

VANITA VISHRAM WOMEN'S UNIVERSITY
SCHOOL OF SCIENCES
DEPARTMENT OF MICROBIOLOGY



VANITA VISHRAM
WOMEN'S UNIVERSITY
— SURAT —

BACHELOR OF SCIENCE (B.Sc.) HONOURS
MICROBIOLOGY PROGRAMME
under Learning Outcomes-based Curriculum Framework (LOCF)
for Under Graduate (UG) Education

SEMESTERS 3
Skill Enhancement Course (SEC)

Syllabus applicable to the students seeking admission in the
B.Sc.- Microbiology (Honours)
under LOCF
w.e.f. the Academic Year 2022-2023

MB14010 Bio-fertilizer & Bio-pesticides
(4 Credits)

Course Objectives: PGPR, Biofertilizers, Nitrogen fixers, Mycorrhizal Bio-fertilizers, Bioinsecticides and Biopesticides

Course learning outcomes: By the conclusion of this course, the students-

Outcome 1. Have developed a very good understanding of practical aspects of the production of biofertilizers.

Outcome 2. Have developed a very good understanding of practical aspects of the production of biopesticides/bioinsecticides.

THEORY COURSE
(4 Credits)

Unit-1	Biofertilizers: General account of the microbes used as biofertilizers for various crop plants and their advantages over chemical fertilizers. Symbiotic N ₂ fixers: <i>Rhizobium</i> - Isolation, characteristics, types, inoculum production and field application, legume/pulses plants. Non-leguminous crop symbiosis. <i>Frankia</i> - Symbiotic relation, Isolation and characteristics.	12 Lectures
Unit-2	Cyanobacteria as biofertilizers- Isolation, characterization, mass multiplication, Role in rice cultivation, Crop response, field application. Non - Symbiotic Nitrogen Fixers- Free living <i>Azospirillum</i> , <i>Azotobacter</i> - isolation, characteristics, mass inoculums, production and field application.	12 Lectures
Unit-3	PGPR- Isolation, characterization, mass inoculum production, field application; Phosphate Solubilizers, Potassium solubilizer etc. Mycorrhizal Bio-fertilizers: Importance of mycorrhizal inoculum, types of mycorrhizae and associated plants, Mass inoculum production of VAM, field applications of Ectomycorrhizae and VAM.	12 Lectures
Unit-4	Bioinsecticides and Biopesticides: General account of microbes used as bioinsecticides & Biopesticides and their advantages over synthetic pesticides. Production, Field applications of biocontrol agents; Bacterial- <i>Bacillus thuringiensis</i> , Viruses – NPV, Baculovirus etc., Fungal- <i>Trichoderma viride</i> , and <i>Beauveria bassiana</i>	12 Lectures

Reference Books

1. Eldor A. Paul. Soil Microbiology. Ecology and Biochemistry. VI Edition: Academic Press, (2007).
2. Eugene L. Madsen. Environmental Microbiology: From Genomes To Biogeochemistry. I Edition, Wiley- Blackwell Publishing. (2008).
3. Agrios, G. N. Plant Pathology. Harcourt Asia Pvt. Ltd. (2000).
4. Buchanan. B. B., Grisse, W. and Jones, R. L. Biochemistry and Molecular Biology of Plants. I. K International Pvt. Ltd. (2000).
5. Mehrotra R S and Ashok Agrawal. Plant Pathology. Tata Mc Graw Hill, 6th reprint (2006).
6. K. S. Bilgrami, H. C. Dube. A textbook of modern pathology. 6th Edition, Vani Educational Books, a division of Vikas, (1984).
7. Shalini Suri. Biofertilizer and Biopesticide Aph Publishing Corp. (2011)

**MB14020 Microbial Diagnostics and Public Health
(4 Credits)**

Course Objectives: Diagnosis of diseases and their significance, various methods for diagnosis of infectious diseases; Microscopy, Culturing, Serological & Molecular Methods. Antibiotic Sensitivity testing for bacteria.

Course learning outcomes: By the conclusion of this course, the students-

Outcome 1. Have developed a very good understanding of practical aspects of the collection of different clinical samples, their transport, culture and examination by staining, and molecular and immunological diagnostic methods for diagnosis of microbial diseases.

Outcome 2. Have established a very good understanding of practical aspects of antibiotic sensitivity testing, water and food testing skills using kits available in the market.

**THEORY COURSE
(4 Credits)**

Unit-1	Importance of Diagnosis of Diseases: Bacterial, Viral, Fungal and Protozoan Diseases of various human body systems, Disease associated clinical samples for diagnosis. Collection of Clinical Samples: How to collect clinical samples (oral cavity, throat, skin, Blood, CSF, urine and faeces) and precautions required. Method of transport of clinical samples to laboratory and storage.	12 Lectures
Unit-2	Direct Microscopic Examination and Culture. Examination of sample by staining - Gram stain, Ziehl-Neelson staining for tuberculosis, Giemsa- stained thin blood film for malaria. Preparation and use of culture media- Blood agar, Chocolate agar, Lowenstein-Jensen medium, MacConkey agar, Distinct colony properties of various bacterial pathogens.	12 Lectures
Unit-3	Serological and Molecular Methods: Serological Methods- Agglutination, ELISA, immunofluorescence, immunochromatography, Nucleic acid based methods - PCR, Nucleic acid probes. Kits for Rapid Detection of Pathogens: Typhoid, Dengue and HIV, Swine flu.	12 Lectures
Unit-4	Testing for Antibiotic Sensitivity in Bacteria: Importance, Determination of resistance /sensitivity bacteria using disc diffusion method, E-Test, Determination of Minimal inhibitory concentration (MIC) of an antibiotic by serial double dilution method.	12 Lectures

Reference Books:

1. Willey, Sherwood, Woolverton. Prescott, Harley, and Klein's Microbiology McGraw-Hill publication
2. Tortora, Funke, Case. Microbiology. Pearson Benjamin Cummings.
3. Jacqelyn G. Black. Microbiology Principles and explorations. JOHN WILEY & SONS, INC.
4. Madigan, Martinko, Bender, Buckley, Stahl. Brock Biology of Microorganisms. Pearson
5. Ananthanarayan R and Paniker CKJ. Textbook of Microbiology. 7th Edition. University Press Publication. (2005).