O/C


**MGM INSTITUTE OF HEALTH SCIENCES**

**Accredited by NAAC with 'A' Grade**

(Deemed University u/s 3 of UGC Act, 1956)

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# CHOICE BASED CREDIT SYSTEM (CBCS)

**(With effect from 2019-20 Batches)**

**(For Sem I & Sem II)**

# Curriculum for M.Sc Medical Microbiology

Dr. Rajesh B. Goel
Registrar
MGM Institute of Health Sciences
(Deemed University u/s 3 of UGC Act, 1956)
Navi Mumbai- 410 209

Approved as per BOM –57/2019, [Resolution No. 3.2.1.6.i], Dated 26/04/2019

22-06-2020

# MICROBIOLOGY

**SUGGESTIIONS FOR SUBJECT SPECIFIC LEARNING OUTCOME BASED CURRICULAM FRAMEWORK PROPOSED BY UGC (MGMIHS)**

**PG Course- MSc Medical Microbiology**

| Sr. No. | | |
|---|---|---|
| 1 | Objectives of PG Education | • **Learning Objectives No.1 : Acquisition of Knowledge**<br>A post graduate student upon successfully qualifying in the MSc Medical Microbiology examination should be able to Demonstrate competence as a Medical microbiologist. Interact effectively with the allied departments by rendering services in basic as well as in advanced laboratory investigations. Demonstrate application of Microbiology in a variety of clinical settings to solve diagnostic and therapeutic problems along with preventive measures. He may help in hospital infection control, including formulation of antibiotic policy and management of biomedical waste.<br><br>• **Learning Objectives No.2 : Teaching and Training**<br>The student should be able to effectively teach and demonstrate various techniques of Microbiological tests to the undergraduate students in medicine (MBBS) and allied health science courses (Dentistry , Nursing, BSc ) .<br><br>• **Learning Objectives No.3 : Research**<br>The student should be able to carry out a research project from planning to publication and be able to pursue academic interests and continue life-long learning to become more experienced in all the above areas.<br><br>**3. Integration**<br><br>o Practical knowledge of pathogenesis, Lab diagnosis and prophylaxis of various infective agents and about rationale use of antibiotics to prevent spread of drug resistance will be acquired through integrated teaching in clinical meetings. |
| 2 | Generic Graduate Attributes | **Scholarly Attitude :**<br>• Lab training in Sections of Bacteriology, Serology, |

| | | |
|---|---|---|
| | | Mycobacteriology, Mycology, Parasitology, Molecular Biology, Media preparation and Sterilisation.<br>• Allied postings in Molecular biology, CSSD, ICTC, RNTCP, Clinical Pathology and Biochemistry.<br>• Hands-on training programs<br>• Encouraged to participate in Quiz/Student Symposiums<br>.<br><br>**Research Aptitude :**<br>• Encouraged to apply for research funding, ICMR Fellowship<br>• Research Methodology training programs<br>• Plan, execute, analyze and present the research work in medical microbiology at various conferences.<br>• Encouraged to write papers and publish them in Indexed journals.<br><br>.<br><br>**Exemplary Leadership**<br>• Helps in organizing various conferences, CMEs and workshops<br>• Part of various Institutional Committees<br>• Organizes cultural festivals, Annual fest<br>Student magazines<br>. |
| 3 | Desired Learning Outcomes of Degree | **Social Commitment**<br>• Participatesin Hospital Infection Control, Rounds for implementation of antibiotic policy , OT surveillance, MRSA Surveillance, Surveillance of Food handlers , Water testing etc<br>.<br>**Element of Critical thinking**<br>In addition to didactic lectures to provide a holistic education students are exposed to the following teaching-learning practices/programs<br>• Clinical meetings<br>• Culture presentations<br>• Journal Clubs<br>• Slide discussions<br>• Seminars<br><br>**Dynamic Professionalism**<br>• Bioethics Topics should be included in PG Teaching |

| | | |
|---|---|---|
| | | • Encouraged to participate in various conferences, CMEs and workshops and do paper presentations (Oral/Poster). |
| 4 | Proportion of knowledge / Skill / Soft Skill in Curriculum | **Effective Communication Skills**<br>• Induction programs to include topics on Patient-Doctor<br>• communication skills<br>• Formative and summative assessment of Communication and teaching skills in the form of Pedagogue |
| 5 | Curriculum and Employability | **Global Competencies :**<br>• Participate in fellowship programs and training programs available across the world<br>• Go for further education like PhD<br>• Industry-Academia collaboration |

## Annexure Item 6

**Item 6:** Restructuring syllabus of M.Sc. Medical Microbiology Program (1st and 2nd Semester) as per Choice Based Credit System (CBCS)

# Outline of course curriculum
# MSc-Medical Courses (2019-20 batch)
# Semester -I(Total Credits=25)

| | | Hrs/week | | | | | Hrs/semester | | | | Exam Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Core subjects** | **Lecture/ week** | **Tutorial/week** | **Practical hrs/ week** | **Total Hrs/week** | **Total Credits /week** | **Lecture/ semester** | **Tutorial/ semester** | **Practical/ semester** | **Total hours** | **IA** | **semester Exam** | **Total marks** |
| **Theory** | | | | | | | | | | | | | |
| | **Anatomy** | 3 | 1 | | 4 | 4 | 45 | 15 | | 60 | 20 | 60 | 80 |
| | **Physiology** | 3 | 1 | | 4 | 4 | 45 | 15 | | 60 | 20 | 60 | 80 |
| | **Biochemistry** | 3 | 1 | | 4 | 4 | 45 | 15 | | 60 | 20 | 60 | 80 |
| | **Pharmacology** | 3 | 1 | | 4 | 4 | 45 | 15 | | 60 | 20 | 60 | 80 |
| | **Microbiology** | 3 | 1 | | 4 | 4 | 45 | 15 | | 60 | 20 | 60 | 80 |
| **Practical** | | | | | | | | | | | | | |
| | **Anatomy** | | | 2 | 2 | 1 | | | 30 | 30 | 20 | 50 | 70 |
| | **Physiology** | | | 2 | 2 | 1 | | | 30 | 30 | 20 | 50 | 70 |
| | **Biochemistry** | | | 2 | 2 | 1 | | | 30 | 30 | 20 | 50 | 70 |
| | **Pharmacology** | | | 2 | 2 | 1 | | | 30 | 30 | 20 | 50 | 70 |
| | **Microbiology** | | | 2 | 2 | 1 | | | 30 | 30 | 20 | 50 | 70 |
| | **Total** | | | | | | | | | 450 | | | 750 |

| Total Marks for IA | |
|---|---|
| Theory | Practical |
| 30 | 30 |

| Theory Internal Assessment | |
|---|---|
| Theory | 15 |
| Seminar | 5 |
| Total | 20 |

| Practical Internal Assessment | |
|---|---|
| Practical | 15 |
| Journal | 5 |
| Total | 20 |

# MSc-Medical Courses (2019-20 batch)

## Semester -II (Total Credits=30)

| | | Hrs/week | | | | | Hrs/semester | | | | Exam Marks | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | **Core subjects** | **Lecture/ week** | **Tutorial / week** | **Practical hrs/ week** | **Total Hrs /week** | **Total Credits/ week** | **Lecture/ semester** | **Tutorial/ semester** | **Practical/ semester** | **Total hours** | **IA** | **semester Exam** | **Total marks** |
| | Theory | | | | | | | | | | | | |
| | **Anatomy** | 3 | 1 | | 4 | 4 | 45 | 15 | | 60 | 20 | 60 | 80 |
| | **Physiology** | 3 | 1 | | 4 | 4 | 45 | 15 | | 60 | 20 | 60 | 80 |
| | **Biochemistry** | 3 | 1 | | 4 | 4 | 45 | 15 | | 60 | 20 | 60 | 80 |
| | **Pharmacology** | 3 | 1 | | 4 | 4 | 45 | 15 | | 60 | 20 | 60 | 80 |
| | **Microbiology** | 3 | 1 | | 4 | 4 | 45 | 15 | | 60 | 20 | 60 | 80 |
| | **Research Methodology& Biostatistics** | 4 | | | 4 | 4 | 60 | | | 60 | 20 | 60 | 80 |
| | **Practical** | | | | | | | | | | | | |
| | **Anatomy** | | | 2 | 2 | 1 | | | 30 | 30 | 20 | 50 | 70 |
| | **Physiology** | | | 2 | 2 | 1 | | | 30 | 30 | 20 | 50 | 70 |
| | **Biochemistry** | | | 2 | 2 | 1 | | | 30 | 30 | 20 | 50 | 70 |
| | **Pharmacology** | | | 2 | 2 | 1 | | | 30 | 30 | 20 | 50 | 70 |
| | **Microbiology** | | | 2 | 2 | 1 | | | 30 | 30 | 20 | 50 | 70 |
| | **Research Methodology& Biostatistics** | | | 2 | 2 | 1 | | | 30 | 30 | 20 | 50 | 70 |
| | Total | | | | | | | | | **540** | | | **900** |

| **Total Marks for IA** | |
|---|---|
| Theory | Practical |
| 30 | 30 |

| **Theory Internal Assessment** | |
|---|---|
| Theory | 15 |
| Seminar | 5 |
| Total | 20 |

| **Practical Internal Assessment** | |
|---|---|
| Practical | 15 |
| Journal | 5 |
| Total | 20 |

**ACADEMIC SYLLABUS FOR SEMESTER-I (ANNEXURE 1)**

| | |
|---|---|
| Name of the Programme | **M.Sc. MEDICAL MICROBIOLOGY** |
| Course Code | |
| Name of the Course | **MICROBIOLOGY Part 1** |

| | |
|---|---|
| **Course Objective ( Teaching Objectives)** | • To teach basic Microbiological concepts related to General Microbiology<br>• To teach basic Microbiological concepts related to Immunology |
| **Course Outcomes ( learning Objectives)** | • To understand the basic Microbiological concepts of General physiology<br>• To understand the basic Microbiological concepts of Immunology, |

| **Unit no.** | **THEORY TOPICS** | **Hours allotted 45hrs** |
|---|---|---|
| **1.** | **General Microbiology** | **(35 hrs)** |
| | Historical aspects | **1** |
| | Classification of living beings | **1** |
| | Study of bacteria | **2** |
| | Structure of Bacterial cell | **2** |
| | Growth and Multiplication of Bacteria | **2** |
| | Sterilization | **3** |
| | Disinfection | **3** |
| | Culture Media | **2** |
| | Culture Methods | **2** |
| | Identification of Bacteria | **2** |
| | Bacterial Genetics | **2** |
| | Antimicrobial Agents | **1** |
| | Antibiotic Sensitivity Test | **2** |

| | | |
|---|---|---|
| | Antibiotic Resistance | **2** |
| | Universal Safety Precautions | **2** |
| | Hospital Waste Disposal | **2** |
| | Hospital Acquired Infections | **2** |
| | Infection Control Committee | **2** |
| **2.** | **Immunology** | **10 Hrs** |
| | Infection | **1 Hr** |
| | Immunity | **2 Hr** |
| | Antigens | **1 Hr** |
| | Antibodies | **1 Hr** |
| | Complement | **1 Hr** |
| | Serological Reactions | **4 Hr** |
| | **Total** | **45 HRS** |

| **Unit no.** | **TUTORIAL TOPICS** | **Hours allotted 15hrs** |
|---|---|---|
| **1.** | Historical aspects & Microscopy | 1 |
| **2.** | Study of bacteria | 1 |
| **3.** | Sterilization | 1 |
| **4.** | Disinfection | 1 |
| **5.** | Culture Media & Culture Methods | 1 |
| **6.** | Identification of Bacteria | 1 |
| **7.** | Bacterial Genetics | 1 |
| **8.** | Antibiotic Sensitivity Test & Antibiotic Resistance | 1 |
| **9.** | Universal Safety Precautions & Hospital Waste Disposal | 1 |
| **10.** | Hospital Acquired Infections & Infection Control Committee | 1 |
| **11.** | Infection & Immunity | 1 |
| **12.** | Antigens & Antibodies | 1 |
| **13.** | Complement | 1 |
| **14.** | Serological Reactions | 1 |
| **15.** | Vaccines and Immunization Schedule | 1 |
| | **Total** | **15hrs** |

| Unit no. | PRACTICAL TOPICS | Hours allotted 30 hrs |
|---|---|---|
| **1.** | **General Microbiology** | **18 hrs** |
| | 1. Microscopy | **2 Hr** |
| | 2. Study of Bacteria ( Gram's Stain) | **4 Hr** |
| | 3. Study of Bacteria ( ZN Stain) | **4 Hr** |
| | 4. Culture Media | **2 Hr** |
| | 5. Identification of Bacteria | **2 Hr** |
| | 6. Sterilization | **2 Hr** |
| | 7. Disinfection | **2 Hr** |
| **2.** | **Immunology** | **12 Hrs** |
| | 1. Widal Test & VDRL Test | **2 Hr** |
| | 2. ASO, CRP, RA Test | **2 Hr** |
| | 3. ELISA Test | **2 Hr** |
| | 4. Test for HIV & Hepatitis | **2 Hr** |
| | 5. Test for Dengue | **2 Hr** |
| | 6. Vaccines & Immunization Schedule | **2 Hr** |
| | **Total** | **30 HRS** |

**REFERENCE BOOKS:**

**List of the books recommended**
**MSc- Medical Microbiology**

| Semester | Name of the Books | Author/ Editor |
|---|---|---|
| **I** | Textbook of Microbiology | Ananthnarayan&Paniker |
| | Textbook of Microbiology | C.P. Baveja |

| | | |
|---|---|---|
| | Practical & Applied Microbiology | Anuradha De |

**ACADEMIC SYLLABUS FOR SEMESTER-II**

| | |
|---|---|
| **Name of the Programme** | **M.Sc. MEDICAL MICROBIOLOGY** |
| **Course Code** | |
| **Name of the Course** | **MICROBIOLOGY Part 2** |

| | | |
|---|---|---|
| **Course Objective ( Teaching Objectives)** | | • To teach basic Microbiological concepts related to Systemic Bacteriology<br>• To teach basic Microbiological concepts related to Mycology<br>• To teach basic Microbiological concepts related to Virology<br>• To teach basic Microbiological concepts related to Parasitology<br>• To teach basic concepts related to Applied Microbiology |
| **Course Outcomes ( Learning Objectives)** | | • To understand the basic Microbiological concepts of Systemic Bacteriology<br>• To understand the basic Microbiological concepts of Mycology<br>• To understand the basic Microbiological concepts related to Virology<br>• To understand the basic Microbiological concepts related to Parasitology<br>• To understand the basic concepts related to Applied Microbiology |

| Unit no. | THEORY TOPICS | No of lectures | |
|---|---|---|---|
| 3. | **Basics of Systemic Bacteriology**<br>• Gram Positive Organisms: Morphology and infections caused by Staphylococcus, Streptococcus, Pneumococcus, Bacillus<br>• Corynebacterium diphtheria (Morphology, Pathogenesis, Lab Diagnosis)<br>• Anaerobes: Morphology and infections caused by allClostridia Pathogenesis and Lab Diagnosis of gsgangreen<br>• Mycobacteria Morphology and infections caused by M. leprae, Atypical mycobacteria<br>• Mycobacterium tuberculosis (Morphology, Pathogenesis, Lab Diagnosis)<br>• Gram Negative Organisms: Morphology and infections caused by Gonococcus, Meningococcus<br>• E.Coli, Klebsiella, Proteus, Shigella- Morphology and infections caused<br>• Salmonella -Morphology, Pathogenesis, Lab Diagnosis of enteric fever<br>• Morphology and infections caused by Pseudomonas, yersinia, Haemophilus, Bordetella and Brucella<br>• Vibrio (Morphology, Pathogenesis, Lab Diagnosis)<br>• Spirochetes: Morphology and infections caused by Spirochaetes, Leptospira<br>T. pallidum (Morphology, Pathogenesis, Lab Diagnosis),<br>• Miscellaneous: Morphology and infections caused by Rickettsiae ,Chlamydiae, Actinomycetes and Nocardia, | 1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1 | **12 hrs** |

| | | | |
|---|---|---|---|
| | Mycoplasma, Miscellaneous Bacteria | | |
| **4.** | **Basics of Mycology**<br>• Introduction, General features, Structure, Differences from bacteria , Classification – Morphological<br>• Broad outline of Lab diagnosis along with Specimen Collection<br>• Superficial, sub cutaneous Lab diagnosis of dermatophytes<br>• Deep infections -fungi names and diseases caused, morphology of cryptococcus<br>• Opportunistic fungi diseases caused, morphology of candida and aspergillus - 1lecture | 1<br>1<br>1<br>1<br>1 | **5 Hrs** |
| **5.** | **Basics of Virology**<br>• Historical aspects: General properties of viruses, Structure, Composition, Multiplication, Resistance<br>• Cultivation of viruses<br>• Classification of viruses: DNA Virus– Name the diseases caused.<br>• RNA Virus – Name the diseases caused<br>• Specimen collection and transport<br>• Outline of diagnosis of viral diseases<br>• Details of HIV: Structure of virus, modes of transmission, Pathogenicity, clinical features,<br>• HIV Laboratory diagnosis. PEP<br>• Details Hepatitis B virus: Structure of virus, modes of transmission, Pathogenicity, clinical features,<br>• HBV Laboratory diagnosis. PEP | 1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1 | **12 Hrs** |

| | | | |
|---|---|---|---|
| | • HAV, HCV, HEV: tramsmission, Pathogenicity,<br>• Swine flu, Ebola Virus, Rabies: Dengue ,Rota virus Tramsmission Pathogenicity, | | |
| **6.** | **Basics of Parasitology**<br>• Definition and explanation of various terms - Parasite, host, symbiosis, commensalism, Parasitism, Parasitology,<br>• Classes of parasites, Classes of hosts, Outline of laboratory diagnosis of parasitic diseases,<br>• **General features of Protozoa**- List of Common Protozoa & diseases caused<br>E. Histolytica- Morphology, Life cycle, Pathogenicity and Lab. Diagnosis<br>Plasmodium spp.- Morphology, Life cycle, Pathogenicity and Lab. Diagnosis<br>• **General features of Helminths** – Classification<br>• **General features of Nematodes**- Examples of nematodes - List the diseases caused,<br>Ascaris lumbricoides - Morphology – Adult worm, Ova. Lesions, Clinical features & Lab. Diagnosis.<br>• **General features of Cestodes** - Examples of Parasites- List the diseases caused,<br>T. saginata, T. solium- Morphology –Adult worms, Ova Def. & Int. Host, Lesions, Lab diagnosis<br>• **General features of Trematodes** - Examples of Parasites and list the diseases caused<br>• **Vectors**- Definition, types, diseases transmitted | 1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1<br>1 | **10 Hrs** |
| **7.** | **Applied Microbiology**<br>• List of Organisms causing PUO<br>• List of Organisms causing Diarrhea<br>• List of Organisms causing LRTI | 1<br>1<br>1<br>1<br>1<br>1 | **6Hrs** |

| | | | |
|---|---|---|---|
| | • List of Organisms causing Meningitis<br>• List of Organisms causing UTI<br>• List of Organisms causing STD | | |
| | **Total** | | **45 HRS** |

| Unit no. | TUTORIAL TOPICS | Hours allotted 15hrs |
|---|---|---|
| **1** | Gram positive Bacteria | 1 |
| **2** | Laboratory diagnosis of anaerobic bacterial infections | 1 |
| **3** | Laboratory diagnosis of M. Tuberculosis | 1 |
| **4** | Gram negative Bacteria | 1 |
| **5** | Laboratory diagnosis of T. pallidum | 1 |
| **6** | Laboratory diagnosis of Leptospirosis | 1 |
| **7** | Laboratory diagnosis of Fungal Infections | 1 |
| **8** | Laboratory diagnosis of Viral Infections | 1 |
| **9** | Human Immunodeficiency Virus structure and lab diagnosis | 1 |
| **10** | Hepatitis B virus structure and lab diagnosis | 1 |
| **11** | Laboratory diagnosis of Parasitic Infections | 1 |
| **12** | Laboratory diagnosis of Ascaris lumbricoides | 1 |
| **13** | Laboratory diagnosis of Tinea saginata& Tinea solium | 1 |
| **14** | Medical Entomology: Common vectors and diseases transmited | 1 |
| **15** | Applied Microbiology: organisms causing syndromes meningitis, UTI, diarrhoea, LRTI,PUO,STD | 1 |
| | **Total** | **15hrs** |

| Unit no. | PRACTICAL TOPICS | Hours allotted 30 hrs |
|---|---|---|
| 3. | **Basics of Systemic Bacteriology**<br>8. Gram positive cocci ( Staph, Strepto, Pneumo) Grams staining and slides<br>9. Gram positive bacilli ( C. diphtheriae, Clostridium species)<br>10. Mycobacterium species slides and ZN staining<br>11. Gram negative bacteria (Niesseriae species), Vibrio & Pseudomonas species<br>12. Enterobacteriaeceae( E. Coli, Klebsiella, Proteus, Salmonella, Shigella)<br>13. Spirochetes | **12 hrs** |
| 4. | **Basics of Mycology**<br>7. General Introduction to Mycology<br>8. Laboratory diagnosis of fungal infections, grams staining for candida, Wet mount of common fungi like aspergillus, LPCB preparation | **04 Hrs** |
| 5. | **Basics of Virology**<br>1. General Introduction to Virology<br>2. Laboratory diagnosis of Viral infections<br>3. Human Immunodeficiency Virus & Hepatitis B. Virus<br>Demo of rapid tests for HIV and Hepatitis B. Virus | **06 Hrs** |
| 6. | **Basics of Parasitology**<br>1. General Introduction to Parasitology, Stool Examination<br>2. Laboratory diagnosis of Plasmodium species (Protozoa)<br>3. Laboratory diagnosis of T. saginata& T. solium( Cestodes)<br>4. Laboratory diagnosis of A. lumbricoides & A. deodenale (Nematodes) | **08 Hrs** |

| | | |
|---|---|---|
| | Demo of slides and specimens | |
| | **Total** | **30 HRS** |

**REFERENCE BOOKS:**

**List of the books recommended**
**MSc- Medical Microbiology**

| Semester | Name of the Books | Author/ Editor |
|---|---|---|
| II | Textbook of Microbiology | Ananthnarayan&Paniker |
| | Textbook of Microbiology | C.P. Baveja |
| | Practical & Applied Microbiology | Anuradha De |
| | Medical Parasitology | C.P. Baveja<br>V. Baveja |

| MGM INSTITUTE OF HEALTH SCIENCES<br>M. Sc. Medical Students<br>Syllabus for Research Methodology and Biostatistics | | |
|---|---|---|
| | No. of Hours | |
| **I. Research Methodology:** | Theory | Practical |
| **Scientific Methods of Research :** Definition of Research, Assumptions, Operations and Aims of Scientific Research. Research Process, Significance and Criteria of Good Research , Research Methods versus Methodology, Different Steps in Writing Report, Technique of Interpretation, Precaution in interpretation, Significance of Report Writing, Layout of the Research Report | 5 | — |
| **Research Designs**: Prospective, retrospective, Observational Studies: Descriptive, explanatory, and exploratory, Experimental Studies: Pre-test design, post-test design, Follow-up or longitudinal design, Cohort Studies, Case Control Studies, Cross sectional studies, Intervention studies, Panel Studies. | 5 | — |
| **Sampling Designs** : Census and Sample Survey, Implications of a Sample Design, Steps in Sampling Design Criteria of Selecting a Sampling Procedure, Characteristics of a Good Sample Design, Different Types of Sample Designs (Probability sampling and non probability sampling), How to Select a Random Sample?, Systematic sampling, Stratified sampling, Cluster sampling, Area sampling, Multi-stage sampling, Sampling with probability proportional to size, Sequential sampling. | 4 | 0 |
| **Measurement in research:** Measurement Scales, Sources of Error in Measurement, Tests of Sound Measurement, Technique of Developing Measurement Tools, Scaling Meaning of Scaling, Scale Classification Bases, Important Scaling Techniques, Scale Construction Techniques, Possible sources of error in measurement, Tests of sound measurement | 5 | 5 |
| **Methods of Data Collection:** Types of data, Collection of Primary Data, Observation Method, Interview Method, Collection of Primary Data | 3 | 0 |
| **Ethics and Ethical practice in research and plagiarism** | 1 | |
| **Sampling Fundamentals :** Need and importance for Sampling, Central Limit Theorem, Sampling Theory, Concept of Standard Error, Estimation, Estimating the Population Mean Estimating Population Proportion, Sample Size and its Determination, Determination of Sample Size through the Approach Based on Precision Rate and Confidence Level. | 5 | 2 |
| **II. Biostatistics** | | |

| | | |
|---|---|---|
| **Data Presentation** : Types of numerical data: Nominal, Ordinal, Ranked, Discrete and continuous. Tables: Frequency distributions, Relative frequency, Graph: Bar charts, Histograms, Frequency polygons, one way scatter plots, Box plots, two way scatter plots, line graphs | 3 | 3 |
| **Measures of Central Tendency and Dispersion** : Mean, Median, Mode Range, Inter quartile range, variance and Standard Deviation, Coefficient of variation, grouped mean and grouped standard deviation (including merits and demerits). | 3 | 3 |
| **Testing of Hypotheses**: Definition, Basic Concepts, Procedure for Hypothesis Testing, Normal distribution, data transformationImportant Parametric Tests, Hypothesis Testing of Means, Hypothesis Testing for Differences between Means, Hypothesis Testing for Comparing Two Related Samples, Hypothesis Testing of Proportions, Hypothesis Testing for Difference between Proportions, Testing the Equality of Variances of Two Normal Populations. | 6 | 6 |
| **Chi-square Test:** Chi-square as a Non-parametric Test, Conditions for the Application Chi-square test, Steps Involved in Applying Chi-square Test, Alternative Formula, Yates' Correction, and Coefficient by Contingency. | 2 | 2 |
| **Measures of Relationship**: Need and meaning, Correlation and Simple Regression Analysis | 2 | 2 |
| **Analysis of Variance and Covariance**: Analysis of Variance (ANOVA):Concept and technique of ANOVA, One-way ANOVA, Two-way ANOVA, ANOVA in Latin-Square Design Analysis of Co-variance (ANOCOVA), ANOCOVA Technique. | 4 | 4 |
| **Nonparametric or Distribution-free Tests:** Important Nonparametric or Distribution-free Test Sign test, Wilcoxon signed-Rank Test, Wilcoxon Rank Sum Test: Mann-Whitney U test Kruskal Walli's test, Friedman's test, and Spearman Correlation test. | 3 | 3 |
| **Vital Health Statistics:** Measurement of Population: rate, crude rate, specific rate, *Measurement of fertility***:** specific fertility rate, Total fertility rate, *Reproduction rate,* Gross Reproduction Rate, Net Reproduction Rate, Measures related to mortality: Crude Death Rate (CDR) , Age-specific death Rate, Infant and child mortality rate, Measures related to morbidity. | 4 | 3 |
| **Computer Application** Use of Computer in data analysis and research, Use of Software and Statistical package. | 0 | 2 |
| **Total hours** | 55 | 35 |

**Name of the Degree: M.Sc. Medical Microbiology**

**AIMS OF THE PROGRAM**

Microbiologist are in great demand of India and abroad.

Postgraduate qualification in Microbiology can earn to placements in hospital laboratories and research laboratories run by the government and the corporate sector. Private sector placements are in both technical and managerial positions. The demand is growing at an accelerated rate, which makes career prospects in this field bright.

In academics, one can go for higher qualifications like Ph.D. in various field of biology. There is a great demand of this course abroad as most of the foreign countries are looking for expert in this field. After completion of the course, one can work as Tutor or Medical Microbiologist in a Medical set up or as a Research Associate in Research Laboratories.

**Duration of Study:** The duration of the study for M.Sc. Medical Microbiology will be of six semesters spread over three years.

**Program pattern- Commencement of Semester**

- First Semester: August
- Second Semester: February
- Third Semester: August
- Fourth Semester: February
- Fifth Semester: August
- Sixth Semester: February

**Eligibility Criteria:** As a minimum criterion of eligibility, aspiring candidates are needed to have attained a B.Sc. in any discipline of Life Sciences, Biosciences, Bachelor's degree in any of Physics, Biological Sciences, M.B.B.S, BDS, BAMS, BHMS, B.Pharm.,B.Tech (Biotechnology), Bachelor's Degree in Agricultural, Veterinary and Fishery Sciences, or equivalent examination with a minimum aggregate score of 50%.

**For any query visit the website: www.mgmuhs.com**

**CURRICULUM FOR M. Sc. Medical Microbiology**

**I st YEAR**

| Semester I | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Syllabus Ref. No.** | **Subject** | **Credits** | **Teaching hours** | **Marks** | | |
| | **Theory** | | | | **Internal Assessment** | **Semester Exam** | **Total** |
| | **MM101T** | **Medical Anatomy** | **4** | **4** | **20** | **60** | **80** |
| | **MM102T** | **Medical Physiology** | **4** | **4** | **20** | **60** | **80** |
| | **MM103T** | **Medical Biochemistry** | **4** | **4** | **20** | **60** | **80** |
| | **MM104T** | **Medical Pharmacology** | **4** | **4** | **20** | **60** | **80** |
| | **MM105T** | **Medical Microbiology** | **4** | **4** | **20** | **60** | **80** |
| | **Practical** | | | | | | |
| | **MM101P** | **Medical Anatomy** | **1** | **2** | **20** | **50** | **70** |
| | **MM102P** | **Medical Physiology** | **1** | **2** | **20** | **50** | **70** |
| | **MM103P** | **Medical Biochemistry** | **1** | **2** | **20** | **50** | **70** |
| | **MM104P** | **Medical Pharmacology** | **1** | **2** | **20** | **50** | **70** |
| | **MM105P** | **Medical Microbiology** | **1** | **2** | **20** | **50** | **70** |
| | **Total** | | **25** | **30** | **200** | **550** | **750** |

**Semester II**

| | Syllabus Ref. No. | Subject | Credits | Teaching hours | Marks | | |
|---|---|---|---|---|---|---|---|
| | **Theory** | | | | **Internal Assessment** | **Semester Exam** | **Total** |
| | **MM201T** | **Medical Anatomy** | **4** | **4** | **20** | **60** | **80** |
| | **MM202T** | **Medical Physiology** | **4** | **4** | **20** | **60** | **80** |
| | **MM203T** | **Medical Biochemistry** | **4** | **4** | **20** | **60** | **80** |
| | **MM204T** | **Medical Pharmacology** | **4** | **4** | **20** | **60** | **80** |
| | **MM205T** | **Medical Microbiology** | **4** | **4** | **20** | **60** | **80** |
| | **MM206T** | **Research Methodology & Biostatistics (Core Course)** | **4** | **4** | **20** | **60** | **80** |
| | **Practical** | | | | | | |
| | **MM201P** | **Medical Anatomy** | **1** | **2** | **20** | **50** | **70** |
| | **MM202P** | **Medical Physiology** | **1** | **2** | **20** | **50** | **70** |
| | **MM203P** | **Medical Biochemistry** | **1** | **2** | **20** | **50** | **70** |
| | **MM204P** | **Medical Pharmacology** | **1** | **2** | **20** | **50** | **70** |
| | **MM205P** | **Medical Microbiology** | **1** | **2** | **20** | **50** | **70** |
| | **MM206P** | **Research Methodology & Biostatistics (Core Course)** | **1** | **2** | **20** | **50** | **70** |
| | **Total** | | **30** | **36** | **240** | **660** | **900** |

**2ND YEAR**

| **Semester III** | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Syllabus Ref. No.** | **Subject** | **Credits** | **Teaching hours** | **Marks** | | |
| | **Theory** | | | | **Internal Assessment** | **Semester Exam** | **Total** |
| | MM301T | Details of General Microbiology<br>Details of Immunology | 4 | 4 | 20 | 60 | 80 |
| | | **Core Elective course**** | 4 | 4 | Internal Exam 80 Marks | | |
| | MM302CET | Molecular Biology | | | | | |
| | MM303CET | Nanobiotechnology | | | | | |
| | MM304 | Clinical Postings | 6 | 18 | 50 | | 50 |
| | MM305 | Dissertation/Project Proposal* | 5 | 10 | 50 | - | 50 |
| | MM306 | Seminar | 2 | 2 | 50 | | 50 |
| | **Practical** | | | | | | |
| | MM301P | Details of General Microbiology<br>Details of Immunology | 2 | 4 | 20 | 50 | 70 |
| | | Core Elective practical | 1 | 2 | Internal Exam 70 Marks | | |
| | MM302CEP | Molecular Biology | | | | | |
| | MM303CEP | Nanobiotechnology | | | | | |
| | | **Total** | 24 | 44 | 190 | 110 | 300 |

| **Semester IV** | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Syllabus Ref. No.** | **Subject** | **Credits** | **Teaching hours** | **Marks** | | |
| | **Theory** | | | | **Internal Assessment** | **Semester Exam** | **Total** |
| | MM401T | **Systemic Bacteriology** | 4 | 4 | 20 | 60 | 80 |
| | | **General elective **** | 4 | 4 | | | |
| | MM402GET | Bioethics, Biosafety, IPR & Technology Transfer | Internal Exam of 80 Marks | | | | |
| | MM403GET | Disaster Management and Mitigation Resources | | | | | |
| | MM404GET | Human rights | | | | | |
| | MM405 | Clinical Postings | 7 | 21 | 50 | | 50 |
| | MM406 | Dissertation / Project* | 5 | 10 | 50 | | 50 |
| | MM407 | Seminar | 2 | 2 | 50 | | 50 |
| | **Practical** | | | | | | |
| | MM401P | Systemic Bacteriology | 2 | 4 | 20 | 50 | 70 |
| | | **Total** | 24 | 45 | 190 | 110 | 300 |

**IIIrd YEAR**

| **Semester V** | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Syllabus Ref. No.** | **Subject** | **Credits** | **Teaching hours** | **Marks** | | |
| | **Theory** | | | | **Internal Assessment** | **Semester Exam** | **Total** |
| | MM501T | Virology, Parasitology, Mycology | 4 | 4 | 20 | 60 | 80 |
| | MM502 | Clinical Postings | 6 | 18 | 50 | | 50 |
| | MM503 | Dissertation / Project* | 12 | 24 | 50 | | 50 |
| | **Practical** | | | | | | |
| | MM501P | Virology, Parasitology, Mycology | 1 | 2 | 20 | 50 | 70 |
| | | **Total** | 23 | 46 | 140 | 110 | 250 |

| **Semester VI** | | | | | | | |
|---|---|---|---|---|---|---|---|
| | **Syllabus Ref. No.** | **Subject** | **Credits** | **Teaching hours** | **Marks** | | |
| | **Theory** | | | | **Internal Assessment** | **Semester Exam** | **Total** |
| | MM601T | Applied Microbiology & Molecular Biology | 4 | 4 | 20 | 60 | 80 |
| | MM602 | Clinical Postings | 6 | 18 | 50 | | 50 |
| | MM603 | Dissertation / Project* | 12 | 24 | | 100 | 100 |
| | **Practical** | | | | | | |
| | MM601P | Applied Microbiology & Molecular Biology | 2 | 4 | 20 | 50 | 70 |
| | | **Total** | 24 | 50 | 90 | 210 | 300 |

*(a) ***Dissertation / Project* Course** commences in II nd Semester.

Students should undergo ICMR Online Course of Research Methodology before submitting the protocol for their Dissertation. ( Ist / II nd Semester)

| | |
|---|---|
| Allotment of Guide | II nd Semester ( On or Before 30 April ) |
| Submission of Protocol for Scientific and Ethical Committee Approval | III rd Semester ( On or Before 14 th Aug ) |
| Scientific and Ethical Approval | III rd Semester ( On or Before 14 th October) |
| Commencement of Research Work | III rd Semester 15th October |
| Submission of Thesis | VI th Semester 31 st March |

**(Elective): Any one subject is to be chosen from the subjects offered** (Subjects offered may change from time to time depending on the availability of expertise)

**Elective courses may or may not have practical and/or field work.

**Mahatma Gandhi Mission's**

# MEDICAL COLLEGE

Sector1, Kamothe Navi Mumbai – 410209,
Tel No.: 022-27433404, 27437991, 27437900 Fax : (022) 27432459
Email: mgmmcnb@gmail.com/ Website : www.mgmmedicalcollege.org.in

## Academic Year 2019 – 2020

## Academic Calendar For M.Sc. (3 Years) Medical Courses

**(Anatomy, Physiology, Biochemistry, Pharmacology, Microbiology)**

| SCHEDULE OF ACTIVITY | DATES |
|---|---|
| Commencement of First Semester | 01.08.2019 |
| Receipt of completed Eligibility forms at MGMIHS from Respective college without late fees<br><br>Receipt of completed Eligibility forms at MGMIHS from Respective college with late fees (Only for new admission) | On or before 30.10.2019<br><br>On or before 30.11.2019 |
| Commencement of Internal Exam | 3rd Week of November 2019 |
| Winter Vacation for Staff | 16.10.2019 to 15.11.2019 |
| Notification of First Semester University Examination | As per MGMIHS |
| Commencement of First Semester University Examination | 1 Week of January 2020 |
| Conclusion of respective semesters | Last week of January 2020 |
| Declaration of final Result | As per MGMIHS |
| Commencement of Second Semester | 1st Week of February 2020 |
| Commencement of Internal Examination | 3rd Week of April 2010 |
| Allotment of Guide for Dissertation | On or Before 30 th April 2020 |
| Notification of Second Semester University Examination | As per MGMIHS |
| Summer Vacation for staff | 01.05.2020 to 10.06.2020 |
| Commencement of Second Semester University Examination | 1 Week of July 2020 |
| Conclusion of Second Semester | 15 July 2020 |
| Declaration of final Result | As per MGMIHS |
| Commencement of Next Academic Session | 16.07.2020 |

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**Academic Year 2020 – 2021**
**Academic Calendar For M.Sc. (3 Years) Medical Courses**
**(Anatomy, Physiology, Biochemistry, Pharmacology, Microbiology)**

| SCHEDULE OF ACTIVITY | DATES |
|---|---|
| Commencement of Third Semester | 16.07.2020 |
| Submission of Protocol for Scientific and Ethical Approval | 14.08.2020 |
| Commencement of Internal Exam | 3rd Week of November 2020 |
| Winter Vacation for Staff | 16.10.2020 to 15.11.2020 |
| Notification of First and Third Semester University Examination | As per MGMIHS |
| Commencement of Third Semester University Examination | 1 Week of January 2021 |
| Conclusion of respective semesters | 15 January 2021 |
| Declaration of final Result | As per MGMIHS |
| Commencement of Fourth Semester | 3rd week of January 2021 |
| Commencement of Internal Examination | 2nd Week of April 2021 |
| Notification of Fourth Semester University Examination | As per MGMIHS |
| Summer Vacation for staff | 01.05.2021 to 10.06.2021 |
| Commencement of Fourth Semester University Examination | 3rd Week of June 2021 |
| Conclusion of Respective Semesters | 30 June 2021 |
| Declaration of final Result | As per MGMIHS |
| Commencement of Next Academic Section | 1.07.2021 |

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**Academic Year 2021 – 2022**
**Academic Calendar For M.Sc. (3 Years) Medical Courses**
**(Anatomy, Physiology, Biochemistry, Pharmacology, Microbiology)**

| SCHEDULE OF ACTIVITY | DATES |
|---|---|
| Commencement of Fifth Semester | 1.07.2021 |
| Commencement of Internal Exam | 3rd Week of November 2021 |
| Winter Vacation for Staff | 16.10.2021 to 15.11.2021 |
| Notification of First, Third and Fifth Semester University Examination | As per MGMIHS |
| Commencement of Fifth Semester University Examination | First Week of December 2021 |
| Conclusion of Fifth semester | Second Week of December 2021 |
| Declaration of final Result | As per MGMIHS |
| Commencement of Sixth Semester | 16 December 2021 |
| Submission of Dissertation | 31 March 2022 |
| Commencement of Internal Examination | 2nd Week of April 2022 |
| Notification of Fourth Semester University Examination | As per MGMIHS |
| Summer Vacation for staff | 01.05.2022 to 10.06.2022 |
| Commencement of Sixth Semester University Examination | 1st June 2022 |
| Conclusion of Respective Semesters | 30 June 2022 |
| Declaration of final Result | As per MGMIHS |