

# Department of Biochemistry

Chairperson (acting):	Usta, Julnar
Professors:	Boustany, Rose-Mary; Ziyadeh, Fuad; Usta, Julnar
Associate Professor:	Habib-Abdul Karim, Aida
Assistant Professors:	Khalaf, Kinda; Nemer, Georges
Associates:	Bitar, Fadi; Dbaibo, Ghassan; Mikati, Mohammad; Salti, Ibrahim

The Department of Biochemistry offers undergraduate courses to nursing students, and graduate courses to medical students and graduate students in the graduate program leading to a master's degree (MSc).

The requirements for admission to the graduate program are a BA or BS degree from a university and an academic record with a cumulative grade average of 80 and above in major courses. Students should have a background in chemistry, biology, math, physics or related medical science. The graduate program consists of a minimum of two years including didactic, interactive, and practical training leading to the Master of Science degree. Students must finish 21 credits of graduate courses; pass a comprehensive exam; and submit a thesis based on independent research. The 21 credits of graduate courses include a total of 15 credits of obligatory courses and 6 credits of elective courses.

Obligatory courses include: BIOC 300 (6 cr.); BIOC 302 (3 cr.); BIOC 304 (3 cr.) and MBIM 310 (3 cr.)

## **BIOC 246 Biochemistry for Nursing 60.0; 4 cr.**

An introduction to basic concepts in biochemistry. This course 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. Prerequisite: none. First semester.

## **BIOC 255 Biochemistry for MLTP 45.0; 3 cr.**

The course 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 semester.

## **BIOC 300 Basic Biochemistry 72.44; 6 cr.**

A course that provides students with a coherent account of biochemistry and molecular biology, correlating clinical disorders with basic concepts. This course describes the living cell as a physiochemical, highly organized system that is precisely controlled, self-reproducing, and energy-generating. Homeostatic mechanisms, steady state, and molecular biology are fully described. Offered to medical students and graduate students. First semester.

## **BIOC 302 Developmental Biochemistry 48.0; 3 cr.**

A course that discusses the pre- and post-natal development of cardiac and skeletal muscles as well as hemopoiesis. This course is a mix of didactic lectures and interactive teaching. Each topic is presented by a faculty member and further illustrated by an article discussed by the students. The course is required by all graduates in biochemistry. Open to graduate students from other departments with consent of the coordinator. Second semester.

**BIOC 304**                      **Signal Transduction of G-protein Coupled Receptor**                      **48.0; 3 cr.**

A course that presents classical pathways triggered by G-protein coupled receptors as well as the recent information and findings in the field. *This course is required of all biochemistry graduate students. Open to graduates from other departments in the basic medical sciences and biology. Prerequisite: none. First semester.*

**BIOC 305**                      **Biochemical Research**                      **48.0; 3 cr.**

An elective course that discusses the theoretical basis of ongoing research projects. This course consists of didactic lectures, student presentation, and written assignments on novel aspects related to each topic. *The course is open to all graduate students. Prerequisite: basic biochemistry (BIOC 300) or consent of coordinator. Second semester, alternate years.*

**BIOC 306**                      **Eicosanoids in Vascular Biology and Inflammation**                      **32.0; 2 cr.**

An elective course that describes the different eicosanoids and their role in vascular biology and in mediating inflammation. *Open to graduate students in basic medical sciences, biology, and to medical doctors who want to enhance their knowledge in the field. Prerequisite: none. Second semester, alternate years.*

**BIOC 307/308**                      **Biochemical Methods**                      **0.128; 4 cr. (each)**

Basic principles and applications of the techniques of molecular biology, spectrophotometry, and chromatography. *Open to all graduate students. Prerequisite: BIOC 300, or a background in biology. Offered second semester and summer.*

**BIOC 309**                      **Proteins and Enzymes**                      **22.20; 2 cr.**

An elective course open to all graduate students either as 2 credits or as 1 credit as 309A/309B, respectively. This course is composed of two units. Unit I: Protein Architecture discusses the stabilizing forces directing protein folding and thus conformation, introducing students to the various existing protein data banks. Unit II: Discusses the different kinetic approaches that may be used in studying the kinetic analysis of complex biological systems. *Prerequisite: a biochemistry course and/or consent of coordinator. Second semester, alternate 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. *Elective. Open to non-biochemistry majors. Prerequisite: basic biochemistry or a background in biology. Second semester, alternate years.*

**BIOC 311/312**                      **Biochemistry Tutorial**                      **32.0; 2 cr. (each)**

Students are assigned special topics(2) of current interest and are required to write a report evaluating the current status of the chosen subject. *Open to biochemistry graduate students. Prerequisite: none. First and second semester.*

**BIOC 313**                      **Advanced Biochemistry**                      **30.36; 3 cr.**

A course that deals with the latest developments in molecular biology techniques and troubleshooting with hands-on bench experience. *Elective. Open to all graduate students. Prerequisite: basic biochemistry or a background in biology. Second semester and summer.*

**BIOC 314 Mitochondria: Genetics, Protein, and Disease 32.0; 2 cr.**

A course that provides a clear understanding of the biochemistry, molecular genetics, and bioenergetics of the mitochondria. It emphasizes the role of the mitochondrial dysfunction (mt-DNA mutations, environmental toxins) in the pathogenesis of mitochondrial diseases. *Elective. Open to all graduate students in basic sciences and biology graduates. Prerequisite: none. Second semester, alternate years.*

**BIOC 315 Orthopedic Biomechanics 45.0; 3 cr.**

A course that presents the fundamentals of orthopedic biomechanics and the application of solid mechanics toward describing physiologic systems. Emphasis is placed on the interaction between biomechanical and physiological factors (bone, joint, connective tissue, and muscle physiology and structure) in the musculoskeletal system and application of engineering principles in clinical practice. *Open to medical orthopedic residents and to graduate students. Prerequisites: graduate standing or permission of instructor. Second semester.*

**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. *Open to both basic medical science, and arts and sciences graduate students. Prerequisite: graduate standing.*

**BIOC 317 (a-i) Selected Topics in Biochemistry 16.0; 1 cr.**

A series of elective courses (a-i), each 1 credit. Each course emphasizes the basic concepts and introduces recent developments in the fields of (a) proteins (b) carbohydrates (c) lipids (d) molecular biology (e) cancer (f) apoptosis (g) cyclooxygenase and lipoxygenase (h) biomaterial (l) congenital heart problems (j) special techniques in biochemistry: PCR, sequencing, transfection, Elisa, FPLC, SDS-PAGE, western blotting. *The course is open to medical doctors, graduates in medical and related fields. No prerequisite offered during the second semester and summer session.*

**BIOC 319/320 MS Thesis 9 cr.**

A 9 credit hour course in which students conduct original research under staff supervision. The projects center around enzymology of ATPase, molecular mechanisms of inflammation, congenital heart problems, Wilson's disease, epilepsy, apoptosis, and cyclooxygenase.