# COURSE OF STUDIES

for

Master of Philosophy

in

Microbiology


**UNIVERSITY OF HEALTH SCIENCES, LAHORE PAKISTAN**

**Program Rationale:**

Microbiology is an essential part of basic medical sciences that provides the conceptual basis for understanding pathogenic microorganisms and the mechanisms by which they cause disease in the human body. The programme emphasizes prevention, diagnosis and treatment of infectious diseases.

**Mission Statement:**

The mission of the M.Phil. Microbiology Programme is to produce medical researchers/teachers of high quality with strong hands-on experience and necessary skills to initiate and carry out teaching, diagnostics, patient care as well as research of internationally accepted standards.

**Program Educational Objectives:**

The objective of this curriculum is to define the professional and microbiological content that will enable the trainees to provide.

- An appropriate knowledge and understanding of good Microbiology laboratory practices.
- An adequate knowledge and understanding of infectious diseases as an independent practitioner.
- To demonstrate up to-date knowledge of the scientific basis of infectious diseases.
- To demonstrate the ability to perform all routine laboratory investigations and is able to interpret their results.
- To demonstrate the ability to organize, manage and quality control Microbiology.
- To demonstrate up to -date knowledge of other methods and techniques (Bacteriology, Mycology, Parasitology, Virology ,Serology, Molecular Biology, Immunology etc.) in diagnosing and managing infectious diseases.

- To have appropriate attitudes and communication skills required for the practice of the specialty.
- To have the qualities of an effective teacher, team worker and leader.
- To enable them to provide opinion in consultative Microbiology and maintain good liaison with primary physician.
- To have knowledge and understanding of medical governance and audit.
- To understand the role of research in improvements in medical practice.
- To recognize the need for continuous professional development for the maintenance of standards of practice.
- To enable them to deal with ethical and legal issues related to clinical practice.
- To communicate effectively and to be able to share decision making, while maintaining appropriate situational awareness, professional behavior, and professional judgement
- To be focused on patient safety and deliver effective quality improvement in patient care.
- To carry out research and managing data appropriately

By the end of the two years programme, the M. Phil resident should also acquire enough knowledge and expertise to evaluate patients with infectious diseases and interpret relevant investigations required for arriving at a diagnosis.

**Program Learning Outcomes:**

1. Students will be able to process the clinical microbiological specimens and establish microbiological diagnosis of infectious diseases.
2. Students will be able to apply knowledge of basic and clinical Microbiology in solving day-to-day and scientific problems.
3. Students will be able to teach and assess medical microbiology courses at undergraduate & postgraduate level.
4. Students will be able to identify, formulate and solve clinical microbiological cases.

5. Students will be able to design components, processes, and systems to meet desired needs in the field of clinical Microbiology.
6. Students will be able to conduct microbiological experiments and will use laboratory instruments and computers to analyze and interpret data.
7. Students will be able to use modern tools, techniques, and skills necessary for practicing clinical microbiology including computational tools, statistical techniques, and instrumentation.
8. Students will be able to work in a professional laboratory environment and understand the associated economic considerations in the field of clinical microbiology and diagnostics.
9. Students will be able to communicate effectively in written, oral, and graphical forms, including the use of professional quality visual aids.
10. Students will be able to work effectively in teams including multidisciplinary teams to solve clinical microbiology cases.
11. Students will be able to understand the professional and ethical responsibilities of a clinical scientist in the field of microbiology.
12. Students will be able to understand the impact of scientific knowledge in the field of clinical microbiology on society and the environment.
13. Students will be able to recognize the need and an ability to engage in lifelong learning of immunological sciences.

# SCHEME OF STUDIES (2-Year)

## MS/MPhil___M.Phil. Microbiology

| Semester # | Course code | Course title | Credit hours | | |
|---|---|---|---|---|---|
| | | | Theory | Practical | Total |
| 1 | | Biostatistics and Research Methodology | 2 | 0 | 2 |
| | MIC 701 | Basic Bacteriology | 1 | 1 | 8 |
| | MIC 702 | Clinical Bacteriology | 2 | 2 | |
| | MIC 703 | Molecular Medical Microbiology | 1 | 1 | |
| | | Elective Course | 2 | 0 | 2 |
| 2 | MIC 704 | Medical Virology | 1 | 1 | 8 |
| | MIC 705 | Medical Mycology & Parasitology | 2 | 2 | |
| | MIC 706 | Medical Immunology | 1 | 1 | |
| | | Elective Course | 2 | 0 | 2 |
| 3 | Research (thesis) | | 6 | | 6 |
| 4 | Professional & Teaching Skills Apprenticeship (PTSA) | | 0 | | 2 |
| | | | | | **(Total: 30)** |

# Course Title: M.Phil Microbiology

Contact Hours:

Theory = 224

Practical = 384

Total = 608

Credit Hours:

Theory = 14

Practical = 08

Total = 22

**Course Objective:**

The aim of the Medical Microbiology course is to introduce basic principles and application relevance of clinical disease for students who are in preparation for medical microbiologists. The content of rigorous course includes many etiological agents responsible for global infectious diseases. It covers all biology of bacteria, viruses and other pathogens related with infectious diseases in humans. The course will provide the conceptual basis for understanding pathogenic microorganisms and particularly address the fundamental mechanisms of their pathogenicity. It will also provide opportunities for a student to develop diagnostic skills in microbiology, including the practical application and interpretation of laboratory tests for the diagnosis of infectious diseases.

**Learning Outcome:**

The Student after completion of course will have knowledge of medical microbiology and the importance of microorganisms in diagnosis, monitoring and treatment of infectious diseases. He will acquire knowledge of bacteria and viruses and other microorganisms that can cause

infectious diseases. He/she will also have knowledge of prokaryotic genetics, taxonomy, growth conditions and virulence.

**Course Outline:**

It covers mechanisms of infectious disease transmission, principles of aseptic practice, and the role of the human body's normal microflora. The biology of bacterial, viral, fungal, and parasitic pathogens of medical importance and the diseases they cause are covered. It also covers diagnostic and clinical microbiology.

**Practicals:**

**Basic Bacteriology**

- Microscopy
- Disinfection and sterilization & Lab Safety
- Culture methods
- Identification of organisms
- Antimicrobial Susceptibility Profile
- Quality Control (External & Internal)
- Journal Clubs

**Clinical Bacteriology**
**Collection, transport and handling of Clinical and Environmental samples**

- Blood Cultures
- Throat Cultures
- Sputum Cultures (Routine and AFB)
- Spinal Fluid Cultures
- Body fluids (RE and complete examination)
- Stool Cultures and complete examination
- Urine Cultures and complete examination
- Genital Tract Cultures
- Wound & Abscess Cultures
- Automated identification and susceptibility of bacteria and fungi
- Anaerobic microbiology
- Food microbiology
- Water microbiology
- Semen analysis

## Clinical Virology

- Enzyme-Linked Immunosorbent Assay
- Serological Procedures
- Detection of Viral Antigens
- Detection of Viral Nucleic Acids

## Clinical Molecular Microbiology

- Demonstrate basic knowledge of MOLECULAR MICROBIOLOGY
- Various molecular and typing methods.
- PCR/Real Time PCR
- Gene Xpert

## Clinical Serology

- Demonstrate basic knowledge of Serology
- Common serological tests
- Syphilis
- Infectious mononucleosis
- Rheumatic fever
- Typhoid fever
- VDRL/TPHA and interpretation
- Pregnancy test and interpretation
- Monospot test
- ASO titers and interpretation
- Typhidot test and interpretation

## Clinical Mycology

- Identification of common yeast
- Identification of dermatophytes
- Identification of Aspergillus species
- Identification of Mucormycosis agents
- Preparation of Lactophenol slide
- Antifungal Susceptibility

## Clinical Parasitology

- Identification of common ova/cysts in stool
- Thick/Thin Blood smear for Haemoparasites

**Recommended Books:**


1. REVIEW OF MEDICAL MICROBIOLOGY AND IMMUNOLOGY Warren Levision & Earnest Jawetz
2. Practical Medical Microbiology Diagnostic Microbiology Mackie & McCartney
3. Lippincott's illustrated Review of Microbiology William A. Strohl
4. Color Atlas and Textbook of Elmer W. Koneman MD.
5. Medical Microbiology David Greenwood
6. Antibiotics: Actions, Origins, Resistance Congenital and Perinatal Infections
7. Colour Atlas of Medical Bacteriology By: Marrie .T. Pezzlo, Elena M. Peterson (ASM Press/ Current edition)
8. Anaerobic Bacteriology, Clinical and Laboratory Practice: A. Trevor Willis Third Edition
9. Clinical Laboratory Management Volume Editor: L. S. Garcia
10. Clinical Virology, 2nd Edition Editors: D. D. Richman, R. J. Whitley, F. G. Hayden
11. Diagnostic Molecular Microbiology: Principles and Applications Editors: D. H. Persing, T.F. Smith, F.C. Tenover, T.J. White
12. A Guide to Specimen Management in Clinical Microbiology, 2nd Edition Author: J. M. Miller
13. Polymicrobial Diseases Editors: K. A. Brogden, J.M. Guthmiller
14. Practical Guide to Diagnostic Parasitology Author: L. S. Garcia
15. Sexually Transmitted Disease and Adverse Outcomes of Pregnancy Editors: P. J. Hitchcock, H. T. MacKay, J. N. Wasserheit
16. Tick-Borne Diseases of Humans Editors: J. L. Goodman, D. T. Dennis, D. E. Sonenshine
17. Urinary Tract Infections: Molecular Pathogenesis and Clinical Management Editors: H. L. T. Mobley, J. W. Warren
18. Wadsworth – KTL Anaerobic Bacteriology Manual 6th Edition By: Hannele Jousimies Somer, Vera L. Sutter
19. Performance Standards for Antimicrobial Disk Susceptibility Tests: Approved Standard—Tenth Edition (2007) M2-A9
20. Methods for Dilution Antimicrobial Susceptibility: Tests for Bacteria that grow Aerobically; Approved Standard—Seventh Edition (2006) M7-A7
21. Development of In Vitro Susceptibility Testing Criteria and Quality Control
22. Parameters; Approved Guideline—Second Edition (2001) M23-A2
23. Analysis and Presentation of Cumulative Antimicrobial Susceptibility Test Data; Approved Guideline Second Edition (2005) M39-A2
24. Performance Standards for Antimicrobial Disk Susceptibility Tests: Seventeenth Informational Supplement, Clinical and Laboratory Standards Institute Edition (2007)
25. The Lancet Infectious Diseases
26. Diagnostic Medical Parasitology 5th Edition By Lyne Shore Garcia
27. Gene IX By Benjamin Lewin