COURSE OF STUDIES

for

Doctor of Philosophy

in

Microbiology

UNIVERSITY OF HEALTH SCIENCES, LAHORE PAKISTAN

Program Rationale:

The PhD Medical Microbiology program emphasizes independence in scientific pursuit and critical thinking with an emphasis on quality research and life-long learning to bring the student to a higher level of competence in Medical Microbiology with special expertise in an area chosen for the thesis.

Mission Statement:

To promote high-impact education and innovative research in a diverse and inclusive environment by exploring fundamental questions in medical microbiology.

Program Educational Objectives:

The broad objective of the PhD Medical Microbiology programme is to produce high-quality graduates that can integrate knowledge and skills drawn from biological sciences and related technologies, considering the aspects of ethics, communication skills, leadership, professionalism and social responsibility.

Program Learning Outcomes:

- Develop, implement and evaluate unique clinical and community-based programs and interventions that aim to promote health and improve specific health outcomes.
- Design and conduct independent research projects using advanced methodologies on the individual, social and health care delivery system factors influencing health outcomes.
- Engage in rigorous health outcomes assessments and clinical effectiveness research across the lifespan.

- Compile, manage and assess biomedical informatics and health records databases and apply advanced statistical methods to research endeavours.
- Evaluate the effects of health policies on health outcomes, health care access, quality of care and costs from a variety of perspectives, which are integrated into effective research projects.
- Contribute to methods development that will further advance health outcomes and translational research.
- Translate evidence-based treatments and programs into health practice and policy through dissemination and implementation of scientific methodologies.

SCHEME OF STUDIES (3-Year)

PhD Microbiology

Semester #	Course code	Course title	Credit hours		
			Theory	Practical	Total
1		Research Methodology	2	0	02
		Advance Biostatistics	2	0	02
		Basic Bacteriology & Biosafety	1	1	05
		Clinical & Diagnostic Bacteriology	2	1	
2		Advanced Laboratory Techniques	01	01	02
		Basic & Clinical Virology	01	01	07
		Clinical Parasitology & Mycology	02	01	
		Clinical Immunology	01	01	
3	Research (thesis)		30		30
			(Total: 48)		

Course Title: PhD Microbiology

Contact Hours:

Theory = 192

Practical = 288

Total = 480

Credit Hours:

Theory = 12

Practical = 06

Total = 18

Course Objective:

The objective of this course is to include up-to-date understanding of modern research in the field of medical microbiology and the link between laboratory-based discovery science and clinical microbiology. The structure of the laboratory sessions will provide training in the practical skills necessary for microbiology in academic research and clinical laboratories of tertiary care hospitals.

Learning Outcome:

- Have a thorough knowledge of the literature and a comprehensive understanding of scientific methods and techniques applicable to their own research.
- Be able to demonstrate originality in the application of knowledge, together with a practical understanding of how research and enquiry are used to create and interpret knowledge in their field.
- Have developed the ability to critically evaluate current research and research techniques and methodologies.
- Have self-direction and originality in tackling and solving problems.
- Be able to act autonomously in the planning and implementation of research; and have gained oral presentation and scientific writing skills.

Course Outline:

The PhD medical microbiology coursework will cover extensive knowledge of research methods and advanced biostatistical tools for the research. The coursework will also encompass the core subjects of Medical Microbiology with special emphasis in advanced laboratory techniques.

Practicals:

- DNA extraction from Bacterial & Human Cells
- Gel Preparation
- Conventional PCR
- Real Time PCR
- SDS PAGE
- ELISA
- Cell Culture
- MIC determination by Agar Dilution & Broth Dilution
- Automated identification & Susceptibility by VITEK
- Antimicrobial activity of Plant extracts
- Automated identification of MTB on BACTEC MGIT 960

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

Professional & Teaching Skill Apprenticeship (PTSA):

The students will be doing diagnostic microbiology training in Microbiology Laboratory of a tertiary care hospital for acquiring hands-on practical experience.

The students will attend the Teacher's training course designed by Medical Education Department for attaining teaching skills.