

DEPARTMENT OF MICROBIOLOGY

{Programme Outcome, Programme Specific Outcome and Course Outcome}

Overview:

The aim of the undergraduate degree in Microbiology is to make students knowledgeable about the various basic concepts in wide ranging contexts which involve use of knowledge and skills of Microbiology. B.Sc. Microbiology is three year undergraduate programme covers wide range of basic and applied microbiology courses as well as a course of interdisciplinary nature. The course is designed to build a strong microbiology knowledge base in the student, and furthermore, acquaints the students with the applied aspects of this fascinating discipline as well. The student is thus equipped to apply the skill learnt in the programme to solving practical societal problem.

Objectives:

After obtaining this degree, a microbiologist may enter into the job market or opt for undertaking further higher studies in the subject. The programme offers skill enhancement courses that prepare the student for an eventual job in academia or industry, public health and play their role as microbiologist in a useful manner contributing their role in the development of the welfare of the society.

{A} Programme outcomes:

Upon completion of B. Sc. Microbiology programme student will be able to:

PO-1: Graduate will acquire adequate knowledge and leadership skill for successful career.

PO-2: Will inculcate the scientific temperament in the students and outside the scientific community.

PO-3: become aware on role of the microbiology in interdciplinary research as well as daily life.

PO-4: Will be able to learn independently and develop critical thinking.

PO-5: Will acquire practical skills, plan and execute experimental techniques independently as well as to analyse and interpret data.

PO-6: Will accomplish ability to communicate effectively and able to understand ethical responsibilities.

PO-7: Can develop a broader perspective of the discipline of microbiology to enable them to identify challenging social problems and plan their professional career to develop innovative solution for such problems.

PO-8: Competent enough to use knowledge and skill of microbiology to analyze problems involving microbes articulate these with peers/ team members and undertake remedial measures.

PO-9: Will carry on to learn and to adopt in a world of constantly evolving technology.

{B} Programme Specific Outcomes:

A graduate with B.SC. Microbiology will have the ability to:-

(Microbiology, Chemistry, Botany)

PSO 1: Acquire knowledge on fundamentals of Microbiology& basic techniques.

PSO 2: Understand details of diversity and morphology of microbial world.

PSO 3: Grasp the fundamental concepts of biochemistry.

PSO 4: Understand the structural difference among solids, liquids , gases and solutions

PSO 5: Gained the Knowledge in electrical and thermal properties of d- block elements through Free Electron Theory, Valency Bond Theory and Band Theory.

PSO 6: Analyze the structures of glucose, fructose and sucrose and their chemical properties.

PSO4: Use spectrophotometer to analyze known and unknown organic and natural compounds.

PSO 7: The students gained the knowledge relating to the interrelationships of different plant groups and their evolutionary tendencies

PSO 8: The students acquired the knowledge enough to differentiate animals plants and Micro organisms with their distinguishing characteristics.

PSO 9: Student of the gained the Knowledge and acquired capability of applying the Knowledge in the areas of like Agriculture, Plant Medicines, Horticulture and Tissue culture.

(Microbiology, Chemistry, Zoology)-

PSO 1 : Learned about Ecological adaptations and the knowledge of inter relationships of the animal with other groups like plants and microbes.

PSO 2 : The students gained practical knowledge about the pH , Alkalinity, concentration of oxygen and also analysis of human blood regarding types of blood groups, Estimation of Haemoglobin, total count of RBC ,WBC etc.

PSO 3: The students understood the applications of Zoology in Aquaculture, Vermiculture, Sericulture, Poultry Science and Fundamentals of Clinical Science and Immunology.

PSO 4: Explain the properties of metal Complexes and Transition Elements.

PSO 5: Applies the uses of drugs and Antibiotics in Daily life.

PSO 6 : Students will enable to get sufficient knowledge in principles and applications of microbiology to be applied as future prospect.

PSO 7 : Students will be able to develop efficient and effective methodologies based on modern techniques to be used in research institutions and industries.

{C} Course Outcomes:

Name of Course & Code	Course Outcomes
<p>GENERAL MICROBIOLOGY AND BASIC TECHNIQUES [Paper code-]</p>	<p><i>Upon successful completion of the course students will be able to:</i></p> <p>CO1: Acquainted with the historical account and development of microbiology as a scientific discipline.</p> <p>CO2: Will have a broad perspective of the scope of microbiology.</p> <p>CO3: Will have depth knowledge of basic microbiological techniques i.e. methods of sterilization, pure culture isolation, preservation, staining techniques.</p> <p>CO4: Will have acquired depth knowledge of diversity, classification structure, functional organization and economic importance of virus and bacteria.</p> <p>CO5: Will have detailed information on general characteristics, classification, structure, reproduction of fungi, various fungal diseases of crops.</p> <p>CO6: Will have gained knowledge of general characteristics, classification, structure, reproduction and economic importance of algae, protozoa and cyanobacteria.</p>

**BIOCHEMISTRY AND
PHYSIOLOGY**

[Paper code-]

Upon successful completion of the course students will be able to :

CO1: Will be thoroughly conversant with the structure of carbohydrates and proteins, their key properties and be able to detect their presence in samples by performing biochemical tests.

CO2: Will be able to explain structure, classification and properties of lipids and be able to detect their presence in samples by performing biochemical tests.

CO3: Will be able to gain depth knowledge of structure and types of nucleotides (DNA& RNA).

CO4: Will be able to understand structure, classification, and properties of enzymes.

CO5: Will be able to gain knowledge of enzyme kinetics, Michaelis menten equation, enzyme inhibition, Co-enzymes, Allosteric enzymes Isoenzymes, extracellular enzymes.

CO6: Will be able to explain concept of microbial metabolism- Bacterial photosynthesis and chemosynthesis, oxidative phosphorylation, Anaerobic catabolism of glucose, Fat metabolism, Deamination and transamination, Urea cycle.

CO7: Will have learnt the basic concept of Growth physiology and Transport system.

PRACTICAL SYLLABUS

CO1: Will gain depth practical knowledge of various instruments used in microbiological laboratory.

CO2: Will gain knowledge of preparation of culture media and pure culture isolation techniques.

CO3: Will be able to perform Micrometry of isolated organism..

CO4: Will be able to do qualitative tests for carbohydrates, lipid, amino acids

CO5: Will be able to estimate protein.

CO6: Will be able to do Assay of the activity of amylases.

**MICROBIAL
PHYSIOLOGY AND
GENETICS**

[Paper code- 0869]

Upon successful completion of the course students will be able to

CO1: Will be able to understand energy transformation, physiology of bacterial growth, sporulation, Replication of chromosome.

CO2: Will be able to explain concept of primary and secondary metabolism.

CO3: Will gain depth information about bacterial plasmids structure, properties, replication and amplification.

CO4: Will acquired with fundamental aspects of transposons, types and structure.

CO5: Will have learnt thoroughly lytic/ lysogenic swich in phage, single stranded DNA phage, mechanism of antibiotic resistance. And spread of antibiotic resistance.

CO6: Will get acquainted with concept of genetic recombination, genetic analysis of recombination in bacteria.

CO7: Will have learnt types of repair systems, various types of restriction enzymes.,dam, dcm methylase.

**PRINCIPLES OF
BIOINSTRUMENTATI
ON AND TECHNIQUES**

[Paper code- 0870]

Upon successful completion of the course students will be able to:

CO1: Will be able to understand principle, instrumentation and applications of Colorimetry, spectrophotometry, turbidimetry, nephelometry, luminometry and pH metry.

CO2: Will be able to explain concept of various types and wide applications of Chromatography.

CO3: Will gain depth information about Centrifuge and ultracentrifuge, microscopy and digital image analysis.

CO4: Will understand principle, requirements of animal tissue culture, concept of Decontamination, sterilization and Disinfection.

CO5: Will have learnt various types of electrophoresis and their application.

CO6: Will get depth knowledge of sequencing of proteins and nucleic acids, radioisotope techniques, enzyme purification and assay technique.

PRACTICAL SYLLABUS

CO1: Will gain practical knowledge of bacterial growth measurement, Determination of antibiotic resistance by plating method.

CO2: Asaying of the activity of amylase, catalase.

CO3: Gain practical knowledge on chromatography, Absorption curve of dyes, Testing of Beer's law.

**MOLECULAR
BIOLOGY AND
GENETIC
ENGINEERING**

[Paper code: 0923]

Upon successful completion of the course students will be able to:

CO1: Gain fundamental information about history of molecular biology and genetic engineering, model system, ethical issue.

CO2: Will get acquainted with basic aspects of mutation.

CO3: Will gain depth information about function of macromolecules; basic mechanism of replication of DNA, transcription, translation, genetic code, regulation of gene expression. In microbes.

CO4: Will be able to understand concept of DNA repair and restriction, Biology of plasmids, Bacteriophages, restriction enzymes.

CO5: Able to understand concept of plasmid and phage vectors, restriction and ligation of vectors, Selection vs screening of recombinant clones, analysis of recombinant clones, DNA sequencing, protein separation and identification methods.

**ENVIRONMENTAL
AND MEDICAL
MICROBIOLOGY**

[Paper code: 0924]

Upon successful completion of the course students will be able to:

CO1: Acquainted with the depth knowledge of Aeromicrobiology, airborne diseases, their symptoms and preventive measures.

CO2: Will have a broad perspective of Soil Microbiology, Microbial interactions and Biofertilizers.

CO3: Will have depth knowledge of biological nitrogen fixation, and Mycorrhizae.

CO4: Will gain depth information about Aquatic microbiology, ecosystem, waterborne diseases and preventive measures.

CO5: Will have detailed information on Food spoilage and food borne infections, biodegradation, bioaccumulation, biopesticides, and deterioration.

CO6: Will acquire with fundamental aspects of Industrial microbiology and their application.

CO7: Will learnt thoroughly the concept of solid/ liquid waste treatment, Useful byproducts, Biodegradation of Industrial wastes.

PRACTICAL SYLLABUS

CO1: Will gain practical knowledge of Characterization and identification of microbes from various sources.

CO2: biochemical identification of biodegraded organic molecules, microbial assessment of potable water/BOD/COD.

CO3: Will be able to gain practical knowledge of isolation of Genomic/plasmid DNA.

CO - CURRICULAR ACTIVITIES:

- **Hall seminar should be organized for personality development of students.**
- **Project work given for enhancing their writing skill.**
- **Site visit/ study tour organized.**
- **Model/ Poster presentation organized.**
- **Lecture by experts organized.**

EXTRA - CURRICULAR ACTIVITIES:

- **Students participated in Quiz/ Essay writing Competition.**
- **Students take part in SVEEP programme.**
- **Students take part in sports and various cultural activities.**
- **Students participate in NCC/NSS/Science club activities.**
- **Students participate in environmental project/ Green Clean College /Swakshata abhiyan.**

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