

**Institute of Microbiology and Molecular Genetics**  
**Faculty of Life Sciences**  
**University of the Punjab, Lahore**  
**Course Outline**



<b>Programme</b>	BS	<b>Course Code</b>	MMG 402	<b>Credit Hours</b>	3(2+1)
<b>Course Title</b>	<b>ANTIMICROBIAL AGENTS AND RESISTANCE</b>				
<b>COURSE INTRODUCTION</b>					
<p>This course provides a deep understanding of how antimicrobial agents work, the factors leading to antimicrobial resistance, and strategies to combat this critical global health issue. Students will explore the mechanisms of action of various antimicrobial agents and analyze the causes and public health impact of resistance. The course emphasizes the application of this knowledge to develop effective strategies for the responsible use of antimicrobial agents, aiming to mitigate the spread of resistance. Through lectures and lab work, students will gain both theoretical and practical skills essential for addressing antimicrobial resistance in clinical and public health settings.</p>					
<b>LEARNING OUTCOMES</b>					
<p>On the completion of the course, the students will be able to:</p> <ol style="list-style-type: none"> <li>1. Understanding the mechanism of action of various antimicrobial agents and their role in treating microbial infections.</li> <li>2. Analyze the factors contributing to antimicrobial resistance and its impact on public health.</li> <li>3. Apply knowledge of antimicrobial resistance to develop strategies for the effective use of antimicrobial agents and so mitigate the spread of resistance.</li> </ol>					
<b>COURSE CONTENT</b>					
<p>Introduction to Antimicrobial Agents, Mechanisms of Antimicrobial Resistance, Antibacterial, Antiviral, Antifungal, and Antiparasitic Agents, Laboratory Techniques in Antimicrobial Testing, Antimicrobial Resistance in Healthcare and the Community, Epidemiology and Global Impact of Antimicrobial Resistance, Antimicrobial resistance in Pakistan, New Approaches to Overcome Resistance, Strategies to Combat Antimicrobial Resistance, Ethical, Social, and Economic Aspects of Antimicrobial Resistances, Antimicrobial Stewardship, Case Studies in Antimicrobial Resistance and Control, Integration and Application</p>					
<b>PRACTICALS</b>					
<p>Hands-on training in disk diffusion (Kirby-Bauer) and broth dilution methods, Phenoty[ic detection methods for detecting bacterial resistance, Impact of Antimicrobial Resistance, PCR and gel electrophoresis for detecting resistance genes markers, MIC and MBC determination using microdilution assays, analysis of clinical isolates for resistance patterns, Antimicrobial Stewardship in Practice, Novel Approaches to Mitigating Resistance: Investigating the efficacy of bacteriophages and antimicrobial peptides</p>					
<b>TEXTBOOKS AND READING MATERIAL</b>					
<ol style="list-style-type: none"> <li>1. Rice, L. B. (2020). <i>Antimicrobial Resistance in Gram-Positive Bacteria</i>. Springer.</li> <li>2. Hoffman, S. L., &amp; Walker, B. D. (2021). <i>Antimicrobial Resistance: Challenges and Therapeutic Approaches</i>. Wiley.</li> <li>3. Opal, S. M., &amp; Medeiros, A. A. (2022). <i>The Antimicrobial Therapy Handbook</i> (31st ed.). Oxford University Press.</li> <li>4. Choffnes, E. R., Relman, D. A., &amp; Olsen, L. (2020). <i>Antibiotic Resistance: Implications for Global Health and Novel Intervention Strategies</i>. National Academies Press.</li> </ol>					

5. World Health Organization (WHO). (2021). *Global Antimicrobial Resistance and Use Surveillance System (GLASS) Report: 2021*. WHO Press.
6. Neuhauser, M. M., & MacDougall, C. (2023). *Infectious Diseases and Antimicrobial Stewardship in Critical Care*. Cambridge University Press

### ASSESSMENT

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Continuous assessment includes Classroom participation, assignments, presentations, viva voce, attitude and behavior, hands-on activities, short tests, projects, practicals, reflections, readings, quizzes etc.
3.	Final Assessment	40%	Written Examination at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, fieldwork , report writing etc.