

## **B.Sc (MICROBIOLOGY)**

### **Semester – I**

<b>Code</b>	<b>Course title</b>	<b>Course Type</b>	<b>HPW</b>	<b>Credits</b>
<b>BS104</b>	<b>General Microbiology</b>	<b>DSE -1A</b>	<b>4</b>	<b>4</b>

Upon successful completion of the course, students are expected to be able to:

- ✚ Understand nature of science and scientific enquiries, and have mastered a set of fundamental skills and effect of microorganisms on everyday life, health, food, sanitation, genetic engineering.
- ✚ Have a thorough concept of microscopy, methods of staining and measurement
- ✚ Gain knowledge about how microorganisms are ubiquitous in nature with a concept on classification and general characteristics on microorganisms.
- ✚ Understand general characters of eukaryotes and viruses.

### **Semester - II**

<b>Code</b>	<b>Course title</b>	<b>Course Type</b>	<b>HPW</b>	<b>Credits</b>
<b>BS204</b>	<b>General Microbiology</b>	<b>DSE -1B</b>	<b>4</b>	<b>4</b>

Upon finishing the course in general microbiology students are able to :

- ✚ Perform and follow sterilization techniques and display a habit of good lab practices.
- ✚ Develop and have thorough knowledge of developing pure cultures and methods of preservation techniques
- ✚ Understand the fundamental biochemical principles, such as the structure/function of biomolecules
- ✚ Gain knowledge on current *biochemical* and molecular technique and carry out experiments.

### Semester - III

Code	Course title	Course Type	HPW	Credits
BS 104	Microbial Physiology & Enzymology	DSE -1A	4	4

By the conclusion of this course, the students should be able to:

- ✚ Identify the various physiological groups of bacteria with their special features.
- ✚ Detail the macromolecules required for cell synthesis and growth as well as explain the various transport systems involved in the uptake of nutrients by bacteria
- ✚ Devise and prepare media for isolation and growth of microorganisms, describe the different stages, methods and measurement of microbial growth and how environmental factors (pH, temperature, salt concentration) effect microbial growth, metabolism, and physiology.
- ✚ Explain the structure and function of enzymes, how enzymes are able to increase speed of an biochemical reaction, mechanisms of regulation of enzymatic action, importance of enzymes in regulation of metabolism
- ✚ Explain the principles of the energy-yielding and -consuming reactions, the various catabolic pathways(including **fermentations and photosynthesis**), and the mechanisms of energy conservation in microbial metabolism.

### Semester - IV

Code	Course title	Course Type	HPW	Credits
BS 204,	Microbial Genetics	DSC-1B	4	4

By the conclusion of this course, the students should be able to:

- ✚ Analyze the basic concepts of hereditary and the process of inheritance, understand the functions and molecular structures of DNA and RNA and how they serve as genetic information and concept of plasmids and transposons.
- ✚ Analyze the molecular mechanisms behind DNA damage and repair, classify mutations and discuss the various ways in which bacteria acquire new genetic information. (transduction, transformation, and conjugation)

- ✚ Conceptualise gene and their types and explain the processes and regulatory mechanisms governing the synthesis of nucleic acid and protein
- ✚ Explain the basic principles of genetic engineering (enzymes and vectors) and the applications of genetic engineering in various fields.

## Semester – V

Code	Course title	Course Type	HPW	Credits
BS 506	Immunology	DSE-1E-A	3	3

By the conclusion of this course, the students should be able to:

- ✚ Demonstrate a comprehensive and practical understanding of basic immunological principles involved in research and clinical/applied science.
- ✚ Differentiate between humoral and cell mediated immunity and Learn about the different cells in immune system and their role in immunity.
- ✚ Understand the concept of antigens, antibodies and their structures in brief.
- ✚ Understand about the types of hypersensitivity and autoimmunity.
- ✚ Discuss current immunology news and issues.

Code	Course title	Course Type	HPW	Credits
BS 506	Applied Microbiology	DSE-1E	3	3

On completion of this course, students should be able to:

- ✚ Understand the role of microorganisms as plant growth promoting bacteria and understanding the characteristics of soil.
- ✚ To understand the concepts and approaches to manage plant pathogens and diseases in crops and natural plant communities by measures that have minimal impact on the environment.
- ✚ To understand the concept of nitrogen fixation and role of microorganisms in the geochemical cycles and host- microbe interactions .
- ✚ Understand the role of microorganisms as agents of environmental change & recognize microorganisms as indicators & to understand microbial processes aimed to solve environmental problems.

## Semester – VI

Code	Course title	Course Type	HPW	Credits
BS 603	Medical Microbiology	DSC-1F	3	3

On completion of this course, students should be able to:

- ✚ Understand the importance and the role of normal flora, diagnosis and treatment.
- ✚ Description , classification, structure, and pathogenesis of bacteria that infect humans.
- ✚ To understand the importance of pathogenic bacteria in human disease with respect to infections of the respiratory tract, gastrointestinal tract, urinary tract, skin and soft tissue and explain the methods of microorganisms control, e.g. chemotherapy & vaccines. Solve problems in the context of this understanding.
- ✚ Recall the relationship of this infection to symptoms, relapse and the accompanying pathology.

Code	Course title	Course Type	HPW	Credits
BS 606	Food Microbiology	DSE-1F-A	3	3

On completion of this course, students should be able to:

- ✚ Understand the role microorganisms in food spoilage & to use predictive microbial growth programs with various food case studies to examine growth of foodborne pathogens and spoilage microbes.
- ✚ Understand theoretical background of functional micro-organisms (lactic acid bacteria, yeasts and molds), their behaviour as fermentation starters, process engineering aspects of the formation of biomass and products, and of modern biotechnology in food fermentation.
- ✚ Understand the concept of food preservation and food poisoning.
- ✚ Understand microbial processes aimed to solve environmental problems.