

MEDICINE (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)
- 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: RESEARH 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: RESEARH 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 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 SCIENCES
[MEDICAL MICROBIOLOGY]**

INTRODUCTION

The Department of Microbiology (Faculty of Medicine) offers a Ph.D. program in **Medical Microbiology**. Only full-time students are admitted to this program. A graduate successfully completing this program will be expected to have an in-depth knowledge in specific areas of Medical Microbiology. In addition, he/she should become an independent thinker, planner and executor of specific ideas relevant to Medical Microbiology. A major part of the program is the dissertation, which requires high quality research in a specific area of Medical Microbiology.

PROGRAM REQUIREMENTS

The program requirements are:

33 TOTAL COURSE CREDITS**9-15 Course credits in the major specialization (Medical Microbiology)**

0520-601	Molecular Techniques and Instrumentation	(3)
0520-602	Molecular Virology	(3)
0520-603	Advanced Medical Mycology	(3)
0520-604	Advanced Immunology	(3)
0520-605	Clinical Immunology	(3)
0520-606	Advanced Bacteriology	(3)
0520-607	Advanced Parasitology	(3)
0520-608	Current Topics in Microbiology I	(3)
0520-609	Seminar-I	(1)
0520-610	Seminar-II	(1)
0520-611	Seminar-III	(1)
0520-612	Gene Cloning and Expression	(3)
0520-613	Current topics in Microbiology II	(3)

0-6 Courses outside the major specialization*

0510-601	Bio-statistical Methods in Medical Research	(3)
0510-602	Epidemiology of Infectious Diseases	(3)
2000-501	Scientific Writing and Communication Skills	(3)
2000-503	Ethics and Professionalism	(2)

*Students may study other appropriate Graduate level Courses outside the Department of Microbiology, with the approval of the Program Committee.

18 COMPULSORY

0520-697 to 699 Dissertation (18)

COURSE DESCRIPTION**0520-601: MOLECULAR TECHNIQUES AND INSTRUMENTATION****CR: 3 PR:0520-519 or its equivalent**

Polymerase chain reaction (PCR), RT-PCR, In-situ PCR, PCR-SSCP, ligase chain reaction, strand displacement assay, cloning and expression of foreign DNA, site directed mutagenesis, restriction fragment length polymorphism, use of isotopes and autoradiography, nucleic acid and antibody probes, electroporation, chromatography, electrophoresis, blotting and hybridization techniques, electrophoresis, ultracentrifugation, DNA and protein sequencing, image analysis, DNA and peptide synthesis, construction and screening of DNA and genomic DNA libraries in lambda gt 11.

0520-602: MOLECULAR VIROLOGY**CR: 3 PR: 0520-505 or its equivalent**

Modern approaches to the finding of new medically important viruses, their identification, molecular characterization and the development of diagnostic tests. The content of the course will include the following molecular approaches: expression libraries, representational difference analysis, DNA/RNA amplification techniques, DNA sequencing, DNA/protein sequence analysis, development of antibody/ antigen and viral DNA/RNA detection tests in the absence of complete virus isolates.

0520-603: ADVANCED MEDICAL MYCOLOGY**CR: 3 PR:0520-510 or its equivalent**

Biology of pathogenic fungi, molecular epidemiology of fungal diseases, recent advances in diagnosis of fungal diseases, molecular techniques in diagnostic mycology, defense against fungal infections, virulence factors in pathogenic fungi, immune response in mycoses, cytokines and mycoses, heat shock proteins in fungi, emerging fungal pathogens, recent advances in antifungal therapy, drug resistance in pathogenic fungi, fungal vaccines.

0520-604: ADVANCED IMMUNOLOGY**CR: 3 PR:0520-504 or its equivalent**

Antigens and haptens (Immunogenicity of antigens, epitopes, mitogens and Haptens), antigen receptors (structure, function, generation of diversity, immunoglobulin superfamily), major histocompatibility complex (organization and inheritance, structure, polymorphism), antigen processing and presentation (role of antigen

processing cells, MHC-restriction, regulation of processing), complement (steps in complement activation, receptors, biological function, regulation), generation of the humoral immune response (kinetics, steps in B cell activation, proliferation and differentiation), cell-mediated immunity (cell activation, cytotoxic responses mediated by CD8 and CD4 T cells) cytokines (general properties, secretion and function of cytokines, cytokines receptors, role of cytokines in inflammation and disease), hybridomas and monoclonal antibodies (formation and selection of hybrid cells, production and function of monoclonal antibodies, T cell hybridomas).

0520-605: CLINICAL IMMUNOLOGY**CR:3 PR: 0520-504 or its equivalent**

Transplantation (immunogenicity of various organs, HLA matching, immunosuppressive regimen, rejection), immunity to infection (immunity to viral, bacterial and parasitic infections), autoimmunity (proposed mechanisms, rheumatoid arthritis, connective tissue disorders), immunohematology, hypersensitivity, neoplasia (malignant transformation of cells, oncogenes, tumor antigens, immune response), immunodeficiency and infection (primary and secondary immunodeficiencies), immune intervention (vaccines, immunosuppression, immunopotentialiation, plasmapheresis).

0520-606: ADVANCED BACTERIOLOGY**CR:3 PR: 0520-506 or its equivalent**

An advanced course in bacteriology including mycobacteriology, anaerobic bacteriology, enterobacteriaceae, microbial genetics, gram-positive aerobic bacteria, unconventional bacteria e.g chlamydia, mycoplasma and rickettsia and antimicrobial agents with varying degree of emphasis on techniques and methodologies.

0520-607: ADVANCED PARASITOLOGY**CR: 3 PR: 0520-509 or its equivalent.**

The course covers recent knowledge on important aspects of selected parasitic diseases with emphasis on the biology and transmission of the parasites, the immune host response, modern aspects of laboratory diagnosis, current problems in therapy, drug resistance and vaccine development. Principles and application of serodiagnostic procedures in parasitic infections will be discussed. Arthropods as a cause of disease and those

involved in transmission of parasites will be reviewed. Relevant clinical cases also be highlighted especially, zoonoses and emerging parasitic infections and problems in diagnosis.

Practical sessions will involve benchwork to review the role of classical microscopical methods in the diagnosis of parasitic infections such as procedures for the examination of stool, urine, blood, sputum, aspirates and biopsy material for diagnosis of parasitic infections.

The ongoing research techniques and experimental protocols for parasite culture, antigen preparation and animal inoculation will be demonstrated. The currently available immunodiagnostic tests, new techniques, use of isoenzymes in parasite identification, DNA probes (selection, construction and use in diagnosis) and PCR as a tool for diagnosis will be reviewed and demonstrated.

Journal articles, practicals, slides sessions, seminars /discussion sessions will involve the active participation of students to instill an awareness of complexities involved.

0520-608: CURRENT TOPICS IN MICROBIOLOGY I

CR: 3 PR: 0520-501 or its equivalent

In this course, students will be required to critically analyze and present the topics of current interest in Medical Microbiology for discussion to their peers and the Faculty. They will also be required to write term papers on selected topics in the sub-specialties of Medical Microbiology.

0520-609: SEMINAR I
CR: 1

The candidate will be assigned a topic relevant to his/her area of specialization in Medical Microbiology. He/She will be asked to critically review the literature and present it in the Department.

0520-610: SEMINAR II
CR: 1

The candidate will be assigned a topic relevant to his/her area of specialization in Medical Microbiology. He/She will be asked to critically review the literature and present it in the Department.

0520-611: SEMINAR III
CR: 1

The candidate will be assigned a topic relevant to his/her area of specialization in Medical Microbiology. He/She will be asked to critically review the literature and present it in the Department.

0520-612: GENE CLONING AND EXPRESSION

CR: 3 PR: 0520-519 or its equivalent

Basic techniques in molecular biology, isolation and analysis of genomic DNA, extraction and analysis of eukaryotic mRNA, nucleic acid labelling and detection, plasmid cloning vehicles, phage and cosmid vectors, construction of genomic DNA libraries, construction of cDNA libraries, screening of libraries for recombinants, subcloning and DNA sequencing, how to obtain a clone for a specific gene, cloning in yeast, mammalian cells and insect vectors, gene amplification, targeted mutagenesis of cloned DNA, expression and analysis of cloned genes in *Escherichia coli*, detection and analysis of expressed proteins, mapping transcribed DNA sequences.

0520-613: CURRENT TOPICS IN MICROBIOLOGY II

CR: 3 PR: 0520-501 or its equivalent.

In this course, students will be required to critically analyze and present the topics of current interest in Medical Microbiology for discussion to their peers and the Faculty. They will also be required to write term papers on selected topics in the sub-specialization of Medical Microbiology.

0520-697: DISSERTATION
CR: 0

0520-698: DISSERTATION
CR: 0

0520-699: DISSERTATION
CR: 18