

B.Sc (MICROBIOLOGY)

Semester – I

Code	Course title	Course Type	HPW	Credits
BS, DSE -1A	General Microbiology	DSE -1A	4	4

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
- ✚ Understand general characters of prokaryotes and viruses
- ✚ Develop and have thorough knowledge of developing pure cultures and methods of preservation techniques.
- ✚ Identify the various physiological groups of bacteria and describe the nutrients 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.
- ✚ Explain the principles of the energy-yielding and energy-consuming reactions, the various catabolic pathways and the mechanisms of energy conservation in microbial metabolism.

Semester – II

Code	Course title	Course Type	HPW	Credits
BS DSC-1B	Microbial Diversity	DSC-1B	4	4

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

- ✚ Understand the concept of Biodiversity & its Conservation as well as describe the elements of Biodiversity.
- ✚ Classify Bacteria as per the second edition of Bergeys manual of Systemic Bacteriology and understand the Haeckel's, Whittaker's & Carl Woese system of classification of Living Organisms.
- ✚ Study the comparative characteristics of prokaryotes and eukaryotes.
- ✚ Develop a good understanding of the characteristics of different types of microorganisms.
- ✚ Understand the Ecology, physiology and Metabolic diversity of Archaea bacteria (Extremophiles)
- ✚ Understand the physiology & Diversity of Gram Negatives (Cyanobacteria & Proteobacteria) & Gram Positives (Actinobacteria, Firmicutes, Bacteroidetes, and Acidobacteria).
- ✚ Describe the structural, physiological & metabolic characteristics of Eukaryotic Organisms. (Algae, Fungi, Protozoa)
- ✚ Classify the microbial interactions like Symbiosis, Neutralism, Commensalism, Antagonism, Synergism & Parasitism.
- ✚ Explain the diversity of cultivated & uncultivated microorganisms & also understand the Great Plate Count Anomaly.
- ✚ Learn the different techniques used to study Microbial Diversity.
- ✚ Gain Knowledge and also assess the different micro organisms present in the preserved and perturbed microbial ecosystems.

Semester III

Code	Course Title	Course Type	HPW	Credits
BS	Food & Environmental Microbiology	DSC-1C	4+2	5

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

- ✚ Understand the beneficial role of microorganisms in food processing and the microbiology of different types of fermented foods – pickles, sauerkraut, Kimchi, Idli, etc.
- ✚ Study the different types of microorganisms in milk and their activities - fermented dairy products (cheese, yogurt, Bulgarian milk) and their applications as probiotics and prebiotics
- ✚ Understand the significance and activities of microorganisms in different foods and role of intrinsic and extrinsic factors of microbial growth in foods leading to spoilage, and understand the principles underlying the preservation methods
- ✚ Understand of the basis of food safety regulations and discuss the rationale for the use of standard methods and procedures for the microbiological analysis of food
- ✚ Understand the role of microorganisms in water, air and safety standards to protect the environment
- ✚ Study the soil environment and microbes harbouring and influencing soil ecosystem and their participation in biogeochemical cycle and learn in detail the types and mechanisms of nitrogen fixation.

Semester IV

Code	Course Title	Course Type	HPW	Credits
BS	Medical Microbiology & Immunology	DSC-1D	4+2	5

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

- ✚ Know the conceptual basis for understanding pathogenic microorganisms and the mechanisms by which they cause disease in the human body transmitted by air water and through contact.
- ✚ Provides opportunities to develop informatics and diagnostic skills, including the use and interpretation of laboratory tests in the diagnosis of infectious diseases and use of lab animals in medical field.
- ✚ To understand the importance of pathogenic bacteria in human disease with respect to infections of the food born, Insect born , Zoonotic mode and viral infections
- ✚ Demonstrate and understanding of key concepts in immunology along with overall organization of the immune system.
- ✚ Begin to appreciate the significance of maintaining a state of immune tolerance sufficient to prevent the emergence of autoimmunity.
- ✚ To make them understand the salient features of antigen antibody reaction & its uses in diagnostics and various other studies.

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 food borne pathogens and spoilage microbes.
- ✚ Understand theoretical background of functional micro-organisms (lactic acid bacteria, yeasts and molds), their behavior 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.