Course Code	Course Name	Credits
26BY011	MICROBIOLOGY AND PLANT PATHOLOGY	04

Course Objectives

- Analyze microbial diversity, classification, and ecological roles in plant systems.
- Evaluate bacterial structure, genetics, and recombination for applied microbiology.
- Investigate viral replication strategies and their plant disease implications.
- Design disease management strategies through pathogen-host interaction analysis.

Learning Outcomes

Upon successful completion of this course, it is intended that a student will be able to:

- Classify microorganisms using the three-domain system and assess biofilm ecological roles.
- Model bacterial genetic recombination (transformation/transduction/conjugation/CRISPR).
- Diagnose plant diseases and develop integrated biocontrol strategies.
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Unit 1 - Microbial Diversity (12 Hrs.)

Historical development, scope. Classification: bacteria, archaea, yeast, protozoa, viruses, cyanobacteria. Three-domain system, Bergey's Manual. Ecological roles, microbial biofilms in plant rhizospheres.

Unit 2 – Bacteriology (12 Hrs.)

Structure: glycocalyx, S-layer, flagella, fimbriae, pili, cell wall, plasma membrane, cytoplasm, ribosomes, nucleoid, plasmids, endospores, inclusions. Genetics: chromosomes/plasmids, recombination (transformation, transduction, conjugation), CRISPR-Cas. Asexual reproduction.

Unit 3 - Virology (12 Hrs.)

Characteristics/classification (Baltimore). Structure: nucleic acids, capsid, envelope. Replication. TMV, T4 bacteriophage ultrastructures. Plant virus transmission.

Unit 4 – Plant Pathology Principles (12 Hrs.)

History, importance. Disease classification/symptoms. Disease triangle/interactions, epidemiology, forecasting. Koch's postulates. Plant microbiome in suppression.

Unit 5 - Major Plant Diseases (12 Hrs.)

Symptoms, development, biocontrol, integrated management of: Little leaf of brinjal; citrus canker; red rot sugarcane; Tobacco mosaic disease. Colocasia Leaf Blight, Anthracnose & Fruit Rot (King Chilli), Powdery Mildew (Mulberry/Common plants), Leaf Blight (Cabbage/Mustard), and Rice Blast & Sheath Rot (Rice).

Reference Books:

1. Willey, J. M., Sherwood, L. M., & Woolverton, C. J. (2023). *Prescott's Microbiology* (12th ed.). McGraw Hill.
2. Tortora, G. J., Funke, B. R., & Case, C. L. (2024). *Microbiology: An Introduction* (14th ed.). Pearson.
3. Madigan, M. T., Bender, K. S., Buckley, D. H., Sattley, W. M., & Stahl, D. A. (2021). *Brock Biology of Microorganisms* (16th ed.). Pearson Education Limited.
4. Pelczar, M. J., Jr., Chan, E. C. S., & Krieg, N. R. (2025). *Microbiology* (7th ed.). Affiliated East-West Press.
5. Cowan, M. K., & Smith, H. (2024). *Microbiology: A Systems Approach* (7th ed.). McGraw Hill.