P.G. COURSES IN MICROBIOLOGY
M.D. MICROBIOLOGY

GOALS

The main goal of this course is to train students of medicine in the field of medical microbiology. Theoretical and Practical training is given to in the subspecialties viz., Bacteriology, Virology, Parasitology, Immunology and Mycology so that they can participate in good patient care and prevention of infectious diseases in the community. They are introduced to basic research methodology, so that they can conduct fundamental and applied research. They are also trained in teaching methods which may enable them to take up teaching assignment in medical colleges/institutions.

OBJECTIVES

At the end of the course the students will be able to:

1. Establish good "Laboratory medicine" in hospitals and community in the field of bacteriology, virology, parasitology, immunology, and mycology.
2. Undertake teaching assignment of microbiology in a medical college.
3. Undergo specialisation in any of the above subspecialities.
4. Carry out applied and fundamental research in various branches of medicine involving microbiological work.

COURSE CONTENT

General Microbiology

1. History and Pioneers in Microbiology.
2. Microscopy.
3. Morphology of bacteria and other microorganisms.
4. Nomenclature and classification of microbes.
5. Growth and nutrition of bacteria.
6. Bacterial metabolism.
7. Sterilisation and disinfection.
8. Bacterial toxins.
9. Bacterial antagonism: Bacteriocine.

10. Bacterial genetics.
11. Gene cloning.
12. Antibacterial substances used in the treatment of infections and drug resistance in bacteria.
13. Bacterial ecology-Normal flora of human body, Hospital environment, Air, Water and Milk.
14. Host parasite relationship.
15. Diagnostic tests based on molecular biology
16. Organization of clinical Microbiology laboratory and quality control / quality assurance.
17. Hospital Waste Management: Organization for Health care waste management (biomedical waste), techniques for treatment and disposal of biomedical waste regulation on biomedical waste management, 1998.

Immunology

1. Normal immune system
2. Innate immunity
3. Antigens
4. Immunoglobulins
5. Complement
6. Antigen-Antibody reactions
7. Cell mediated immunity
8. Hypersensitivity
9. Immunodeficiency
10. Auto-immunity
11. Immuno tolerance
12. Immunology of transplantation
13. Tumour immunology
14. Prophylaxis and immunotherapy
15. Measurement of immunity.
16. Immunogenetics
17. Cells of the Immune System
18. Immune response

Systematic Bacteriology

1. Isolation, description and identification of bacteria
2. Staphylococcus and Micrococcus : The anaerobic gram positive cocci
3. Streptococcus and Lactobacillus
4. Neisseria, Branhamella & Moraxella
5. Corynebacterium and other coryniform organisms
6. Bacillus: the anaerobic spore bearing bacilli
7. Clostridium : The spore bearing anaerobic bacilli
8. Enterobacteriaceae
9. Vibrios, Aeromonas, Plesiomonas, Campylobacter and Spirillum
10. Haemophilus and Bordetella
11. Pasteurella and Francisella
12. Brucella
13. Mycobacteria
14. Actinomyces, Nocardia, and Actinobacillus
15. Pseudomonas
16. Spirochaetes
17. Chlamydiae
18. Rickettsiae
19. The bacteriodaceae : Bacteriodes, Fusobacterium and leptotricha
20. Mycoplasmatales: Mycoplsama, Ureaplasma, Acholeplasma
21. Erysipelothrix and listeria
22. Chromobacteruium, Flavobacterium, Acinetobacter and Alkaligens
23. Miscellaneous bacteria

Virology

1. The nature of viruses
2. Classification of viruses

3. Morphology, virus structure
4. Viral replication
5. The genetics of viruses
6. Pathogenicity of viruses
7. Epidemiology of viral infections
8. Vaccines and Anti viral drugs
9. Bacteriophages
10. Pox viruses
11. Herpes viruses
12. Vesicular viruses
13. Toga viridae
14. Flavi viridae
15. Arena viridae
16. Marburg and Ebola viruses
17. Rubella
18. Orbi viruses
19. Influenzae viruses
20. Respiratory diseases : Rhinoviruses, Adenoviruses and Corona viruses
21. Paramyxoviridae
22. Enteroviruses : Polio & other enteric viruses
23. Hepatitis viruses
24. Rabies virus
25. Slow viruses
26. Human immunodeficiency viruses
27. Oncogenic viruses
28. Teratogenic viruses
29. Viruses of gastroenteritis
30. Bunyaviridae

Parasitology

1. Protozoan parasites of medical importance :
   Entamoeba, Giardia, Trichomonas, Leishmania, Trypanosoma, Plasmodium, Toxoplasma, Sarcocystis, Cryptosporidium, Babesia, Balantidium etc.
2. Helminthology: All those medically important helminths belonging to Cestodes, Trematode and Nematode.

   Cestode: Diphyllobothrium, Taenia, Echinococus, Hymeonolepis, Dipylidium, Multiceps etc.

   Termatode: Schistosomea, Fasciola, Gastrodiscoides, Paragonimus, Clonarchis, Opisthorchis, etc.,

   Namatodes: Trichuria, Trichinella, Strongyloides, Ancylostoma, Ascaris. Enterobius, Filarial worms, Dracunculus, etc.,

   Ectoparasites: Common arthropods and other vectors.

Mycology

1. The morphology and reproduction in fungi and antimycotic agents,
2. Classification of fungi,
3. Contaminant and opportunistic fungi
4. Superficial mycotic infections.
5. Fungi causing subcutaneous mycoses
6. Fungi causing systemic infections.

Microbiology Applied To Tropical Medicine & Pathology

1. Epidemiology of infectious diseases
2. Hospital acquired infections
3. Infections of various organs and systems of human body
4. Molecular genetics as applicable to microbiology
5. Vaccinology : Principle, methods of preparation, administration of vaccines.
6. Bioterrorism
7. Emerging and Remerging microbial infections

SKILLS

Bacteriology

1. Preparation and pouring of media – Nutrient agar, Blood agar, Mac Conkey agar, Sugars, Triple sugar iron Agar (TSI) etc.
2. Operation and maintenance of autoclave, hot air oven, distillation plant, filters like Seitz and Membrane and sterility tests.
3. Washing and sterilisation of glassware.
4. Preparation of reagents – oxidase, kovac etc.,
5. Disposal of contaminated materials.
6. Testing of disinfectants - Phenol coefficient and In use test.
7. Quality control of media, reagents etc.,
8. Aseptic practice in Lab and safety precautions.
9. Care and maintenance of common laboratory equipments.
10. Preparation of antibiotic discs ; performance of Kirby Bauer, Stokes etc.,

    Estimation of Minimal inhibitory / Bactericidal concentrations by tube/plate dilution methods.
11. Tests for a Beta lactamases.
12. Collection of specimens for Microbiological investigations.
13. Techniques of anaerobiosis.
14. Identification of Bacteria of Medical Importance upto species level (except Anaerobes which could be upto generic level)
15. Preparation of stains viz, Grams, Alberts, Capsules, spores, Ziehl Neelsen etc., and performing staining procedure, identification and interpretation
16. Care and operation of microscopes viz., light Dark ground, Phase Contrast and Fluorescent microscopes, Electron microscopy.
17. Care and breeding of lab animals viz., Mice, Rats, Guinea pigs Rabbits, and also experiments on various laboratory animals.
18. Skin tests Mantoux, Lepromin, Casoni's etc.
19. Conjugation experiments
20. Serum antibiotic assay

21. Phage typing of bacteria
22. Enterotoxigenecity
23. Sero grouping of streptococci
24. Antibiotic susceptibility test for Mycobacteria.

Immunology

1. Collection and preservation of serum
2. Preparation of antigens
3. Preparation of adjuvants and rising of antisera in animals
4. Performance of common serological tests
5. Immunodiffusion and CIEP
6. ELISA
7. Radial immuno diffusion
8. Immuno electrophoresis
9. CD4, CD8 counts

Mycology

1. Collection and processing of clinical specimen for fungi,
2. Special techniques like Woods lamp examination, hair baiting techniques, slide cultures.
3. Stock culture maintainance
4. Animal pathogenicity test for Cryptococcus and Candida

Parasitology

1. Examination of faeces for ova and cysts : Direct and Concentration methods.
2. Egg counting techniques
3. Examination of pheripheral blood, urine, CSF, and other fluids for parasites.
4. Examination and identification of histopathology slides for parasitic infection,
5. Serological tests for parasitic diseases
6. Preservation of parasites.

7. Examination of faeces for ova, cysts and larvae
8. Permanent staining techniques for parasites
9. In-vitro culture for parasites, viz., Malarial parasites and Amoeba.
10. Maintenance of toxoplasma.
11. Fecal culture for diagnosis of Nematode larvae

Virology

1. Preparation and identification of CPE in various tissue cultures.
2. Serological tests for viral infections
3. Chick embryo techniques
4. Handling of experimental animals and collection of various samples for evidence of viral infection in animals.
5. Laboratory diagnosis of HIV infection and AIDS
6. Laboratory diagnosis of Hepatitis
7. Prevention and laboratory safety measures.

METHODS OF TRAINING

Duration of degree course: 3 Years (6 terms)

The training is given under the following headings:

1. Seminars
2. Culture seminars & serological tests
3. Animal experiments
4. Journal clubs
5. Symposia
6. Teaching – undergraduate students
7. Slide seminars
8. Preparation of dissertation under the guidance of a recognised teacher
9. Postings to other institutions
10. Guest lectures

Each candidate is posted to different sections on rotation. They should get acquainted with the basic microbiology for first three months. The next three months they are expected to submit a synopsis on dissertation topic that has been chosen by them.

- Seminars shall be conducted once a week on the theory question topic.
- Culture seminars and discussions are held once a week. Which helps in systematic way of identification of all the routine bacteria for first few months followed by identification of rare cultures.
- Clinical sample seminars are held once a month by processing the clinical samples in identification of the microbe causing that condition.
- Animal experiments, egg inoculation are conducted periodically.
- Journal clubs are conducted every week-choosing topics from recent journals.
- Symposia are conducted once in every Semester.
- The candidates are encouraged to take part in Clinical meetings and discussions.

The M.D. Postgraduate students are trained to conduct practical demonstration classes for Undergraduates in their 2nd Year of study. They are expected to take theory lectures for Undergraduates during their final year.

I Schedule of training : Each student shall undergo orientation in various sections in microbiology during the first 3 months so as to get familiarised with the basic knowledge in the subject. At the end of the next 3 months, the student shall have to submit the synopsis of the dissertation.

II term	Culture seminars – pure culture of all bacilli and animal experiments.
III term	Culture seminars on clinical samples like stool, pus etc., and serological tests-Methodology.
IV term	Training in Mycology, Parasitology, UG teaching – theory for smaller batches and practicals and demonstrations.
V term	Virology Experiments. UG Teaching – Theory and practicals for smaller batches. Submission of dissertation.

VI term Slide seminars, Mock examinations.

POSTING IN OTHER DEPARTMENTS

Students will be posted for Allied and Applied Departments during the period of III, IV and V terms. Total period not exceeding 3 months. The departments are:

1. Virology & Vaccinology etc.,- 1 month
2. Clinical Pathology - 1 month
3. Clinical Biochemistry - 1 month

The candidates are posted to different institutions for applied Microbiology like Virology, Vaccinology etc.

The students shall maintain a Log Book for the period of his/her postings to other departments Institutions and get the Certificate from the Departmental Head at the end of postings.

MONITORING LEARNING PROGRESS

Please see Chapter IV

a) The Progress of the student is monitored by conducting periodical assessment tests

b) The Student shall maintain a Log Book and assessment records (specimen Check lists are given in Chapter IV) are maintained by the Guide/s and Head of the Department.

DISSERTATION

1. The topic selected for Dissertation shall be on the applied aspects of Microbiology
2. The Synopsis should be submitted at the end of the first six months of course, as notified by the University.
3. For details, please see sl.no.9, chapter - 1.
4. The dissertation shall be submitted six months prior to final university examination on the date notified by the University to the Registrar (Evaluation).
5. Acceptance of dissertation is an essential precondition for appearing in the final examination.

SCHEME OF EXAMINATION

Theory consists of four papers each of 100 marks	:	400 Marks
Practicals conducted for 3 days	:	200 Marks

Viva-voce : 100 Marks.

A. THEORY

There shall be four question papers, each of three hours duration. Each paper shall consist of two long essay questions each question carrying 20 marks and 6 short essay questions each carrying 10 marks. Total marks for each paper will be 100. Questions on recent advances may be asked in any or all the papers *.

Details of distribution of topics for each paper will be as follows:

PAPER I	General Microbiology and Immunology
PAPER II	Systematic Bacteriology
PAPER III	Mycology and Virology
PAPER IV	Parasitology .

* The topics assigned to the different papers are generally evaluated under those sections. However a strict division of the subject may not be possible and some overlapping of topics is inevitable. Students should be prepared to answer overlapping topics.

B. PRACTICALS

Duration of examination: 3 days (as per the scheme enclosed). Marks: 200

The examination will consists of the following exercises conjointly conducted and evaluated by four examiners (2 internals and 2 externals)

1. Exercise in clinical bacteriology.

   Isolation and identification of bacteria from various clinical samples,

2. Exercise in bacteriological techniques.

   Isolation and identification of bacteria from a pure culture

3. Identification of various fungi, and slide culture
4. Exercise in virological techniques
5. Exercise in Parasitology
6. Histopathology : Identification of slides
7. Serology exercise in Bacteriology and Virology

8. Applied bacteriological techniques- Staining or Serology exercise
9. Immunology exercise

C. VIVA-VOCE Marks: 100

The Viva - Voce examination consists of question on Bacteriology, Mycology, Virology, Immunology, and Parasitology topics, it will also include recent advances, history and scope of Microbiology.

1) Viva-Voce Examination: (80 Marks)
Students will be examined by all the examiners together about comprehension, analytical approach, expression and interpretation of data. Student shall also be given case reports, charts for interpretation. It includes discussion on dissertation.

2) Pedagogy Exercise: (20 Marks)
A topic be given to each candidate along with the Practical Examination question paper on the first day. Student is asked to make a presentation on the topic on the second day for 8-10 minutes.

D.

Maximum marks for	Theory	Practicals	Viva-voce	Total
M.D. Micro Biology	400	200	100	700

RECOMMENDED BOOKS:

1. Samuel Baron, **Medical Microbiology,** 3rd Edn, 1991, Churchill Livingstone Inc.
2. Edmin H Lennette, **Laboratory Diagnosis of Viral Infections,** 2nd Edn, 1992, Newyork Marcel Dekker, Inc.
3. Gordon Cook, **Manson's Tropical Diseases,** 20th Edn, 1996, London, ELBS.
4. John G Holt et al, **Bergey;s Manual of Determinative Bacteriology,** 9th Edn, 1994, Maryland, Williams & Wilkins.
5. Albert Balows, **Manual of Clinical Microbiology,** 5th Edn, 1991, Washington D.C, American Society for Microbiology.
6. Ellen Jo Baron et al; **Bailey & Scott's Diagnostic Microbiology,** 9th Edn, 1994, Missouri, Mosby
7. Douglas D Richman, **Clinical Virology,** 1997, Newyork, Churchill Livingstone.

8. Bob A Freeman, **Burrows Textbook of Microbiology,** 21st Edn, 1979, W.B Saunders.

9. Brian I Duerden & B S Drasar, **Anaerobes in Human Disease,** 1991, Great Britain, Edward Arnold.

10. Elmer W Koneman et al, **Introduction to Diagnostic Microbiology,** 1994, Philadelphia, J B Lippincott Company.

11. Bernard N Fields et al, **Field Virology,** Vol.11 3rd End, 1996, Philiadelphia, Lippincott-Ramen.

12. Bernard Fields et al, **Field's Virology,** Volume 2, 3rd edn, 1996, Philadelphia, Lippincott - Raven.

13. Danial Greenwood et al, **Medical Microbiology,** A guide to Microbial Infections, Pathogenesis, Immunity, Laboratory Diagnosis and Control, 15th Edn, 1997, London, Churchill Livingstone.

14. J G College et al, Mackie & McCartney **Practical Medical Microbiology,** 14th Edn, 1996, London, Churchill Livingstone.

15. John V. Bennett & Philip S Brachman, **Hospital Infections,** 3rd Edn, 1992, Little Brown.

16. Noel R Rose et al, **Manual of Clinical Laboratory Immunology,** 4th edn, 1992, Washington D.C, American Society for Microbiology.

17. William E Paul; **Fundamental Immunology,** 3rd Edn, 1993, Newyork, Raven Press.

18. Ivan Roitt, **Essential Immunology**

19. Stites, **Clinical Basic Immunology**

20. Parasitology: Paul Chester Beaver, Rodney Clifton Jung, Eddie Wayne cipp. **Clinical parasitology** : 1984, Philadelphia Lea and Febiger.

JOURNALS:

1. Journal of Medical Microbiology, Lippincott-Raven Publishers, Pathological Society of Great Britain & Ireland, 1998.

2. Clinical Infectious Diseases. Pub: The University of Chicago Press, Chicago, Illinois 60637, 1998.

3. Clinical Microbiology Reviews. Pub: The American Society for Microbiology.

4. Microbiology & Molecular Biology Reviews (mmbr). Pub: American Society for Microbiology, 1999.
5. Journal of Clinical Microbiology (JCM); Pub: American Society for Microbiology, 1999.
6. The Journal of Infectious Diseases. Pub: The University of Chicago Press, 1998.
7. Journal of Communicable Diseases, Pub: The Indian Society for Malaria and other communicable disease. 1999.
8. Infectious Disease Clinics of North America. Pub: W B Saunde Company, A Division of Harcourt Brace & Company, 1999.
9. Indian Journal of Medical Microbiology, Pub: Indian Associates of Medical Microbiologists, 1999.
10. The Indian Journal of Medical Research. Pub: Indian Council of Medical Research, New Delhi. 1999.
11. Annual Review of Microbiology. Pub: Annual Reviews Inc. Palo Alto. California, USA. 1997.

ADDITIONAL READING

1. Compendium of recommendations of various committees on Health and Development (1943-1975). DGHS, 1985 Central Bureau of Health Intelligence, Directorate General of Health Services, min. of Health and Family Welfare, Govt. of India, Nirman Bhawan, New Delhi. P - 335.
2. National Health Policy, Min. of Health & Family Welfare, Nirman Bhawan, New Delhi, 1983
3. Santosh Kumar, The elements of Research, writing and editing 1994, Dept. of Urology, JIPMER, Pondicherry
4. Srinivasa D K etal, Medical Education Principles and Practice, 1995. National Teacher Training Centre, JIPMER, Pondicherry
5. Indian Council of Medical Research, "Policy Statement of Ethical considerations involved in Research on Human Subjects", 1982, I.C.M.R, New Delhi.
6. Code of Medical Ethics framed under section 33 of the Indian Medical Council Act, 1956. Medical Council of India, Kotla Road, New Delhi.
7. Francis C M, Medical Ethics, J P Publications, Bangalore, II edn., 2004.

8. Indian National Science Academy, Guidelines for care and use of animals in Scientific Research, New Delhi, 1994.

9. International Committee of Medical Journal Editors, Uniform requirements for manuscripts submitted to biomedical journals, N Engl J Med 1991; 424-8

10. Kirkwood B R, Essentials of Medical Statistics , 1st Ed., Oxford: Blackwell Scientific Publications 1988.

11. Mahajan B K, Methods in Bio statistics for medical students, 5th Ed. New Delhi, Jaypee Brothers Medical Publishers, 1989.

Raveendran and B Gitanjali, A Practical approach to PG dissertation, New Delhi, J P Publications, 1998.

SRI SIDDHARTHA UNIVERSITY

M.D. Degree Examination – Model Question Paper

[Time: 3 Hours] [Max. Marks: 100]

MICROBIOLOGY

GENERAL MICROBIOLOGY AND IMMUNOLOGY

PAPER – I

Q.P. CODE :

Your answers should be specific to the questions asked.
Draw neat labeled diagrams wherever necessary. Answer all questions

LONG ESSAY **2 X 20 = 40 Marks**

1. Discuss the various virulence factors in the pathogenesis of microbial infections
2. Discuss the mechanism of production of antibody and mention the applications of monoclonal antibodies

SHORT ESSAY **6 X 10 = 60 Marks**

3. Polymerase chain reaction
4. Dark filed microscope
5. Tumor antigens
6. Idiotypes
7. Gram negative cell wall
8. Guinea pig as laboratory animal

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SRI SIDDHARTHA UNIVERSITY

M.D. Degree Examination – Model Question Paper

[Time: 3 Hours] [Max. Marks: 100]

MICROBIOLOGY

SYSTEMATIC BACTERIOLOGY

PAPER – II

Q.P. CODE :

Your answers should be specific to the questions asked.
Draw neat labeled diagrams wherever necessary. Answer all questions

LONG ESSAY **2 X 20 = 40 Marks**

1. Discuss the pathogenesis, epidemiology and laboratory diagnosis of leptospirosis
2. Discuss the role of nonfermenting gram negative bacilli in various clinical condition and the methods of identification

SHORT ESSAY **6 X 10 = 60 Marks**

3. Methicillin resistant staphylococcus aureus
4. Verotoxigenic Escherichia coli
5. Urea plasma urealyticum
6. Antigenic variation in salmonella
7. Chlamydial inclusions
8. Bacteriological examination of water

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SRI SIDDHARTHA UNIVERSITY

M.D. Degree Examination – Model Question Paper

[Time: 3 Hours] [Max. Marks: 100]

MICROBIOLOGY

MYCOLOGY AND VIROLOGY

PAPER – III

Q.P. CODE : 7353

Your answers should be specific to the questions asked.
Draw neat labeled diagrams wherever necessary. Answer all questions

LONG ESSAY **2 X 20 = 40 Marks**

1. What are the enteroviruses of human origin? Discuss the antigenic properties of polio virus, epidemiology laboratory diagnosis and immuno prophylaxis of poliovirus infection

2. What are dimorphic fungi? Discuss briefly on pathogenesis, laboratory diagnosis and epidemiology of histoplasma capsulatum

SHORT ESSAY **6 X 10 = 60 Marks**

3. Hepatitis G virus
4. Rabies vaccines
5. Oncogenic viruses
6. Aspergillosis
7. Polymerase chain reaction
8. chlamydospores

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SRI SIDDHARTHA UNIVERSITY

M.D. Degree Examination –Model Question Paper

[Time: 3 Hours] [Max. Marks: 100]

MICROBIOLOGY

PARASITOLOGY - PAPER – IV

Q.P. CODE :

Your answers should be specific to the questions asked.
Draw neat labeled diagrams wherever necessary. Answer all questions

LONG ESSAY **2 X 20 = 40 Marks**

1. Enumerate the coccidian parasites. Discuss the pathogenecity and laboratory diagnosis of Toxoplasma Gondii

2. Discuss the pathogenesis, laboratory diagnosis of human filariasis and the control measures

SHORT ESSAY **6 X 10 = 60 Marks**

3. Immunity in malaria

4. Larva migrans

5. Cultivation of Entamoeba histolytica

6. Lung fluke

7. Larvae found in stool

8. Cutaneous leishmaniasis

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