HAIVIDA_RD INSTITUTE OF MEDICAL SCIENCES AND RESEARCH
JAMIA HAIVIDA_RD
NEW DELHI-62

M.SC MEDICAL MICROBIOLOGY
SYLLABUS ANP CU RR1CULUM

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MASTERS IN MEDICAL MICROBIOLOGY

a)	**Name of the course**	M.Sc in Medical Microbiology
b)	**Nature**	Regular
c)	**Duration**	Three years
d	**Medium of instruction and examinations**	English
e)	**Eligibility**	55% marks in Bachelor degree
f)	**Commencement of the course**	July of every year
g)	**Mode of Admission**	As per the norms prescribed by Jamia Hamdard from time to time.
h)	**Period of completion (span** period)	Not more than 04 years
i)	**Fees**	As per university norms
j)	**Total Number of Students per** year	05
k)	**Total Theory paper**	4 theory and 1 practical. Total marks 100*5=500 Candidate will have to pass theory and practical examinations ,t-₁-.4,veti
l)	**Total number of credits**	1[5]t year- as per MBBS 1s[t] year 2[nd] and 3[rd] year' 1-11-ileach v$.far 701
m)	**Number of papers *carry* over**	01
n)	**Minimum pass mark**	50%, Grade C
o)	**Eligibility to appear in University Exam**	Minimun 50% marks in Internal assessment and the Credit points mentioned

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M.Sc. MEDICAL MICROBIOLOGY

Goal & Objectives

A candidate upon successful completion of in M.Sc Microbiology course should be able to

1. Be competent in microbiological techniques.
2. Establish good laboratory techniques in hospital and in the community in the fields of Bacteriology, Virology, Mycology, and Parasitology & Immunology.
3. Conduct experimental research having a significant bearing on human health.
4. Plan, execute, analyze & present the research work in medical microbiology.
5. Interact with allied Department by rendering services to advanced laboratory investigations.
6. Acquire skills in conducting collaborative research in the field of Microbiology and Allied Sciences.
7. They are also imparted training in teaching methods in the subject which may enable them to take up teaching assignments in Medical /Dental Colleges/Degree Institutes.
8. Must be able to demonstrate to the students how the knowledge of Microbiology can be used in variety of clinical settings to solve diagnostic problems.

Eligibility:

Candidates with the degree in Bachelor of Science with Microbiology as one of subjects, MBBS*& BDS with minimum of 55 % Marks.

*MBBS qualified students are eligible for M.Sc PhD programme \\ ith lateral entr\ in 2'"' year of MSc. in Medical Microbiology. MBBS candidates who have registered for M.Sc PhD programme in Medical Microbiology will be exempted from entrance test but will have to appear in interview for PhD enrolment.

Duration:

Duration- 3 years.

First year- detail theory and practical classes in Anatomy, Physiology, Biochemistry.
2nd and 3rd year- Training in various sections of Microbiology.

Course overview:

The course will be divided into 2+4 semesters. The first two semesters will include applied aspect of basic Anatomy, Biochemistry, Physiology. The next four semester will focus on various sections of Medical Microbiology. The students will be involved in theory classes, clinical postings, seminars, journal club and practical classes. At the end of each semester the students will take up the Theory, Viva and Practical Exam.

Course Content (syllabus) For First Year: Common for All Medical MSc courses

Course Content (syllabus) For IInd Year and IIIrd Year M.Sc Medical Microbiology:

The postgraduate students will attend the Department of Microbiology during the prescribed two years of course (2nd **and** 3" Year). They **will** be required to have attendance as per university norms. Candidate shall be given full time responsibility and assignments. Postgraduate students must maintain a record hook of the work carried out by them and the training undergone by them during the period of training. I hese record hooks shall he checked and assessed by the faculty.

1. TEACHING/LEARNING METHODS:

Learning in M.Sc Medical Microbiology will essentially be an active-learning, process

Following teaching-learning methods shall he followed-

a) Lectures **and Practical classes**

b) Group teachinu sessions: -

- Journal review
- Subject seminar presentation
- Group discussion
- Presentation of the findings of an exercise on any of the sub-specialities
- Participation in CM E programs and conferences.

c) Ilands on experience (practical training)

Practical training shall be **imparted** by posting **the** students in various sub-specialties (sections) by rotation. Student shall be actively involved in day to day working of all the sections. He/she **will** be trained under the guidance of teachers in all the aspects of Clinical Microbiology **and applied aspects of laboratory medicine including collection and transport** of specimens, receiving of samples, preparation of reagents. chemicals, media and glassware. sample processing and reporting, sterilization procedures, bio-safety precautions. maintenance of equipments, **record keeping and quality control in Microbiolouy.**

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2.Suggested schedule of rotation:

i. Bacteriology (Aerobic and anaerobic)
ii. Mycobacteriology
iii. Hospital infection surveillance
iv. Serology/Immunology
v. Mycology
vi. Virology/H I V/ICTC
vii. Parasitology
viii. Media preparation and Sterilization procedures
ix. Molecular microbiology

3.Thesis/Dissertation.

I) Every candidate shall carry out work on an assigned research project under the guidance of a recognized Postgraduate teacher, the project shall be written and submitted in the form of a Thesis.

2) Every candidate shall submit thesis plan to the university as per university guidelines.
3) Thesis shall be submitted to the university as per university guidelines.
4) The student **will** Identify a relevant research question; conduct a critical review of literature; formulate a hypothesis; determine the most suitable study design; state the objectives of the study; prepare a study protocol; undertake a study according to the protocol; analyze and interpret research data, and draw conclusions; write a research paper.
5) At least 12 months should be spent on the research project.
6) The dissertation shall be completed and submitted by the student three months before appearing for the final university examination.

4.BROAD AREAS OF STUDY :

I)Theory:

General Microbiology; Systematic Bacteriology, Mycology. Virology, Parasitology Immunology and Applied Clinical Microbiology including recent advances in Microbiology

a) General Microbiology

I. History of microbiology
2. Microscopy
3. Guidelines for col lection,transport,processing,analysis and reporting of clinical samples in Microbiology laboratory
4. Sterilization and disinfection
5. Morphology of bacteria and other microorganisms
6. Nomenclature and classification of microorganisms
7. Normal flora of human body

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8. Growth & nutrition of bacteria
9. Identification of bacteria
10. Culture media
11. Culture methods
12. Molecular biology techniques
13. Microbiology of air, milk and water
14. Host-parasite relationship
15. Antibacterial substances and drug resistance
16. Bacterial genetics
17. Bioterrorism
18. Quality assurance & quality control in microbiology
19. Accreditation of laboratories 21.Biosafety practices in clinical microbiology laboratory
22.Hospital acquired infections-types,surveillance and prevention
23.Laboratory diagnosis of bacteria
24.Antibiotic Sensitivity Testing
25.Automation in Microbiology
26.Accreditation of laboratories

b) Immunology

1. The immune system:structure,components and function
2. Types of immunity
3. Antigens
4. Immunoglobulins.
5. Complement
6. Antigen and antibody reactions
7. Hypersensitivity
8. Cell mediated immunity.
9. Immunodeficiency.
10. Autoimmunity
11. Immune tolerance.
12. Transplantation immunity.
13. Tumour immunity.
14. Immunology based therapy of diseases
    Transplantation and transfusion
    Immunoprophylaxis
    Neoantigen discovery and checkpoint blockade
15. Immunological techniques
16. Immunomodulation

c) Basic Computers:

Introduction to Computers Science; Introduction to Data-Base; Introduction to Windows; Windows Application (Word, Excel, PowerPoint and Multimedia);

Introduction to Medical Informatics & use of Statistical Package, Introduction to UNIX & C; Computer Aided Teaching & testing

d) Systematic bacteriology

1. Isolation & identification of bacteria
2. Gram positive cocci of medical importance including Staphylococcus. Micrococcus, Streptococcus ,Enterococci,Pneumococci,anerobic cocci etc.
3. Gram negative aerobic cocci of medical importance including Neisseria. Branhamella, Moraxella etc.
4. Gram positive bacilli of medical importance including Lactobacillus,Corynebacteriurn,Bacillus,Clostridiurn,Actinomycetes,Nocardia,Erysipelothrix,Listeria etc
5. Gram negative bacilli of medical importance including V i brios. Aeromonas, Plesiomonas, Haemophilus, Bordetella, Brucella, Gardnerella, Pseudomonas & other non-fermenters, Pasturela, Francisella, Bacteroides. Fusobacteriunri etc.
6. Helicobacter, Campylobacter & Spirillium
7. Enterobacteriaceae
8. Mycobacteria
9. Anaerobic bacteriology including lab diagnosis
10. Spirochaetes
11. Chlamydiae
12. Mycoplasmatales: Mycoplasma, Ureaplasma, Acholeplasma and other
13. Mycoplasmas.
14. Rickettsiae, Coxiella, Bartonella etc.
15. Chromobacterium, Flavobacterium, Acinetobacter and A lkal igenes
16. Miscellaneous bacteria

e) Mycology

1. General characteristics & classification of fun2,i
2. Morphology & reproduction of fungi
3. Isolation & identification of fungi
4. Host reactions to fungi
5. Yeasts and yeast like fungi of medical importance including Candida, Cryptococcus, Malassezia,Trichosporon. Geotrichum. Saccharomyces etc.
6. Mycelial fungi of medical importance including Aspergillus, Zygomycetes.
7. Pseudoallescheria,Fusarium, Piedra, other dematacеous hyphomycetes and other hyalohyphomycetes etc.
8. Dimorphic fungi including Histoplasma, Blastomyces, Coccidioides, Paracoccidioides, Sporothrix,„Penicillium marneffei etc.
9. Dermatophytes
10. Fungi causing mycetoma, keratomycosis & otomycosis.
11. Pneumocystis carinii infection
12. Rhinosporidium seeberi.

13. **Common laboratory contaminant fungi**
14. **Mycetoma & mycotoxicosis**
15. **Antifungal agents & invitro antifungal susceptibility tests.**
16. **Newer Fungi**
17. **Recent advances in diagnosis of fungal infection**

0 Virolo2v

1. **Introduction to Virology including a:Classification of viruses b:Morphology: virus structure c:Virus replication d:The genetics of viruses e:The pathogenicity of viruses f:Epidemiology of viral infections g:Vaccines and antiviral drugs h:lab diagnosis of viruses including collection,transport,isolation etc.**
2. **Bacteriophages**
3. **DNA virus:Pox,Herpes,Adeno,Hepadna,Parvo etc**
4. **RNA viruses:Entero,Toga,Flavi$_3$Orthomyxo,Paramyxo,Reo,Rhabdo,Arena,Bunya,Filo, Arbo etc**
5. **Slow virus diseases including Prion diseases**
6. **Retrovirus,HIV**
7. **Unclassified viruses**
8. **Teratogenic viruses,**
9. **Carcinogenic viruses**
10. **10.Recent advances in diagnosis of viral infection**

g) **ritsitoloin**

1. **Introduction to parasitology:Classification,general characteristics and lab diagnosis.**
2. **Protozoan parasites of medical importance: Entamoeba, Giardia, Trichomonas, Leishmania, Trypanosoma, Plasmodium, Toxoplasma, Sarcocystis, Cryptosporidium, Balantidium, Isospora, Cyclospora, Microsporidium etc.**
3. **Helminthology: All medically important helminths belonging to Cestoda, Trematoda and Nematoda.**
4. **Cestodes: Diphyllobothrium Taenia, Echinococcus, Hymenolepis, Dypyllidium, Multiceps etc.**
5. **Trematodes: Schistosomes, Fasciola, Gastrodiscoides. Paragonimus, Clonorchis, Opisthorchis etc.**
6. **Nematodes: Trichuris, Trichinella, Stronglyloides, Ancylostoma, Necator, Ascaris. Toxocara, Enterobius, Filarial worms, Dracunculus etc.**
7. **Ectoparasites: Common arthropods and other vectors .**
8. **AntiparasitiC agents**
9. **Drug resistance in parasites**
10. **Recent advances in parasitology**

h) Biostatistics

Definition of selected terms Scale of measurements related to statistics; Methods of collecting data; Presentation of data statistical tables; Measures of dispersion. Range quartile deviation, mean deviation & relative deviation; Concepts of statistical population and sample, need for sampling studies; Simple procedures of random sampling; Methods of sampling; Probability : Basic concepts; Basic theorems of probability addition and multiplication theorems; Conditional probability of Bayes Theorems; Probability distribution definition & applications; Logic of statistical standard error estimation testing of hypothesis; Tests of significance : Normal deviate tests (Z test); Student's "t" test; ('hi-Square test; F test and analysis of variance; Correlation concept and applications: Regression concept and application.

ilClinical Microbiolo2v / Applied Microbioloav

1. Epidemiology of infectious diseases
2. Hospital acquired infections
3. Management of hospital waste
4. Investigation of an infectious outbreak
5. Infections of various organs and systems of human body and their lab diagnosis viz. respiratory tract infections, urinary tract infections. central nervous system infections. congenital infections, reproductive tract infections, `gastrointestinal infections, hepatitis, pyrexia of unknown origin. infections of eye. ear& nose. skin & wound infections septicaemia, endocarditis, haeniorrhagic fever etc.
6. Opportunistic infections.
7. Sexually transmitted diseases
8. Vaccinology: principle, methods of preparation, administration of vaccines
9. Information technology (Computers) in microbiology
10. Molecular techniques as applicable to microbiology
11. Epidemiological typing techniques
12. Statistical analysis of microbiological data and research methodology
13. Animal & human ethics involved in microbiological work
14. Recent Advances in Medical Microbiology

11)Practical (skills)

a) Bacteriology: Must acquire

1. Care and operation of Microscopes viz. Light, Dark ground, Phase contrast. Fluorescence microscopes, etc.
2. Preparation of stains viz. Gram's Albert's, Ziehl -Neelsen and other special stains and performing of staining.

3. Washing and sterilization including plugging and packing.
4. Handling & operation of autoclave, hot air oven, distillation plant, microbial filters and sterility tests.
5. Care and maintenance of common laboratory equipments.
6. Preparation of various liquid and solid media.
7. Preparation of reagents required for routine diagnosis.
8. Tests for in-vitro drug resistance.
9. Collection of specimens for Microbiological investigations such as blood, urine. throat swab, rectal swab, stool, pus. OT specimens.
10. Preparation, examination and interpretation of direct smears from clinical specimens, viz. gram stain, sputum for AFB ZN & auramine 0, slit smears for M.Leprae.-ZN stain, conjunctival smear for Chlmydiae Giemsa/lodine.
11. Techniques of anaerobiosis.
12. Identification of bacteria of medical importance upto species level (except anaerobes -- upto generic level)
13. Quantitative and semi-quantitative analysis of urine.
14. Plating of clinical specimens on media for isolation, purification identification and quantitation.
15. Techniques to demonstrate the motility.
16. In vitro toxigenicity tests.
17. Special tests.
18. Preparation of antibiotic discs & performance of antimicrobial susceptibility testing.
19. Skin tests like Mantoux, Lepromin etc.
20. Standard practices in laboratory and safety precautions.
21. Quality control of media reagents etc.
22. Aseptic practices in 'laboratory and safety precautions
23. Disposal of infectious/ contaminated material.
24. Experiment with laboratory animals if possible.
25. Bacteriology of food, water, milk, air.

Desirable to acquire

I. Conjugation experiments.
2. Phage typing.
3. Bacteriocin typing.
4. Antimicrobial susceptibility tests.

b) Immunology

1. Collection of blood by venepuncture, seperation of serum and preservation of serum for short and long periods.
2. Preparation of adjuvants like Freund's adjuvant.
3. Performance of serological tests.

c) Mycology

1. Collection of specimens.
2. Direct examination of specimens by KOH, Lactophenol cotton blue stains
3. Examination of histopathology slides for fungal infections