

Programme	BS Biotechnology	Course Code	BCBT. 203	Credit Hours	2+1
Course Title	Microbiology				
Course Introduction					
<p>This course provides a comprehensive introduction to the field of Microbiology, designed for undergraduate students majoring in Biochemistry and Biotechnology. The curriculum covers the fundamental concepts of microbiology, including the characteristics, classification, and cultivation of microorganisms. Students will explore the historical foundations of microbiology, microbial nutrition, growth, metabolism, and the role of microbes in various industries. The course will also discuss the methods used to control microbial growth and the applications of microbiology in health, agriculture, industry, and environmental research.</p>					
Learning Outcomes					
<p>On the completion of the course, the students will:</p> <ol style="list-style-type: none"> 1. Describe the structure, function, and diversity of microorganisms. 2. Demonstrate laboratory skills in isolating and identifying microorganisms. 3. Analyze the role of microorganisms in disease, ecology, and biotechnology 					
Course Content					
<p>Theory Unit-</p> <ul style="list-style-type: none"> • Introduction, Scope and Importance of Microbiology • Historical Foundations of Microbiology • General Characteristics of Microbes • Bacterial Forms and Ultrastructure • Differences between Prokaryotic and Eukaryotic Cells • Methods of Microbiology, Microscopy Techniques, Staining Methods • Microbial Nutrition, Nutritional Types of Microorganisms, Nutrient Media and Culture Techniques • Microbial Cultivation, Aerobic and Anaerobic Cultivation, Isolation and Identification of Microbes • Reproduction and Growth of Microbes, Binary Fission and Growth Curve, Factors Affecting Microbial Growth • Metabolic Characteristics of Microbes, Catabolism and Anabolism, Fermentation and Respiration • Symbiotic Relationships, Mutualism, Commensalism, and Parasitism, Microbial Interactions • Taxonomy and Classification, Criteria for Classification, Nomenclature of Microorganisms • Physical Control of Microbes, Methods of Sterilization, Disinfection and Antisepsis • Chemical Control of Microbes, Antimicrobial Agents, Antibiotics and Disinfectants • Role of Microbes in Industry, Industrial Microbiology, Production of Antibiotics, Enzymes, and Biofuels • Role of Microbes in Agriculture, Soil Microbiology, Nitrogen Fixation and Biofertilizers • Role of Microbes in Health, Pathogenic Microorganisms, Human Microbiome 					

- Role of Microbes in Basic Research, Microbial Genetics, Use of Model Organisms
- Role of Microbes in the Environment, Bioremediation, Microbial Ecology

Practical Unit

- Sterilization techniques
- Culturing of Bacteria in liquid medium
- Culturing of bacteria in solid medium
- Gram staining of bacteria
- Colony and cell morphology
- Bacterial cell counts
- Growth curve
- Biochemical tests

Textbooks and Reading Material

2. Textbooks.

1. Dubey, R. C., & Maheshwari, D. K. (2023). *A textbook of microbiology*. S. Chand Publishing.
2. Green, L. H., & Goldman, E. (Eds.). (2021). *Practical handbook of microbiology (4th ed)*. CRC press.
3. GROSS, D. S. T., Faull, J., & Ketteridge, S. (2013). *Introductory microbiology*. Springer.
4. Parija, S. C. (2023). *Textbook of microbiology and immunology (4th ed.)*. Springer.

Teaching Learning Strategies

1. Class lecture
2. Class Discussions
3. Class Tutorials

Assignments: Types and Number with Calendar

5. 1st Quiz in 4th Week of 5 marks
6. 2nd Quiz in 10th Week of 5 marks
7. 3rd Quiz in 14th Week of 5 marks
8. 1st Assignment in 8th Week of 10 marks

Assessment

Sr. No.	Elements	Weightage	Details
4.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
5.	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.