THE TAMIL NADU Dr. M.G.R. MEDICAL UNIVERSITY,

69, ANNA SALAI, GUINDY, CHENNAI - 600 032.

REGULATIONS & SYLLABUS

FOR

M.Sc MEDICAL MICROBIOLOGY COURSE

2014 – 2015 SESSION

The Tamil Nadu Dr. M.G.R. Medical University, Chennai

Regulations of the University

In exercise of the powers conferred by section 44 of The Tamil Nadu Dr. M.G.R. Medical University, Chennai , Act, 1987 (Tamil Nadu Act 37 of 1987), the Standing Academic Board of the Tamil Nadu Dr. M.G.R. Medical University, Chennai hereby makes the following regulations.

SHORT TITLE AND COMMENCEMENT

These regulations shall be called "THE REGULATIONS FOR THE MASTER OF SCIENCE (MEDICAL MICROBIOLOGY) UNDER THE FACULTY OF BASIC SCIENCE OF THE TAMIL NADU DR. M.G.R. MEDICAL UNIVERSITY, CHENNAI".

They shall come into force from the academic year 2014-2015 session.

The Regulations and the Syllabus are subject to modification by the Standing Academic Board from time to time.

REGULATIONS

1. ELIGIBILITY:

Candidates shall be required to have passed the B.Sc. Degree (3 years duration) Examination in Microbiology,Bio -Chemistry or Biotechnology or B.Sc. Degree Examination in Medical Laboratory Technology or a degree with triple majors with Microbiology or Bio-technology as one of the subjects.

2. PHYSICAL FITNESS CERTIFICATE:

Every candidate before admission to the course shall submit to the Principal of the Institution a certificate of medical fitness from an authorized medical officer that the candidate is physically fit to undergo the academic course and does not suffer from any disability or contagious disease.

3. ELIGIBILITY CERTIFICATE:

The candidate who has passed the qualifying examination from any university other than the T.N. Dr. M.G.R. Medical University, as specified in Regulation No. 1 before seeking admission to any one of the affiliated institutions, shall obtain an Eligibility Certificate from the University by remitting the prescribed fees along with application form.

4. ENROLMENT OF CANDIDATES:

The candidates admitted provisionally shall apply to the University for enrolment within 7 days from the date of admission in a prescribed form which shall be down-loaded from the University web site (www.tnmgrmu.ac.in). The following documents are to be submitted along with the application form:

i. Provisional admission card issued by the College / Selection Committee.

ii. Eligibility Certificate.

iii. Prescribed fee.

5. REGISTRATION:

A candidate admitted in the Master of Science (Medical Microbiology) course in any one of the affiliated institutions of this University shall submit the prescribed application form for registration duly filled, along with prescribed fee and declaration in the format, (as in Annexure I of the "Regulation for re-admission after break of study") to the Controller of Examinations of this University through the affiliated institution within 30 days from the cut-off date prescribed for Master of Science (Medical Microbiology) course for admission.

6. DURATION OF THE COURSE:

a. The period of certified study and training of the M.Sc., (Medical Microbiology) course shall be three academic years.

b. No exemption shall be given from this period of study and training for any other experience gained prior to the admission to the course.

7. COMMENCEMENT OF COURSE:

The academic year for the M.Sc., (Medical Microbiology) course shall commence from 1st September of the year of admission.

8. COMMENCEMENT OF EXAMINATION:

October 15th

Theory examinations will not be held on Saturdays and Sundays. If the date of commencement of the examination falls on a public holiday, the next working day will be the date of commencement of examinations.

9. CUT- OFF DATE FOR ADMISSION TO EXAMINATION:

Candidates admitted up to 30th September (as per the 48th SAB) shall be registered to take up their first year examination from October of the next year, after fulfillment of the regulations.

All kinds of admissions shall be completed on or before 30th September of the academic year. There shall not be any admissions after to 30th September, even if seats are vacant.

10. CURRICULUM:

The curriculum and syllabus for the course shall be as prescribed by the Standing Academic Board from time to time.

11. MEDIUM OF INSTRUCTION:

English shall be the medium of instruction for all the subjects of study for the M.Sc., (Medical Microbiology) course.

12. WORKING DAYS IN THE ACADEMIC YEAR:

Each academic year shall consist of not less than 270 working days.

13. **ATTENDANCE REQUIRED FOR ADMISSION TO EXAMINATIONS:**

a) No candidate shall be permitted to appear in any one of the parts of M.Sc., (Medical Microbiology) Course Examinations, unless he / she has attended the course in all the subjects for the prescribed period in an affiliated Institution recognized by this University and has produced the necessary certificates of study, attendance, satisfactory conduct and progress from the Head of the Institution.

b) A candidate is required to put in a minimum of 85% of attendance out of 270 working days each in theory and practical classes in each subject before admission to the examination.

c) A candidate lacking in the prescribed attendance and progress in any one subject in theory and practical classes, wherever necessary in the first appearance, shall not be permitted for admission to the entire examination.

14. CONDONATION FOR LACK OF ATTENDANCE:

There shall be no condonation of attendance in Post Graduate Courses.

15. **SUBJECTS OF STUDY**

FINAL EXAMINATIONS (at the end of third year)	**Total marks**
Paper – I General Systematic Bacteriology	100
Paper – II Mycology, Virology & Parasitology	100
Paper – III Immunology and , Applied Microbiology with Recent advances	100

16. QUESTION PAPER PATTERN :

The following examination pattern shall be uniformly followed for the M.Sc., (Medical Microbiology) course.

1. Essay question	2x 20 marks	=	40 marks
2. Short notes	10x 6 marks	=	60 marks
TOTAL:		**=**	**100 marks**

DURATION OF EXAMINATION: = 3.00 hours.

17. MARKS QUALIFYING FOR A PASS:

A candidate shall be declared to have passed the examination if he / she obtains 50% of marks in Theory and 50% of marks in Practical separately and 50% in aggregate for a pass.

18. REVALUATION OF ANSWER PAPER:

There shall be no retotalling and revaluation of the failed candidates in any post-graduate examination since double valuation is being carried out.

19. NUMBER OF APPEARANCES:

a. A candidate registered for three years Post-Graduate Degree Course must qualify in the examinations within six years of the date of his / her admission.

b. A candidate will not be permitted to appear for more than 7 attempts in the final examination and shall be discharged from the course if he / she fails to pass the examination in the said number of attempts.

20. DURATION FOR COMPLETION OF THE COURSE OF STUDY:

The duration for the completion of the course shall be fixed as double the duration of the course and the students have to pass within the above said period.

21. RE-ADMISSION AFTER BREAK OF STUDY:

Please refer to the separate regulations for re-admission after break of study for all courses.

22. MIGRATION / TRANSFER OF CANDIDATES:

Migration or transfer of candidates from one recognized college to another recognized college of this University or from another University shall not be granted.

23. AUTHORITY TO ISSUE TRANSCRIPT:

The University shall be the Authority for issuing Transcript after remitting the prescribed fee of Rs. 1000/- (rupees one thousand only) or as may be prescribed from time to time.

24. SCHEME OF EXAMINATIONS: (At the end of third year)

The scheme of examinations is as follows:

S.No	Subjects	Theory	
		Max	Min
1.	General & Systemic Bacteriology	100	50
2.	Mycology, Virology and Parasitology	100	50
3.	Immunology Applied Microbiology with Recent advances	100	50
4	Practicals	200	100
5	Viva voce	50	25

6	I.A. Project – 15 marks Theory test – 20 marks Practical test – 15 marks	50	25
	Total	600	

Practicals (200 marks)

The duration of Practical Examination for M.Sc.(Microbiology) exam shall be three days. It will consist of

A. Pure culture	20 marks
B. Mixed culture	50 marks
C. Mycology	20 marks
D. Serology	30 marks
E. Virology	30 marks
F. Parasitology	20 marks
G. Animal experiments & Molecular Techniques	30 marks
Total	200 marks

SYLLABUS

PAPER – I GENERAL BACTERIOLOGY AND SYSTEMATIC

BACTERIOLOGY GENERAL BACTERIOLOGY

Objectives:

To give a comprehensive overview and understanding of the biological principles in relation to microbial structure, physiology, biochemistry and genetics: growth and control of micro organisms

Cognitive skills

1. Cell structure

Microscopy, staining: detailed structure in comparison to eukaryotic cell
morphological changes during growth.

2. Microscopy

Various optical methods available for viewing microorganisms and their applications.

3. Overview of microbial world:

Classification- Purpose
Basic principles and
Classification systems

4. Growth, survival of micro-organisms

-growth curve -
growth parameters
Survival of microorganisms in natural
environment Role of antimicrobial agents

5. Cultivation of microorganisms
-Growth requirements
-Sources of metabiolic
energy -Nutrition
-Environmental and other factors affecting
growth -Methods of cultivation

6. Microbial metabolism

-Metabolism of biosynthesis and
growth -Biosynthesis pathways
-Energy yielding metabolism -
Regulation of metabolic pathways.

7. Control of microorganisms

Sterilization and disinfection -
Antimicrobial agents -Commonly
used lab disinfectants

8. General Principles in Clinical Microbiology

Collection, processing and handling of various samples, identification and characterization of micro organism
Laboratory safety
Quality control
Antimicrobial susceptibility and antibiotic assays

Psychomotor skills

1. Microscopy - handling and general maintenance
2. staining procedures - preparation of stains and staining
Methodology (Routine and special stains)
3.Growth and survival: of microorganisms
Quantitation of microorganism and estimation of microbial colonies by various procedures

Cultivation

Media preparation - details of ingredients (if necessary alternatives) pH measurement, , preparation of solution, buffers, preparation of glass ware solution etc., and quality control

Antimirobial agents

Preparation, Quality control(QC)
Observation

Sterilization and disinfection

Handling of main types of filters
Hot air oven, autoclaving-operation procedures

General procedures
-collection of blood
Blood collection from sheep, rabbit
(observation) Sterility check.

Bio Medical Waste Management

Bacterial Genetics

SYSTEMATIC BACTERIOLOGY

Cognitive skills

At the end of the session the student should know
1) Rationale and basis of classification of bacteria and to enumerate the order, family, genus and species.
2) The morphology, cultural, biochemical and other biological properties and characteristics of medically important bacteria.
3) The mechanism of virulence and pathogenesis and pathology.
4) The disease caused by them, epidemiology, treatment, prevention and control.

Bacteriology techniques:

1. Preparation of media:
Nutrient agar, Blood agar, MacConkey agar, Chocolate agar, Triple sugar iron agar (TSIA), Robertsons cooked meat medium, Lowenstein Jensen's medium, Sabouraud dextrose agar (SDA).
2. Operation of autoclave and hot air oven and sterility tests.
3. Washing and sterilization of glassware (plugging and packing)
4. Disposal of contaminated materials like cultures
5. Aseptic practices in laboratory and safety precautions.
6. Care and maintenance of common laboratory equipments like water bath, centrifuge, refrigerators, incubators, etc.
7. Preparation of stains viz. Gram, Alberts, Ziehl Neelsen and perform staining
8. Tests for Motility: hanging drop, Semi-solid motility media,
9. Care and breeding of laboratory animals viz. Mice, Guinea pigs and Rabbits.

10. Bleeding techniques from animals including sheep (observation).
11. Care and operation of light Microscopes, phase contrast and fluorescence microscope.

Systematic / diagnostic bacteriology

12. Collection of specimens for microbiological investigations on Blood. Urine. Throat swab. Rectal swab, Stool, Pus (swabs), OT specimens.
13. Anaerobic culture methods
14. Identification of Bacteria of Medical Importance upto species level (except Anaerobes which could be upto generic level).
15. Preparation, examination, and interpretation of direct smears from clinical specimens, viz, sputum for AFB-ZN and Auramine O
16. Quantitative analysis of urine by standard loop test for finding significant bacteriuria.
17. Plating of clinical specimens on media for isolation purification, identification and quantitation purposes.
18. Identification and characterization of common disease causing pathogens

Observation:

Testing of disinfectants - phenol coefficient and in use
tests Quality control of media, reagents etc.
Observation estimation of minimal inhibitory /Bactericidal concentrations by tube / plate dilution methods.

PAPER – II MYCOLOGY, VIROLOGY AND PARASITOLOGY

MYCOLOGY

Course Objective:

The students should have basic knowledge of general properties and taxonomy of fungi, general morphological features and classification of fungi and fungal diseases.

They should be sufficiently informed about medically important fungi, the diseases caused and their laboratory diagnosis. They should develop sufficient psychomotor and skills to be able to carry out microscopy, isolation and identification of common medically important fungi.

Cognitive skills:

1. Classification of fungi
2.Growth and isolation
3. Mycoses (all types)
4. Laboratory diagnosis of mycotic diseases
5. Immunity in fungal diseases and value of immuno diagnosis
6. Role of mycotoxin
7. Antifungal agents
8. Epidemiology of fungal diseases

Psychomotor skills:

Basic identification techniques:

1. KOH & LPCB preparation
2.Staining, techniques
3. Culture of Fungi
4. Slide culture

VIROLOGY

Course Objectives:

At the end of the course the student should have a basic understanding of laboratory diagnosis of viral diseases. The training should help the student to understand basic virus isolation, identification, techniques and viral immunodiagnosis

Cognitive skills:

1. General properties of all RNA and DNA virus families of medical importance and prions
2. Pathogenesis, pathology, epidemiology, treatment prevention and control of viral diseases.
3. Basic understanding of viral diagnostics including the relevant theory.

Psychomotor skills:

The student should be able to perform:

1. ELISA for HIV antibody, HBs Ag and HCV antibody
2. Rapid tests for viral diagnosis
3. Ability to handle cell cultures
4. Specimen processing
5. Virus titration
6. Virus identification - conventional methods of virus identification.

PARASITOLOGY

Cognitive domain

1. General principles of host-parasite interactions, types of infection, immune response and effect of parasites on the host

Definitions of terms including parasitism, commensalism etc

2. Morphology, life cycle and pathogenesis of the human parasites listed below. The student should know the medical importance and laboratory diagnostic methods employed.

Protozoa

1. Intestinal protozoa – amoebae, flagellates, ciliates, coccidia and microsporidia
2. Urogenital protozoa
3. Haemoflagellates focusing *Leishmania donovani*
4. Malaria focusing on *P. falciparum* and *P. vivax*
5. Free living amoebae focusing on *Acanthamoeba*
6. *Toxoplasma gondii*

Helminths

1. Nematodes – Intestinal and Tissue focusing on soil transmitted nematodes and endemic microfilarial infections including *Wuchereria* and *Brugia*
2. Cestodes – focusing on *Taenia, Hymenolepis* and *Echinococcus*

Laboratory diagnosis of neurocysticercosis and hydatid disease

3. Trematodes – enumerate the liver, lung, gastrointestinal and blood flukes

Entomology- relating to vector borne transmission of disease

Psychomotor skills

1. Examination of stool for parasites including concentration techniques, saline, iodine preparation and modified acid fast stain for *Cryptosporidium* and *Isospora*
2. Examination of blood films including Leishmans stain for malarial parasites and microfilaria
3. Culture Techniques

Observation: Examine

1. Bone marrow smears for LD bodies
2. Hydatid fluid for scolices, hydatid hooklets etc
3. CSF for *Acanthamoeba*
4. Liver abcess fluid for *Entamoeba*

PAPER – III – IMMUNOLOGY AND APPLIED MICROBIOLOGY WITH RECENT ADVANCES

IMMUNOLOGY

Cognitive domain:

At the end of the course the student should have an understanding of host defenses as well as of basic immunology as primarily a cellular phenomenon with secondarily generation of cell products that sub serve immune cell functions, disorders regulation
And infections, will also be covered. The student should also be familiar with immunization and the national immunization schedule. The student should also have an understanding of the immunologic laboratory tests that aid in the diagnosis of clinical disease.

The topics covered will be

Structure and development of the immune systems
Mucosal immunity and non-specific host defences
Cells of the immune system
HLA complex
Antigens and immunogenicity
Antibodies, structure, function and genetics
Antigen-antibody reactions
Cell mediated immunity, T-cell receptors and cytokines
The immune response, T and B cell interactions
Hypersensitivity reactions
Autoimmune diseases(Auto Immunity, Immuno deficiency)
Virology
Immunization

Psychomotor skills: The student should be able to carry out independently the following procedures (Must know skills)

1. Serum separation
2. Assays: Agglutination, precipitation, ELISA, Immunofluorescence,
3. Interpretation of test results of these assays
4. Preparation of antigen: Weil-Felix antigen, Widal, VDRL etc

Desirable: Preparation of anti-sera (rabbit inoculation)

APPLIED MICROBIOLOGY

Cognitive skills - Normal flora of the human body

Collection of clinical specimens for diagnosis and method processing
Antibiotic susceptibility testing and its interpretation and reporting
Hospital infection control: policy and practice
Quality control in diagnostic microbiology
National programmer for control of infectious diseases

Laboratory diagnosis of infections diseases of each system

Psychomotor skills:

1. Surveillance sampling
2. Sterility testing

Molecular Techniques: PCR ; RFLP Blotting
Bacteriology of water, Air, Milk, Food
Pyrogen Testing
Preservation and Maintenance of stack cultures

RECOMMENDED BOOKS:

Always the latest edition to be used unless otherwise specified. The books given below are the current editions of the same.

Basic reading:

1. Mackie & McCartney Practical Medical Microbiology 14th edition: Eds: J.G.Colle, A.G. Fraser, B.P. Marmion, A.Simmons- Reprint 2008 Elsevier, New Delhi

2. Jawetz, Melnick & Adelberg's, Medical Microbiology 24th edition: Eds: Brooks and others, McGraw Hill, New York.

3. Koneman's Color Altas and Text book of Diagnostic Microbiology 6th edn: Eds: Washington winn and others. 2006 Lippincott Williams and Wilkins, Baltimore, USA

4. Ananthanarayan and Paniker's Text book of Microbiology 8th edn. 2009 Universities Press, Hyderabad.

Reference books

1. Medical Mycology. Kwon-Chung K.J and Bennett JE. 1992. Lea and Febiger, Philadelphia, USA.

2. Bailey and Scott's Diagnostic Microbiology- 11th edition: Eds: Forbes BA, Sahm DF, Weissfeld AS. 2002, Mosby, St. Louis, USA.

3. Medical Microbiology, 3rd edition. Eds: MIMS and others. 2004 Mosby, Spain.

4. Topley & Wilson's Microbiology and Microbial infections. 10th edition. Volumes 1-6: 2008 Arnold, London.

5. Medical Parasitology. Rajesh Karyakarte & Ajit Damle, Books & Allied (P) Ltd., 2003.

6. Medical Immunology, 9th edition Eds: Stites DP, Terr AI and Parslow TG.1997, Appleton & Lange, Stamford, USA.

SYLLABUS

Epidemiology, Biostatistics and Medical Ethics

UNIT I: Epidemiology

Introduction: Historical aspects and evolution of epidemiology, definitions and concepts in Epidemiology.
Approaches in epidemiology: Descriptive and analytical epidemiology, disease burden, natural history of diseases and measures of risk and death.
Study design and sampling: Sample size estimation and introduction to study design in epidemiological investigations.

UNIT II: Biostatistics

Fundamentals of biostatistics: Introduction, types of data, tabular and graphical presentation of data. Measures of location, dispersion and correlation: Measures of central tendency. Mean, mode, median, GM, HM, quartiles Measures of dispersion—ra nge, standard deviation, variance, coefficient of variation.
Probability and statistical inference: Concept and probability distribution. Normal distribution—density curves, applications and statistical tables. Concept of significance tests, parametric and nonparametric tests, standard error and confidence intervals.
Inferential statistics: Probability and distributions – Poisson, Binomial a nd Normal distribution – Chi-square test – Hypothesis test - Student's t-tes t – Correlation and Regression – ANOVA.

UNIT III: Medical Ethics

Bioethics and Medical ethics: Historical perspectives & Introduction to Bioethics, Nuremberg Code, Declaration of Helsinki, Principle of essentiality, informed consent, confidentiality, minimisation of risk, accountability and responsibility. Ethics of clinical trials: Drug trials, vaccine trials, Clinical trials with medical devices/surgical procedures/radioactive materials, Research in transplantation and stem cell therapy. Regulatory framework and guidelines for conduction of human research: Review processes, Institutional ethical committees, composition of committees, review procedures, WHO, UNESCO and ICMR guidelines.

References :

4. Epidemiology: An Introduction. Kenneth J. J. Rothman. Latest edition / Pub. Date: May 2002. Publisher: Oxford University Press.
5. Epidemiology. Leon Gordis. Latest edition / Pub. Date: November 2004. Publisher: Elsevier Health Sciences.
6. Diseases and Human Evolution. Ethne Barnes. Latest edition / Latest edition / Pub. Date: March 2005. Publisher: University of New Mexico Press.

iv. Epidemiology: Beyond the Basics. F. Javier Nieto, Moyses Szklo. Latest edition / Pub. Date: November 2003. Publisher: Jones & Bartlett Publishers, Inc.
v. Basic and Clinical Biostatistics. Beth Dawson, Robert G. Trapp, Robert Trapp. Latest edition / Pub. Date: March 2004.
vi. Discovering Statistics Using SPSS. Andy Field. Latest edition / Pub. Date: April 2005. Publisher: SAGE Publications.
7. Arora PN & Malhon PK (1996). Biostatistics Imalaya Publishing House, Mumbai.
14. Sokal & Rohif (1973). Introduction to Biostatistics, Toppan Co. Japan.
15. Stanton A & Clantz, Primer of Biostatistics — T he McGraw Hill Inc., New York.
10. Government of India. Good Clinical Practices for Clinical Research in India. New Delhi: 2001
d) Indian Council of Medical Research. Ethical Guidelines for Biomedical Research on Human Subjects. New Delhi: 2000
12. United Nations Educational, Scientific and Cultural Organisation (UNESCO). Universal Declaration on Bioethics and Human Rights. Paris; 2005

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