

**Paper: MAJOR Paper code: UMICMAJ11001 Paper level: 100  
INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY  
(Paper type: THEORY)**

**Semester: I**

**Lecture Hours: 45 h    Marks: 40    Credits: 3**

**Unit 1 History of Development of Microbiology**

**No. of Hour: 10 h**

Development of microbiology as a discipline. Spontaneous generation vs. biogenesis. Contributions of Anton von Leeuwenhoek, Louis Pasteur, Robert Koch, Joseph Lister, Alexander Fleming. Role of microorganisms in fermentation, Germ theory of disease, Development of various microbiological techniques and golden era of microbiology. Development of the field of soil microbiology: Contributions of Martinus W. Beijerinck, Sergei N. Winogradsky with reference to chemoautotrophy, Selman A. Waksman. Establishment of fields of medical microbiology and immunology through the work of Paul Ehrlich, Elie Metchnikoff, Edward Jenner.

**Unit 2 Diversity of Microbial World**

**No. of Hour: 30 h**

General characteristics of different groups: Acellular microorganisms (Viruses, Viroids, Prions) and Cellular microorganisms (Bacteria, Algae, Fungi and Protozoa) with emphasis on distribution and occurrence, morphology, mode of reproduction and economic importance.

**Bacteria**

General characteristics of bacteria, Size, Shape and arrangement

**• Algae**

General characteristics of algae including occurrence, thallus organization, algae cell ultra structure, pigments, flagella, eyespot food reserves and vegetative, asexual and sexual reproduction. Different types of life cycles in algae with suitable examples: Haplobiontic, Haplontic, Diplontic, Diplobiontic and Diplohaplontic life cycles.

**• Fungi**

General characteristics of fungi including habitat, distribution, nutritional requirements, fungal cell ultra- structure, thallus organization and aggregation, fungal wall structure and synthesis, asexual reproduction, sexual reproduction, heterokaryosis, heterothallism and parasexual mechanism.

**• Protozoa**

General characteristics with special reference to *Amoeba*, *Plasmodium*

**Unit 3 Bacteriological techniques**

**No. of Hour: 5 h**

Pure culture isolation: Streaking, serial dilution and plating methods; cultivation, maintenance and preservation/stocking of pure cultures; cultivation of anaerobic bacteria, and accessing non-culturable bacteria. Microbiological media: Nutrient Agar and Potato Dextrose Agar.

## B.Sc. in Microbiology Syllabus, NBU

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### INTRODUCTION TO MICROBIOLOGY AND MICROBIAL DIVERSITY (Paper type: Practical)

Semester: I

Total Hour:30h Marks: 20 Credits: 1

1. Microbiology Good Laboratory Practices and Biosafety.
2. To study the principle and applications of important instruments (biological safety cabinets, Autoclave, incubator, BOD incubator, hot air oven, light microscope, pH meter) used in the Microbiology laboratory.
3. Preparation of culture media for bacterial cultivation.
4. Sterilization of medium using Autoclave and assessment for sterility
5. Sterilization of glassware using Hot Air Oven and assessment for sterility
6. Sterilization of heat sensitive material by membrane filtration and assessment for sterility
7. Detection of microflora in the environment by exposing nutrient agar Plates to air.
8. Study of *Rhizopus*, *Aspergillus* using scotch tape method
9. Study of the following protozoans using permanent mounts: *Amoeba*, *Plasmodium*
10. Preservation of bacterial cultures by various techniques.
11. Estimation of CFU count by spread plate method/pour plate method.
12. Isolation of pure cultures of bacteria by streaking method.

#### SUGGESTED READING

1. Tortora GJ, Funke BR and Case CL. (2008). Microbiology: An Introduction. 9th edition. Pearson Education
2. Madigan MT, Martinko JM, Dunlap PV and Clark DP. (2014). Brock Biology of Microorganisms. 14th edition. Pearson International Edition
3. Cappucino J and Sherman N. (2010). Microbiology: A Laboratory Manual. 9th edition. Pearson Education Limited
4. Wiley JM, Sherwood LM and Woolverton CJ. (2013) Prescott's Microbiology. 9th Edition. McGraw Hill International.
5. Atlas RM. (1997). Principles of Microbiology. 2nd edition. W.M.T. Brown Publishers.
6. Pelczar MJ, Chan ECS and Krieg NR. (1993). Microbiology. 5th edition. McGraw Hill Book Company.
7. Stanier RY, Ingraham JL, Wheelis ML, and Painter PR. (2005). General Microbiology. 5th edition. McMillan.