Institute of Zoology
Faculty of Life Sciences
University of the Punjab, Lahore
Course Outline

Programme	BS Zoology	Course Code	ZOOL-311	Credit Hours	2
Course Title	**General Microbiology**				

Course Introduction
This course will build knowledge and skills of students studying microbiology. The students will learn about basic methods of microbial detection and identification, microbial control, microbial diseases and epidemiology. They will study the applications of food microbiology and medical microbiology.

Learning Outcomes
On the completion of the course, the students will:
1. Attain the fundamental knowledge regarding microorganisms
2. Comprehend the basic concepts of microbial diversity
3. Grasp the microbiological techniques and use them efficiently
4. Explore the microbial diversity and role of microorganisms
5. Validate practical skills in the design and execution of experiments
6. Apply the scientific method of investigation and hypothesis testing

Course Content		Assignments/Readings
Week 1	**Unit-I: The beginnings of Microbiology** • Discovery of the microbial world • Discovery of the role of microorganisms in transformation of organic matter, in the causation of diseases, development of pure culture methods • The scope of microbiology	Assignments + Readings
Week 2	• Microbial evolution, systematics and taxonomy • Characterization and identification of microorganisms • Nomenclature and Bergey's manual	Assignments + Readings
Week 3	**Unit-II: Viruses** • Bacteriophages and phages of other protists • Replication of bacteriophages • Viruses of animals and plants • History, structure and composition	Assignments + Readings
Week 4	• Classification and cultivation of animal viruses • Effects of virus infection on cells • Cancer and viruses	Assignments + Readings
Week 5	**Unit-III: Morphology and fine structure of bacteria** • Size, shape and arrangement of bacterial cells • Flagella and motility, Pili, Capsules, sheaths, Prosthecae and stalks	Assignments + Readings
Week 6	• Structure and chemical composition of cell wall • Cytoplasmic membrane • Protoplasts, spheroplasts, the cytoplasm, nuclear material	Assignments + Readings
Week 7	**Unit-IV: Cultivation of bacteria** • Nutritional requirements and nutritional types of	Readings

	bacteria • Physical conditions required for growth	
Week 8	• Bacteriological media • Choice of media and conditions of incubation	Readings
Week 9	**Unit-V: Reproduction and growth of bacteria** • Modes of cell division • New cell formation, Normal growth cycle of bacteria, synchronous growth, Continuous culture	Readings
Week 10	• Quantitative measurement of bacterial growth, Direct microscopic count, Electronic enumeration of cell numbers, the plate count method, Membrane-filter count, Turbidimetric method • Determination of nitrogen content and dry weight of cells • The selection of a procedure to measure growth and importance of measurement of growth	Readings
Week 11	**Unit-VI: Pure cultures and cultural characteristics** • Natural microbial populations, Selective methods, Chemical methods, Physical methods, Biological methods, Selection in nature • Pure cultures, Methods of isolating pure cultures, Maintenance and preservation of pure cultures, Culture collections	Readings
Week 12	• Cultural characteristics • Colony characteristics • Characteristics of broth cultures	Readings
Week 13	**Unit-VII: Eukaryotic microorganisms** • Algae: Biological and economic importance of algae • Characteristics of algae; Lichens. Fungi: Importance of fungi	Readings
Week 14	• Morphology; Physiology and reproduction, Cultivation of fungi • Economic importance of protozoa	Readings
Week 15	**Unit-VIII: Prokaryotic diversity** • Purple and green bacteria, cyanobacteria, prochlorophytes, chemolithotrophs, methanotrophs and methylotrophs, sulfate and sulfur-reducing bacteria, homoacetogenic bacteria • Budding and appendaged bacteria, spirilla, spirochetes, Gliding bacteria, Sheathed bacteria, Pseudomonads, Free living aerobic nitrogen fixing bacteria, Acetic acid bacteria, Zymomonous and chromobacterium, Vibrio, Facultatively aerobic Gram-negative rods, Neisseria and other Gram-negative cocci, Rickettsias, Chlamydias, Gram-positive cocci, Lactic acid bacteria, Endospore forming Gram- positive rods and cocci, Mycoplasmas, High GC Gram-positive bacteria	Assignments + Readings
Week 16	• Actinomycetes, Coryneform bacteria, propionic acid bacteria, Mycobacterium, Filamentous Actinomycetes	Assignments + Readings

	• Archaea, Extremely Halophilic archaea, Methane producing archaea, Methanogens, Hyperthermophilic archaea, Thermoplasma	

Textbooks and Reading Material

1. Microbiology: An Introduction, 12th ed. (2018) by Gerard J. Tortora, Berdell R. Funke, Christine L. Case.
2. Prescott's Microbiology,10th ed. (2017) by Joanne Willey, Linda Sherwood and Christopher J. Woolverton.
3. Laboratory Experiments in Microbiology, 11th ed. (2015) by Ted R. Johnson and Christine L. Case.
4. Brock Biology of Microorganisms, 14th ed. (2014) by Michael T. Madigan, John M. Martinko, Kelly S. Bender, Daniel H. Buckley, David A. Stahl and Thomas Brock.
5. Alcamo's Fundamentals of Microbiology, 9th ed. (2012) by Jeffrey C Pommerville.
6. Bergey's Manual of Systematic Bacteriology(2012).
7. Microbiology Principles and Explorations (2001) by Jacquelyn, G.G.

Teaching Learning Strategies

The basic learning strategies for this course will be:
- • Lectures
- • Presentations
- • Group discussions
- • Assignments
- • Quiz

Assignments: Types and Number with Calendar

Each student will be assigned a separate topic as his/her assignment related to the subject matter for his/her better understanding and having grip on the subject.

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, practical, 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, field work and report writing etc.