

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



Programme	BS	Course Code	MMG103	Credit Hours	3(2+1)
Course Title	MICROBIAL DIVERSITY AND SYSTEMATICS				
COURSE INTRODUCTION					
<p>This course introduces the fascinating and diverse world of microorganisms, exploring their incredible variety and ecological roles. Gain insights into the bacteria and archaea structure, function, bacterial taxonomy rules and interactions within diverse environments. This course will prepare to unravel the mysteries of microbial life and understand its profound impact on ecosystems, human health, and biotechnology.</p>					
LEARNING OUTCOMES					
<p>On the completion of the course, the students will be able to:</p> <ol style="list-style-type: none"> 1. Gain a comprehensive understanding of microbial taxonomy, including the classification and phylogenetic relationships of bacteria, and archaea. 2. Examine the various types of microbial interactions, such as symbiosis and competition, and their implications for ecosystems and human health. 3. Learn about the ecological roles of various microorganisms, and how they interact within different environments. 					
COURSE CONTENT					
<p>Introduction to Microbial Diversity: Definition and significance of microbial diversity, Historical milestones in microbiology, Overview of microbial domains and major groups, Microbial Taxonomy and Systematics: Principles of microbial classification, Rules of microbial nomenclature, Taxonomic ranks and nomenclature, Phylogenetic analysis and molecular markers, Bacterial Domain: Major bacterial phyla and their characteristics, Proteobacteria, The Gram-positive bacteria (Firmicutes and Actinobacteria) The nonproteobacteria, Fusobacteria, Anoxygenic photosynthetic bacteria, Spirochetes and Deinococci, Archaeal Domain: Unique features of archaea compared to bacteria, Classification of archaea as methanogens, extremophiles, Phylum Crenarchaeota, thaumarchaeota and Euryarchaeota, Environmental and clinical significance of different bacterial and Archeal groups, Metabolic diversity: Cyclic and Non-cyclic photophosphorylation, Microbial habitat diversity: soil, water, and extreme environments, Formation and function of microbial communities and biofilms, Applications of Microbial Diversity Research: Biotechnological applications, Medical diagnostics, probiotics, antimicrobial resistance, Environmental and agricultural applications.</p>					
PRACTICALS					
<p>Analysis of microbial diversity from water, soil, and air, classification of microbes based on morphological, biochemical, and molecular parameters. Construction of phylogenetic tree.</p>					
TEXTBOOKS AND READING MATERIAL					
<ol style="list-style-type: none"> 1. Satyanaran, T. (2005). <i>Microbial Diversity</i> K. International Pvt Ltd, - Science. 2. Bull, A.T. (2004). <i>Microbial Diversity and Bioprospecting</i>. ASM Press. 					

3. Prescott, L. M. Harley, J. P. & Klein, D. A. (2017). *Microbiology*, 10th Edition, McGraw-Hill Education.
4. Michael, T. Madigan (2009). *Brock Biology of Microorganisms*, 12th Edition, Pearson/Benjamin Cummings Publishers.
5. Holt, J.G., (1996). *Bergey's Manual of Determinative Bacteriology*, 9th edition Lippincott Williams & Wilkins.USA.

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.