

B.Sc. Microbiology(CBCS)

1. Programme outcomes:

- Insight into the world of microorganisms.
- Knowledge regarding the development of microbiology as a modern science.
- Usage of microbiological instruments.
- Knowledge regarding the Modern and advanced techniques in microbiology.
- Exposure to applications of the course (Microbiology) mainly in the field of agriculture, research, Food and dairy and other industries.

2. Programme specific outcomes:

- Students were provided with the knowledge to handle microbes and basic instrumentation used in microbiological laboratory.
- Various staining techniques to visualize, identify, characterize the microbes morphologically were taught to them.
- Various physical and chemical means of sterilization techniques were taught.
- Motivating the students to take up research activities and higher education in microbiology programme.

3. Course objectives:

- To introduce students to the basic knowledge of handling microbes and instruments.
- To develop practical skills in various staining techniques to visualize, identify, characterize the microbes.
- To educate students on various physical and chemical means of sterilization techniques.
- To guide students in research projects and to inculcate interest in research activities.
- To motivate students to take up higher education in microbiology.
- To visit various agricultural and research institutes, industries for providing an insight into the practical applications and job opportunities in the field of microbiology.

Course outcomes

SEMESTER	Code	Course title
I	BSC MBC 131	Basic Microbiology

After successful completion of this course students were able to:

- Demonstrate theory and practical skills in microscopy and their handling techniques and staining procedures.
- Understand the basic microbial structure and function and study the comparative characteristics of prokaryotes and eukaryotes and also understand the structural similarities and differences among various physiological groups of microbe.
- Understand various physical and chemical means of sterilization.
- Know General concepts of staining, sterilization, motility studies etc.

SEMESTER	Code	Course title
I	BSC MBCE 133	Bioinstrumentation

After successful completion of this course students were able to understand.

- Basic skills in microscopy, their handling techniques and specimen preparation for EM.
- Construction, principle and applications of various instruments.

SEMESTER	Code	Course title
I	BSC MBC 131	Microbial taxonomy and culture techniques

After successful completion of this course students were able to:

- Know various culture media and their applications and also understand various physical and chemical means of sterilization
- Know General bacteriology, mycology and virology
- Knowledge on aseptic techniques and ability to perform routine culture handling tasks safely and effectively
- Comprehend the various methods for identification of unknown microorganisms
- Understand the microbial transport systems and the modes and mechanisms of energy conservation in microbial metabolism – Autotrophy and heterotrophy
- Know the various Physical and Chemical growth requirements of bacteria and get equipped with various methods of bacterial growth measurement.

SEMESTER	Code	Course title
II	BSC MBCE 183	Microbial quality control in pharmaceutical industries

After successful completion of this course students were able to understand:

- Identify microorganisms of relevance to healthcare and the pharmaceutical industry and their sources.
- Discuss Microbial contamination/product spoilage and antimicrobial preservation of pharmaceutical formulations during production and in products.
- Understand various disinfection and sterilization techniques, evaluate the sterility testing, microbial assays, pharmacopoeial standards of sterilization process.
- Evaluate microbial content testing and sterility testing.
- Demonstrate a knowledge and understanding of microbiological assays of growth promoting and growth inhibiting substances.
- Acquire a Knowledge of GMP practices, concepts & guidelines of biosafety
- Management and disposal of biohazardous waste.

SEMESTER	Code	Course title
III	BSC MBC 131	Basic Biochemistry, Microbial physiology and Microbial Genetics

After successful completion of this course students were able to:

- Describe the concepts of pH and its biological significance, buffers, biological buffers systems and their importance.
- Understanding the laws of thermodynamics, concepts of entropy, enthalpy and free energy changes and their application to biological systems and various biochemical studies and reactions.
- Conceptual knowledge of aerobic and anaerobic respiration and various intermediary mechanisms involved, oxidative phosphorylation.
- Overview of major biomolecules – carbohydrates, lipids, proteins, amino acids, nucleic acids, classification, structure, function of the above mentioned biomolecules.
- Specify the biological significance of biomolecules in metabolism.
- Conceptual knowledge of properties, structure, function of enzymes, enzyme kinetics and their regulation, enzyme engineering, Application of enzymes in large scale industrial processes.

SEMESTER	Code	Course title
III	BSC MBCE 233	Clinical lab technology

After successful completion of this course students were able to understand:

- Management of Clinical microbiology laboratory.
- Knowledge on collection, transport and processing of clinical specimens.
- Understanding the techniques involved in examination of urine and blood samples.
- Laboratory methods in basic virology and mycology.

SEMESTER	Code	Course title
IV	BSC MBC 281	Molecular Biology, Recombinant DNA technology, Biostatistics and Bioinformatics

After successful completion of this course students were able to:

- Know the terms and terminologies related to molecular biology and microbiology.
- Understand the properties, structure and function of genes in living organisms at the molecular level.
- Explain the significance of central dogma of gene action.
- Have a conceptual knowledge about DNA as a genetic material, enzymology, and replication strategies.
- Understand the molecular mechanisms involved in transcription and translation.
- Describe the importance of genetic code and wobble hypothesis.

- Discuss the molecular mechanisms underlying mutations, detection of mutations and DNA damage and repair mechanisms.
- Explain the concept of recombination, and gene transfer mechanisms in prokaryotes and eukaryotes.
- Elucidate the molecular techniques involved in gene manipulation and rDNA technology.
- Explain the gene transfer methods for the production of transgenic animals.
- Address bioethical and biosafety issues related to animal transgenics.
- Handle and independently work on lab protocols involving molecular techniques like chromatography, electrophoresis, blotting techniques and nanotechnology.
- Knowledge regarding the basics of Biostatistics and Bioinformatics- understanding the tools of bioinformatic tools and their applications.

SEMESTER	Code	Course title
IV	BSC MBCE 283	Elemental concepts of microbiology

After successful completion of this course students were able to understand:

- Understand the basic staining procedures and various physical and chemical means of sterilization.
- Understand prokaryotes and eukaryotes and also understand the structural similarities and differences among various physiological groups of microbes.
- Know the spoilage mechanisms in foods and thus identify methods to control deterioration and spoilage.
- Role of microorganisms in human health and diseases.
- Role of microorganisms in agriculture.