

EDICINE (FACULTY BASED COURSES)***INTRODUCTION***

All medicine graduate programs may require from their students to study the following Faculty Based Courses. These courses may be considered compulsory for some programs and electives for the others.

0500-501	Basic Molecular Biology	(1)
0510-502	Advanced Biostatistics	(1)
0500-502	Basic Immunology	(1)
0500-503	Research Communication I	(1)
0500-504	Research Communication II	(1)

COURSE DESCRIPTION**0500-501: BASIC MOLECULAR BIOLOGY
CR: 1**

Nucleic acid structure and functions; DNA analysis by agarose gel and DNA sequencing; DNA Replication: Mechanism, Regulation, Differences between prokaryotic and eukaryotic process; DNA damage, repair and mutagenesis, and diseases associated with defective repair; Transcription mechanisms and processing of primary RNA; The genetic code, protein synthesis and regulation; Restriction and modification enzymes and their importance in molecular biology.

**0500-502: BASIC IMMUNOLOGY
CR: 1**

Introduction to immunity, Innate and acquired immunity, Organs and cells of the immune system, the Major Histocompatibility Complex and its role in antigen presentation, Humoral immunity, antibodies and complement, Cell-mediated immune function T cells and macrophages, Cytokines and their roles in immune responses, Transplantation immunology, immunoprophylaxis and immunotherapy, Autoimmunity and autoimmune diseases, Hypersensitivity

**500-503: RESEARCH COMMUNICATION I
CR: 1**

The aim of this course is to improve the student's ability to locate and retrieve information in the library, take effective notes, recognize and manipulate biomedical word roots and affixes of classical origin, write scientific English and communicate effectively in seminars. The course has the following components, which are designated to achieve this aim: Library skills, biomedical terminology, basic information structure, processing and seminar skills.

**0500-504: RESEARCH COMMUNICATION II
CR: 1**

This course has its emphasis on improving the student's ability to collect and organize relevant information, and then communicate that information effectively for research reporting purposes, whether as a written report or a seminar presentation. The timing of the course is contrived to oblique the student to present his thesis background and methods in a seminar.

MEDICINE (GENERAL COURSES)

INTRODUCTION

All Medical graduate programs require the study of one or more of the following courses offered by the **Department of Community Medicine and Behavioral Sciences**.

0510-501	Biostatistics and Computer in Medicine	(2)
0510-502	Advanced Biostatistics	(1)
0510-503	Epidemiology	(1)
0510-504	Radiotracer Methodology in Biological Research	(2)
0510-601	Biostatistical Method in Medical Research	(3)
0510-602	Epidemiology of Infectious Diseases	(3)

COURSE DESCRIPTION

0510-501: BIostatISTICS AND COMPUTER IN MEDICINE
CR: 2

This is a 2 credit hour faculty-required course intended for students joining the graduate M.Sc. program in the Faculty of Medicine, Kuwait University. The course takes into account the fact that enrolled students belong to various backgrounds and hence it includes a diversity of topics to meet their interest. The course is characterized by the inclusion of statistical methods in epidemiology (relative risk, odds ratio to measure the association between diseases and factors, evaluation of diagnostic tests), determination of size of investigations and power, analysis of variance, and design of controlled randomized clinical trials. It also includes multivariate statistical methods such as multiple linear regression and binary multivariable logistic regression. It focuses on concepts, limitations, validity and assumptions underlying these statistical methods.

The course also provides students with knowledge about hardware and software computer technology in addition to the skills of applying the procedures of the SPSS statistical package, and information about computer uses in medicine

(hospital information system, drug information system and computer-assisted diagnoses).

0510-502: ADVANCED BIostatISTICS
CR: 1

Planning of statistical investigation. Controlled comparative studies: Clinical and simple comparative trials, two period cross over design. Analysis of variance. Experimental design. The control of misclassification error. Survivorship tables and life tables. Biological assays: Parallel-line, slope ratio and quantal response. Non-parametric statistics: One-sample run test, Mann-whitney test, Kruskal-Wallis analysis of variance, and Kendall rank correlation.

0510-503: EPIDEMIOLOGY
CR: 1

Scope of epidemiology, basic measures of frequency, sources of morbidity data, direct and indirect standardization. Planning of an epidemiological investigation, survey planning, variability of measurements, validation and problems in validation, measurement of experimental error, population screening and disease control.

**0510-504: RADIOTRACER METHODOLOGY
IN BIOLOGICAL RESEARCH
CR: 2**

This course provides an introduction to the principles and procedures underlying the use of radioactive isotopes in biological research. The material will be presented at a level requiring only elementary mathematics and the principles and procedures will be illustrated with practical examples drawn from actual laboratory work. The course begins with the materials, and detection and measurement of radiation, and progresses to discussions and illustrations of the applications and problems of radiation measurement and experimental design in biology and medicine and methods used for reduction of radiation exposure. Hazards associated with the use of radioactive material will be discussed. Topics which will be given special emphasis include Gamma and Beta counting of biological samples autoradiography, radiochromatography, use in life science and clinical research, and radiation safety measures.

**0510-601: BIostatistical
METHODS IN MEDICAL
RESEARCH**

CR: 3 PR: 0510-501 or its equivalent.

The course primarily aims at equipping students with tools of research. This includes univariate statistical methods update, sampling methods and sample size, experimental design, multivariate

analysis, logistic regression, survival analysis: clinical trials, statistical methods in epidemiology, analysis of matched data and nonparametric statistics. Mann-Whitney, Wilcoxon paired test, Kruskal-Wallis and Spearman rank correlation.

**0510-602: EPIDEMIOLOGY OF
INFECTIOUS DISEASES
CR: 3**

Concepts and definitions, epidemiological models, causality, epidemic process, indices of health and disease, natural history of infectious diseases, contact patterns, measuring infectivity, methods and techniques for studying an infection in the community, time and place clustering, use of routinely collected data, special surveys, surveillance of infectious diseases, field investigation, analysis of an outbreak, seroepidemiology, the effect of bias, confounding and misclassification on the identification of source/reservoir of infection and mode of transmission, statistical techniques often used in infectious disease epidemiology, mathematical models for epidemics, primary and secondary prevention in the infectious disease epidemiology, epidemiology of vaccination, control, elimination and eradication, epidemiology of emerging infections and epidemiology of specific infectious diseases.

**PH.D. IN MEDICAL SCIENCE
MEDICAL BIOCHEMISTRY
Program code: 0540**

INTRODUCTION

The Department of Biochemistry (Faculty of Medicine) offers a Ph.D. of Science program in **Medical Biochemistry**. The objective of the program is to have in-depth knowledge in Medical Biochemistry, and to be capable of learning and carrying out independent basic research in area of their choice in a pertinent field of Biomedical research.

PROGRAM REQUIREMENTS**33 TOTAL COURSE CREDITS****9-15 Course credits in the major specialization (Biochemistry)**

0540-601	Advanced Topics in Cell Biology	(3)
0540-602	Advanced Medical Nutrition and Nutrigenomics	(3)
0540-603	Selected Topics in Omics	(1)
0540-604	Advanced Topics in Protein and Enzyme Biochemistry	(2)
0540-605	Current Advances in Membrane Biochemistry	(2)
0540-606	Advanced Topics in Free Radical Biochemistry	(2)
0540-607	Selected Topics on Catalytic and Small RNA molecules	(1)
0540-608	Advanced Topics in Protein Secretion	(1)
0540-609	Advances in Gene Therapy	(1)
0540-610	Inflammation and Mediators	(1)
0540-611	Advanced Topics in Molecular Biology-I	(1)
0540-612	Advanced Topics in Molecular Biology-II	(1)
0540-613	Research Topic	(2)
0540-614	Research Communication	(2)
0540-615	Advanced Techniques in Cytogenetics & Tissue culture	(1)
0540-616	Advanced Topics in Metabolic Homeostasis	(1)

0-6 Courses outside the major specialization

0510-601	Biostatistical Methods in Medical Research	(3)
0520-519	Molecular Microbiology	(3)
0520-604	Advanced Immunology	(3)
0530-566	Neurophysiology	(3)
0555-502	Nuclear Medicine Instrumentation	(2)
0560-506	Tissue and Organ Histology	(2)
0712-530	Methods in Histology and Histopathology	(2)
2000-501	Scientific Writing and Communication Skills	(3)
2000-503	Ethics and Professionalism	(2)
2050-512	Molecular Medicine	(3)

18 COMPULSORY

0540-697	Dissertation	(0)
0540-698	Dissertation	(0)
0540-699	Dissertation	(18)

COURSE DESCRIPTION

0540-601: ADVANCED TOPICS IN CELL BIOLOGY

CR: 3

The course will be organized in five themes: 'methods for studying the cell', 'structural organization of the cell and cell-to-cell interactions', 'cell signaling and movements', 'cell cycle, aging, and death', and 'special topics'. References will be given to students prior to the classes; students' participation in discussions are expected. The student's learning will further be strengthened by carrying out a study project with an oral presentation. Students' performance will be assessed by written examinations, participation in discussions and a study project report with an oral presentation.

0540-602: ADVANCED MEDICAL NUTRITION AND NUTRIGENOMICS

CR: 3

Relevance of nutrition as a therapy in certain diseases including IBD will be discussed. Implications of recent developments in molecular biology in relation to nutrition-responsive genes and human health and diseases, nutrigenomics and personalized nutrition in pregnancy. Students may be asked to present a relevant recent review.

0540-603: SELECTED TOPICS IN OMICS

CR: 1

Advanced methods used in '-Omic' technology: Probes and limitations, applications in human disease diagnosis and gene identification.

0540-604: ADVANCED TOPICS IN PROTEIN AND ENZYME BIOCHEMISTRY

CR: 2

Determination of protein structure. Protein folding and the nature of native conformation. Intrinsically

disordered proteins. Enzymes and enzyme activity and inhibition. Allosterism and its implications in enzyme regulation and drug development.

0540-605: CURRENT ADVANCES IN MEMBRANE BIOCHEMISTRY

CR: 2

Current membrane models; nature and roles of membrane microdomains. Membrane permeability and transport pathways for water and solutes; nature, activity and regulation of selected nutrient transporters in health and disease.

0540-606: ADVANCED TOPICS IN FREE RADICAL BIOCHEMISTRY

CR: 2

Pathways of production and neutralization of ROS and RNS. Role in human pathologies and signal pathways, inflammation and free radicals; mechanism and treatment strategies. The students will select, critically analyze and discuss recent publications in the field of free radical biochemistry.

0540-607: SELECTED TOPICS ON CATALYTIC AND SMALL RNA MOLECULES

CR:1

Small and micro RNA as regulators of gene expression; roles in human diseases. Structure and synthesis, and applications in gene therapy. Student is expected to make a presentation on a state of the art topic in gene expression regulation by small/micro RNA.

0540-608: ADVANCED TOPICS IN PROTEIN SECRETION

CR: 1

Protein trafficking and secretory pathways, mechanism and pathologies arising due to defect in protein secretion mechanism.

**0540-609: ADVANCES IN GENE THERAPY
CR:1**

Current status of gene therapy of human monogenic and polygenic diseases. Limitations and future hope of Gene therapy.

**0540-610: INFLAMMATION AND MEDIATORS
CR: 1**

Mediators of inflammation: basis of immunopathology and therapy targeting various inflammatory targets.

**0540-611: ADVANCED TOPICS IN MOLECULAR BIOLOGY-I
CR: 1**

Students will undertake critical review of current model of eukaryotic transcription, perform literature search and present to the department as oral presentation; Diseases related to defect in transcription initiation.

**0540-612: ADVANCED TOPICS IN MOLECULAR BIOLOGY-II
CR:1**

Students will perform critical review of current models of eukaryotic translation initiation and regulation, perform literature searches and present to the Department as oral presentation; Diseases related to defects in translation initiation.

**0540-613: RESEARCH TOPIC
CR:2**

Student will conduct a literature search on an assigned topic related to his/her prospective thesis research area and present a written report and oral presentation.

**0540-614: RESEARCH COMMUNICATION
CR:2**

Student will conduct a literature search on a selected topic and will present a written report and oral presentation.

**0540-615: ADVANCED TECHNIQUES IN CYTOGENETICS & TISSUE CULTURE
CR:1**

In this course students will be introduced with FISH, karyotyping, microarray, in-situ genomic hybridization, tissue culture techniques, fluorescence microscopy and confocal microscopy, cell growth and cell cycle, media composition and preparation.

**0540-616: ADVANCED TOPICS IN METABOLIC HOMEOSTASIS
CR:1**

In this course student will study advanced topics in metabolic homeostasis related to human health and diseases in various organs including diabetes and medical trauma.

**0540-697: DISSERTATION
CR: 0**

**0540-698: DISSERTATION
CR: 0**

**0540-699: DISSERTATION
CR: 18**