or biomedical sciences; It introduces the 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 the horizontal integration. Prerequisites: 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 graduate students outside the department.

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. Required of all medical students. Open to all graduate students in the department.

HUMR 308A  Neuroanatomy  28.39; 3 cr.
The neuroanatomy component of Neuroscience, IDTH 208. Open to 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 the 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 be selected all or as one module per speciality 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 \textit{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 316  Principles of Electron Microscopy  32.0; 2 cr.
Lectures on, and demonstration of, basic techniques of electron microscopy. Alternate years.
HUMR 318  Principles of Histochemistry  16.48; 3 cr.
Lectures, demonstration, and laboratory work related to the principal techniques of histochemistry, including immuno-histochemistry. Prerequisite: HUMR 305 or HUMR 309.

HUMR 319  Biology of Nerve and Muscle
Equivalent to IDTH 309. See Interdepartmental Teaching.

HUMR 346  Human Morphology for Graduate Students  48.32; 4 cr.
A course that includes the embryology component of HUMR 207, the whole of 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
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: BIOC 325 (2 cr.); PHYL 300 (2 cr.); PHYL 310 (3 cr.); PHYL 302 (2 cr.); PHYL 308 (3 cr.); HUMR 305 (3 cr.); HUMR 314 (1 cr.); HUMR 310 (2 cr.); PHYL 304 (3 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. Prerequisites: BIOC 246 and BIOL 201 (or BIOL 210).

PHYL 260  Elective in Physiology  0.180-360.
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 in the department.
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 in
the department.

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 in the department.

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 in the department.

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 in the department.

PHYL 311-312  Advanced Physiology  0.48; 2 cr.
A guided study (experimental and theoretical) of the literature of the 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 in the department.

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 317  Perspectives in the Physiological Sciences  32.0; 1 cr.
Selected readings and seminars in the history, philosophy, and methodology of the physiological
sciences designed to give the student a broad view of the field of biology and its implications
in everyday life.

PHYL 324  Electrophysiology of Excitable Cells  12.9; 1 cr.
The course studies the basic mechanisms of membrane cable property and resting potentials
in all cells, action potential initiation and propagation in excitable cells, receptor physiology,
central synaptic transmission, neuromuscular transmission, and muscular contraction.

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 physiological literature survey covering a given subject in the field.
**PHYL 395A/B**  Comprehensive Exam  0 cr.
*Prerequisite: Consent of advisor.*

**PHYL 399**  MS Thesis  9 cr.
*Original research under staff supervision, leading to the MS degree.*

### Neuroscience

Required courses for the discipline in Neuroscience include: BIOC 325 (2 cr.); PHYL 310 (3 cr.); PHYL 308 (3 cr.); HUMR 305 (3 cr.); HUMR 308 (3 cr.); HUMR 314 (1 cr.); HUMR 310 (3 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 graduate students.*

**PHYL 308**  Neurophysiology
*Similar to PHYL 208 and to IDTH 308B. Open to graduate students*

**HUMR 261 or PHYL 261**  Elective in Basic Neuroscience  0.180-360
*Open to Medicine III and IV students, graduate students in the combined MS-MD program and visiting medical students. The objective of this elective is to involve the students in a basic research project as part of the on-going studies in the neuroscience research laboratories of the Department.*

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