

**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 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.

## MASTER OF SCIENCE MICROBIOLOGY

### ***INTRODUCTION***

The Department of Microbiology (Faculty of Medicine) offers a Master of Science program in **Microbiology**. Only full-time students are admitted to this program. The program is designed for candidates wishing to pursue a higher degree in Medical Microbiology in general. In particular the program emphasizes a detailed knowledge of the various areas of Medical Microbiology during the first two semesters. An integral part of the program is the thesis which involves research in a specific area of the candidate/department interest. The current areas of research in the Department include various aspects of Bacteriology, Virology, Immunology, Parasitology, Mycology and Molecular Biology. The program is particularly suitable for candidates wishing to pursue teaching and research as a career.

*According to the University Council decision dated 4/2/2007, Thesis students admitted with effect from September 2007 are exempted from the comprehensive examination.*

### ***PROGRAM REQUIREMENTS***

The program requirements are:

#### **40 TOTAL COURSE CREDITS**

#### **22 COMPULSORY (credits in parenthesis)**

0510-501	Biostatistics and Computers in Medicine	(2)
0520-501	General Microbiology	(2)
0520-504	Immunity and Infection	(2)
0520-505	Medical Virology	(2)
0520-506	Medical Bacteriology	(2)
0520-509	Medical Parasitology	(2)
0520-510	Medical Mycology	(2)
0520-519	Molecular Microbiology	(3)
2000-501	Scientific Writing and Communication Skills	(3)
2000-503	Ethics and Professionalism	(2)

#### **9 ELECTIVES**

The remaining 9 hours may be selected from any 500 level graduate courses offered by the Faculty of Medicine with the approval of the academic advisor. Elective courses offered by the department include:

**TEACHING ELECTIVES (credits in parenthesis)**

0520-502	Microbial Chemistry	(2)
0520-503	Microbial Genetics	(1)
0520-507	Clinical Microbiology	(2)
0520-508	Antimicrobial Agents and Chemotherapy	(2)
0520-511	Seminar I	(1)
0520-512	Clinical Parasitology	(1)
0520-513	Clinical Immunology	(1)
0520-514	Applied and Environmental Microbiology	(1)
0520-516	Diagnostic Techniques in Virology	(1)
0520-517	Diagnostic Techniques in Immunology	(1)
0520-524	Healthcare – Associated Infections	(3)
0520-541	Seminar II	(1)
0520-545	Microbial Pathogenesis	(1)

**RESEARCH ELECTIVES (3 credit each)**

0520-518	Research Electives in Microbial Genetics
0520-520	Research Electives in Bacteriology
0520-522	Research Electives in Microbial Chemistry
0520-523	Microbial Research Techniques
0520-526	Research Electives in Immunology
0520-528	Research Electives in Parasitology
0520-532	Research Electives in Virology
0520-534	Research Electives in Molecular Microbiology
0520-536	Research Electives in Mycology
0520-537	Experimental Microbiology

**9 COMPULSORY (Thesis)**

0520-597	(0)
0520-598	(0)
2000-599	(9)

***COURSE DESCRIPTION***

**0520-501: GENERAL MICROBIOLOGY  
CR: 2**

History and development of Microbiology, chemical and cellular basis of life, Taxonomy and classification of microbes. Morphology and structure of bacteria, nutritional requirements of bacteria, sporulation in bacteria, sterilization and disinfection, antibiotics and chemotherapeutic

agents, microbial toxins, epidemiological markers, microbial ecology, biology of selected groups of bacteria, Biology of fungi and yeast, medical parasitology, bacteriophages, viruses, biohazard and biosafety.

**0520-502: MICROBIAL CHEMISTRY  
CR: 2**

Basic concepts, energetics of chemical reactions. The molecules in cells, proteins, DNA, RNA, lipids

and biomembranes, carbohydrates, glycolipids and glycoproteins, three dimensional structure of proteins, enzymes, carbohydrate metabolism, Energy production, lipid metabolism, nitrogen metabolism, biosynthesis of amino acids, purine and pyrimidine metabolism, characteristics and metabolism of autotrophs, cell surface and microorganisms.

**0520-503: MICROBIAL GENETICS**

**CR: 1**

Introduction, gene transfer and mapping gene in bacteria, extrachromosomal inheritance, movable genes, genetics of bacteriophage and yeast, applied genetics.

**0520-504: IMMUNITY AND INFECTION**

**CR: 2**

Innate and adaptive immune systems, organs and cells of the immune system, the major histocompatibility complex, antigen processing and presentation, humoral immunity, cell-mediated immunity, cytokines, immunoprophylaxis, the complement system in defense and its evasion by microbes, migration and inflammation of leukocytes, T cell subsets in infection, cell-mediated anti-microbial immune mechanisms, immunity to bacteria, viruses, parasites and fungi, evasion of host defenses by microbes.

**0520-505: MEDICAL VIROLOGY**

**CR: 2**

Viral structure, chemistry, classification, Viral multiplication and assays. Viral genetics. Host-virus relationship and pathogenesis of viral infections. Viruses of medical importance: their epidemiology, diagnosis and control. Viral vaccines.

**0520-506: MEDICAL BACTERIOLOGY**

**CR: 2**

The classification and study of bacteria of medical importance. Mycoplasma, Rickettsia, Chlamydia, Anaerobes, spore-formers, gram positive and negative bacilli and cocci, Legionella, Spirochaetes and Mycobacteria. Their epidemiology and diagnosis. Prevention of bacterial disease.

**0520-507: CLINICAL MICROBIOLOGY**

**CR: 2 PR: 0520-506**

Infectious diseases: their clinical aspects, laboratory diagnosis and control. Quality control in a clinical laboratory. Serodiagnostic procedures.

Planning and administration of a clinical laboratory. Correlation of laboratory data and clinical picture. Hospital associated infections: causes, sources, investigation, control.

**0520-508: ANTIMICROBIAL AGENTS AND CHEMOTHERAPY**

**CR: 2**

History of antimicrobial agents. Nature of disinfectants. Chemotherapeutic agents and antibiotics. Mode of action. Microbial drug resistance: chromosomal and plasmid-mediated, its control. Antibiotic policy. Laboratory procedures. Rideal-Walker test. In-use test for disinfectants. MIC, MBC, assay of antibiotics in body fluids and regulation of therapy in patients. Testing of drug combinations. Antiviral and antifungal agents.

**0520-509: MEDICAL PARASITOLOGY**

**CR: 2**

Protozoal and helminth infections of man. Morphology and biology of parasites and diagnosis of their infection. Immunopathology of parasitic disease. Inoculation of animals and cultures. Serodiagnosis. Vaccines. Medical entomology: classification and biology of arthropods. Vector insects, their control and insecticides.

**0520-510: MEDICAL MYCOLOGY**

**CR: 2**

Introduction to medical mycology and mycological techniques. Superficial, deep and systemic mycosis. Laboratory diagnosis of mycotic disease in man. Immunology and immunopathology of diseases and their serodiagnosis. Ecology of pathogenic fungi.

**0520-511: SEMINAR I**

**CR: 1**

Preparation of a seminar on one topic allotted by the advisor. Presentation in the Department.

**0520-512: CLINICAL PARASITOLOGY**

**CR: 1 PR:0520-509**

Complexities of host-parasite relationships. The mechanisms of disease pathogenesis will be reviewed. The local and systemic manifestations of parasitic disease affecting various systems of the body from the clinical viewpoint will be emphasized. The differential diagnosis, parasitology and practical management of the disease caused by the more common parasites is included.

**0520-513: CLINICAL IMMUNOLOGY**

**CR: 1 PR: 0520-504**

Application of immunology to diagnosis and understanding of pathogenesis of diseases, assessment of prognosis and treatment of various clinical disorders, autoimmune diseases.

**0520-514: APPLIED AND ENVIRONMENTAL MICROBIOLOGY**

**CR: 1**

Nature and scope of problem. Food microbiology. Environmental microbiology: air, water, sewage. Soil microbiology. Sampling procedures. Micro biological indices. Micro biological procedures.

**0520-516: DIAGNOSTIC TECHNIQUES IN VIROLOGY**

**CR: 1**

Diagnosis of viral diseases by isolation of virus, direct detection of virus or viral antigen and detection of specific antibody. The different techniques and their application.

**0520-517: DIAGNOSTIC TECHNIQUES IN IMMUNOLOGY**

**CR: 1**

Application and interpretation of immunological techniques for the detection of humoral and/or cellular factors that are directly or indirectly related to the pathogenesis of disease will be discussed.

**0520-518: RESEARCH ELECTIVES IN MICROBIAL GENETICS**

**CR: 3**

Demonstration of basic techniques used in molecular genetics such as DNA isolations and purification, use of restriction enzymes, molecular cloning, bacterial transformation, DNA hybridization and phage infection. These techniques are applied at both basic research and clinical levels.

**0520-519: MOLECULAR MICROBIOLOGY**

**CR: 3**

History of molecular biology, detection and analysis of nucleic acids and proteins, synthesis of proteins, DNA and RNA, DNA replication and recombination, RNA synthesis and gene control in prokaryotes, eukaryotic chromosomes and genes, transcription initiation in eukaryotes, gene control in eukaryotes, nuclear splicing, catalytic RNA,

mutations and DNA repair systems, recombinant DNA technology, microbial toxins and other virulent factors, microbial adherence, molecular perspective of microbial pathogenicity, molecular mechanisms of microbial drug resistance.

**0520-520: RESEARCH ELECTIVES IN BACTERIOLOGY**

**CR: 3**

Research techniques in bacteriology and clinical bacteriology employed in various laboratories. The student will learn the Techniques and employ them personally.

**0520-522: RESEARCH ELECTIVES IN MICROBIAL CHEMISTRY**

**CR: 3**

Separation and Purification of various microbial fractions. Techniques employed in the study of chemistry of these components.

**0520-523: MICRO BIOLOGICAL RESEARCH TECHNIQUES**

**CR: 3**

Experimental protocols presently being employed in the department and the research interests of the individual faculty members.

**0520-524: HEALTHCARE – ASSOCIATED INFECTIONS**

**CR: 3**

Epidemiology of hospital associated infections (size of the problem, patients at risk, prevalence in different hospital settings, national experience). Categorization of hospital associated infections (when the infection become apparent, factors influence infection, susceptibility to infection, reservoir of infection). Type of pathogens associated with hospital associated infections (bacterial, viral, fungal, parasitic, general characteristics, resistance pattern, and prevalence in different hospital settings). Different type of hospital associated infections (catheter-related, ventilator associated, surgical site infections and blood borne infections). Different surveillance strategies applied in different hospital settings in screen for hospital associated infections (routine procedures in different hospital settings eg ICU in sporadic cases and out breaks). Preventive and infection control strategies (sterilization and disinfection policies, hand hygiene and infection control policies) with special emphasize on the

importance of health care worker immunization strategies. Antibiotic policy of the hospital and the affect of the antibiotic misuse on the prevalence of hospital associated infections.

**0520-526: RESEARCH ELECTIVES IN IMMUNOLOGY  
CR: 3**

Techniques in the study of immunologic disorders. Basic techniques of cell separation, cell culture and biological assays.

**0520-528: RESEARCH ELECTIVES IN PARASITOLOGY  
CR: 3**

Methodology for the study of parasites and parasitic infections. The students will learn the ongoing research techniques in current use in parasitology laboratory.

**0520-532: RESEARCH ELECTIVES IN VIROLOGY  
CR: 3**

Research techniques currently used in this laboratory in clinical and basic Virology.

**0520-534: RESEARCH ELECTIVES IN MOLECULAR MICROBIOLOGY  
CR: 3**

Techniques in isolation and identification of fungi of medical importance. Research methodology in studying pathogenic fungi.

**0520-536: RESEARCH ELECTIVES IN MYCOLOGY  
CR: 3**

Techniques in isolation and identification of fungi of medical importance. Research methodology in studying pathogenic fungi.

**0520-537: EXPERIMENTAL MICROBIOLOGY  
CR: 3**

Each student is assigned to an individual staff for an intensive study of all facets of a research project: concepts, planning, literature search, designing experiments and construction of scientific reports.

**0520-541: SEMINAR II  
CR: 1**

The candidate will be assigned a current topic in Microbiology and asked to review the literature and present it in the department.

**0520-545: MICROBIAL PATHOGENESIS  
CR: 1**

Pathogenesis of microbial diseases, microbial adherence, colonisation, invasiveness and toxigenicity. Animals models. Microbial latency and persistence, molecular mimicry. Microbial virulence factor, immunopathogenesis.

**0520-597: THESIS  
CR: 0**

**0520-598: THESIS  
CR: 0**

**2000-599: THESIS  
CR: 9**