

Master of Science in Medical Microbiology
Program code: 052010

INTRODUCTION

The Department of Microbiology (Faculty of Medicine) offers a Master of Science program in **Microbiology**. 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. Research requirements include thesis option only.

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

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 Program Director. 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 COURSES

0520-597	Thesis	(0)
0520-598	Thesis	(0)
2000-599	Thesis	(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 genes 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 the 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 cellular factors that are directly or indirectly related to the pathogenesis of disease.

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.

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**