

Department of Microbiology

After the completion of B.Sc. Honours Degree Programme, the students will be able to achieve the following outcomes:

PO1: Professional knowledge: Acquire comprehensive knowledge of major concepts, theoretical principles and experimental findings of various subjects in pure sciences.

PO2: Critical thinking and Cognitive skills: Convey the intricate science information effectively and efficiently, analyze and solve the problems related to plants, animal sciences without relying on assumptions and guesses.

PO3: Environment and sustainability: Understand the impact of the scientific solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.

PO4: Effective Communication: Demonstrate familiarity with and will be able to analyze both verbally and in writing issues and forms of contemporary art with a clear understanding of historical precedents.

PO5: Instruments and Experiments: Acquire the skills in handling scientific instruments, planning and performing in laboratory experiments and drawing logical inferences from the scientific experiments.

PO6: Research and Analysis: Demonstrate analytical skill and proficiency in a range of tools and techniques used in research in science and interdisciplinary programmes.

PO7: Employability and higher Education: Show proficiency in professional, employability and develop soft skills required for higher education and placements.

PO8: Ethics: Imbibe ethical, moral and social values in personal and social life leading to highly cultured and civilized personality in the field of science.

PO9: Science and Society: Apply reasoning acquired by the scientific knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional science practice.

PO10: Interdisciplinary Learning: Integrate academic curriculum with other co-curricular goals, such as career development, life-long learning, develop interdisciplinary learning and opportunity to extend their knowledge across all disciplines.

PO11: Nation Building: Introspect and evolve into dynamic and creative individuals capable of socially productive, constructive actions that positively impact our Nation and the World at large.

Program Specific Outcomes (PSO)

Upon completion of the programme, the student will attain the ability to:

PSO1: Understand basic concepts of diverse group of microorganisms like eubacteria, archea, fungi, viruses

PSO2: Acquire practical skills of standard microbiological techniques like pure culture technique, preservation and maintenance of microbial culture, assessment of food quality.

PSO3: Produce entrepreneurs who can develop sustainable solutions in mushroom cultivation and small scale biofertilizer production.

PSO4: Skill enhancement in plant tissue culture and basic molecular biology techniques.

PSO5: Practical skills on handling of basic biophysical instruments which will help in future.

PSO6: Pursue career in academics, competitive examinations (FCI, IFS, BIS), biotech industry and other pharma industry.

PSO7: Acquire awareness towards gender, environment, sustainability, human values, and professional ethics and understand the difference between acting, responding, reacting to various social issues.

SEMESTER-I

MBIO CC101: Introduction to Microbiology

COURSE OUTCOME

After completion of the course, the student will be able to:

CO1: Understand Knowledge about contributions made by prominent scientists in this field

CO2: Comprehend Standard microbiological culture techniques

CO3: Apply Basic instrumentation in microbiology

CO4: Develop Knowledge about growth and nutritional requirement of microorganisms

SEMESTER-I

MBIO CC102 : Microbial Diversity

COURSE OUTCOME

After completion of the course, the student will be able to:

CO1: Understand Characteristics features of different groups of microorganisms

CO2: Analysis types of classification of microorganisms

CO3: Apply General characteristics acellular and cellular microorganisms (bacteria, Fungi, Algae, viruses, protozoa, archaea)

CO4: Understand the Ultrastructure of bacterial cells and methods of reproduction.

CO5: Develop knowledge of Nature of viruses and different viruses of animals, plants and bacteria (bacteriophages)

SEMESTER-II

MBIO CC203 : Biochemistry

COURSE OUTCOME

After completion of the course, the student will be able to:

CO1: Understand the Concept of Bioenergetics.

CO2: Analysis the Carbohydrates: types, structure and its storage form

CO3: Develop knowledge on Lipids: Types, structure and function

CO4: Learn about Vitamins : types, function, deficiency disease

CO5: Gain Knowledge on Proteins : structure, function, enzyme kinetics and inhibition

SEMESTER-II

MBIO CC204 : Agricultural Microbiology (Theory)

COURSE OUTCOME

After completion of the course, the student will be able to:

CO1: Study on microbial ecology and their interaction with environment.

CO2: Understand Plant microbe's interactions

CO3: Analysis Biofertilizers and biopesticides: their production techniques

CO4: Develop Production of biogas, biomethane and biohydrogen

CO5: Acquire a knowledge of GM Plants

SEMESTER-III

MBIO CC305 : Microbial Physiology And Metabolism (THEORY)

COURSE OUTCOME

After completion of the course, the student will be able to:

CO1: Understand the Growth characteristics of microorganisms inhabiting in extreme environment

CO2: Describe the mechanism of nutrient transport

CO3: Analysis the mechanism of energy generation in autotrophs, chemolithotrophs & heterotrophs

CO4: Acquire knowledge on mechanism of aerobic and anaerobic respiration mode

SEMESTER-III

MBIO CC306: Cell Biology (Theory)

COURSE OUTCOME

After completion of the course, the student will be able to:

CO1: Understand the structure of cell and function of various subcellular organelles

CO2: Demonstrate the protein sorting mechanism in ER, Golgi complex

CO3: Analysis the mechanism of cell signalling, cell cycle, cell division and cell death

CO4: Apply Practical skill of preparation of temporary and permanent slides for mitosis and meiosis.

SEMESTER-III

MBIO CC307: Molecular Biology (Theory)

COURSE OUTCOME

After completion of the course, the student will be able to:

CO1: The structure of the genetic material present in an organism i.e., DNA and RNA

CO2: Mechanism of replication, transcription and translation

CO3: The regulation of gene expression occurring in prokaryotes and eukaryotes

CO4: Practical skill in isolation of bacterial DNA and its visualization

SEMESTER IV

MBIO CC 408: Microbial Genetics

COURSE OUTCOME

After completion of the course, the student will be able to:

CO1: Understand Genome organization and extrachromosomal DNA in prokaryotes and eukaryotes

CO2: Analysis the Molecular mechanisms that underlie mutations.

CO3: Develop knowledge on Mechanisms of genetic material exchange (transformation, conjugation & transduction)

CO4: Apply Practical skill on study of auxotroph, mutagenic effect of mutagens and plasmid conformations.

SEMESTER-IV

MBIO CC409: Environmental Microbiology

COURSE OUTCOME

After completion of the course, the student will be able to:

CO1: Develop a better understanding of ecosystem and associated microflora

CO2: Analysis on idea of nutrient cycling with reference to C- cycle, N- cycle and other elements

CO3: Understand the Role of microorganisms in degradation of solid/liquid wastes

CO4: Apply Skills in isolation of *Rhizobium* & other microflora from rhizosphere & rhizoplane

SEMESTER-V

MBIO CC410: Food and Dairy Microbiology

COURSE OUTCOME

After completion of the course, the student will be able to:

CO1: Understand the Role of microorganisms in food spoilage

CO2: Analysis the Methods of food preservation

CO3: Develop knowledge on Role of microorganisms in production of fermented foods and probiotics

CO4: Apply Testing of milk quality and microorganism associated with various spoiled foods

SEMESTER-V

MBIO CC511: Industrial Microbiology (Theory)

COURSE OUTCOME

After completion of the course, the student will be able to:

CO1: Understand the Methods of isolation of microorganisms from different sources

CO2: Analysis the Methods of preservation of industrially important microbes

CO3: Apply Knowledge of different types of fermentation process and bioreactors

CO4: Demonstrate the Knowledge of downstream processes and enzyme mobilization techniques

SEMESTER-V

MBIO CC512: Immunology (Theory)

COURSE OUTCOME

After completion of the course, the student will be able to:

CO1: Gain Knowledge of various scientific contributions in the field of immunology

CO2: Understand Immune system and its response to pathogenic microorganisms

CO3: Develop Understanding of various immunological disorders

CO4: Apply Knowledge of various immunological techniques

SEMESTER-VI

MBIO CC613: Medical Microbiology

COURSE OUTCOME

After completion of the course, the student will be able to:

CO1: Understand the Microbiota of human and host pathogen interaction

CO2: Analysis Disease caused by the pathogenic microorganisms and its diagnosis

CO3: Develop understanding of common bacterial, viral, fungal, parasitic diseases of human being and animals

CO4: Develop Knowledge of various therapeutical measures to combat microbial diseases

SEMESTER-VI

MBIO CC614: Recombinant DNA Technology (Theory)

COURSE OUTCOME

After completion of the course, the student will be able to:

- CO1:** Understand the Concept of RDT & its application in the production of therapeutic products
- CO2:** Analysis the Genetic engineering tools for manipulation of DNA
- CO3:** Develop knowledge on DNA isolation techniques, PCR and gel electrophoresis
- CO4:** Perform Demonstration of Bacterial Transformation and calculation of transformation efficiency.

SEMESTER-VI

MBIO DSE501: Biostatistics

COURSE OUTCOME

After completion of the course, the student will be able to:

- CO1:** Develop basic knowledge of mathematics as applied to biological phenomenon
- CO2:** Understand the basic concepts of statistics and their importance
- CO3:** Apply Various statistical techniques to prove the significance of biological experiment
- CO4:** Demonstrate knowledge on Standard Deviation, Coefficient of Variation, Correlation and regression.

SEMESTER-V

MBIO DSE502: Microbes in Sustainable Agriculture and Development

COURSE OUTCOME

After completion of the course, the student will be able to:

- CO1:** Understand the Multifarious roles of microorganisms in the field of sustainable agriculture
- CO2:** Develop Knowledge of various microbiological process of soil
- CO3:** Understand the Knowledge of controlling plant pathogens to combat plant diseases
- CO4:** Demonstrate the Application of biofertilizers and biopesticides in agricultural fields
- CO5:** Apply Practical skill of mushroom cultivation

SEMESTER-VI

MBIO DSE603: Instrumentation and Biotechniques

COURSE OUTCOME

After completion of the course, the student will be able to:

- CO1:** Understand the Instruments and its techniques to study microbes and its biomolecules
- CO2:** Develop depth Knowledge of observing microbial world through microscopy technique
- CO3:** Analysis the Biomolecule separation techniques: chromatography, gel electrophoresis, spectrophotometry
- CO4:** Apply Demonstration of column packing in any form of column chromatography

SEMESTER-VI

MBIO DSE604 : Project Work / Dissertation (6 Credits)

COURSE OUTCOME

After completion of the course, the student will be able to:

- CO1:** Apply Experimental approach of various scientific phenomena
- CO2:** Enhance knowledge on research aptitude and designing experiments independently
- CO3:** Develop knowledge on Augmenting reading habit of research/review articles
- CO4:** Skilled knowledge on project work

SEMESTER-I

MBIO GE101: Introduction and Scope of Microbiology

COURSE OUTCOME

After completion of the course, the student will be able to:

- CO1:** Understand the General characteristics of acellular (viruses) and cellular microorganisms (bacteria, fungi, algae, protozoa, archaea)
- CO2:** Classify bacteria into different groups and methods of reproduction.
- CO3:** Develop depth knowledge of the chemical nature of viruses and different types animals, plants and bacteria (bacteriophages)
- CO4:** Study the principle and applications of important instruments autoclave, incubator, hot air oven, light microscope, pH meter) used in the microbiology laboratory

SEMESTER-II

MBIO GE202: Bacteriology and Virology

COURSE OUTCOME

After completion of the course, the student will be able to:

- CO1:** Understand the Ultrastructure of bacterial cells and their appendages.
- CO2:** Demonstrate the Methods of reproduction in bacteria.
- CO3:** Analysis Viruses: types (Plant virus, Animal virus and bacteriophage)
- CO4:** Study the morphological structures of viruses (DNA and RNA) and their important characters using electron micrographs

SEMESTER-II

MBIO GE202: Bacteriology and Virology

COURSE OUTCOME

After completion of the course, the student will be able to:

- CO1:** Understand the Ultrastructure of bacterial cells and their appendages.
- CO2:** Demonstrate the Methods of reproduction in bacteria.
- CO3:** Analysis Viruses: types (Plant virus, Animal virus and bacteriophage)
- CO4:** Study the morphological structures of viruses (DNA and RNA) and their important characters using electron micrographs

SEMESTER-III

MBIO GE303: Industrial And Food Microbiology

COURSE OUTCOME

After completion of the course, the student will be able to:

- CO1:** Demonstrate the Use of microorganisms in fermentation industry
- CO2:** Understand the Different parameters essential for large scale production of industrial products
- CO3:** Develop depth knowledge on different methods of food preservation and food sanitation
- CO4:** Apply Laboratory skills in producing alcohol and enzymes using bacteria/yeast

SEMESTER-IV

MBIO GE404: Microbes in Environment

COURSE OUTCOME

After completion of the course, the student will be able to:

- CO1:** Understand ecosystem and associated microflora
- CO2:** Develop understanding of microbial interactions with other organisms and among themselves

CO3: Demonstrate an idea of nutrient cycling with reference to carbon, nitrogen & other elements

CO4: Apply Skills in isolation of microbes from soil and potent enzymatic (cellulase, amylase) activity

SEMESTER-IV

MBIO SEC402: Biofertilizers and Biopesticides

COURSE OUTCOME

After completion of the course, the student will be able to:

CO1: Understand N₂ fixation, phosphate solubilization & mycorrhizal interaction in maintaining soil fertility

CO2: Developed skill on potent microorganism to be used as biopesticides

CO3: Analysis Viral diseases, their causal agent, symptoms, prevention and control measures

CO4: Develop depth knowledge on Bioinsecticides

SEMESTER-I

Ability Enhancement Compulsory Courses (AECC) English

ENG AEC101 : English Communication

COURSE OUTCOME

After completion of the course, the student will be able to:

CO1: Communicate effectively using the techniques in the area of spoken as well as written communication.

CO2: Hone their LSRW skills within their communication.

CO3: Design and answer job interview questions

CO4: Demonstrate the ability to craft professional messages that are clear yet courteous.

HINAECC101– हिंदी-व्याकरण और सम्प्रेषण

परिणाम - 1. विभिन्न प्रतियोगी परीक्षाओं के लिए तैयार करना ।

२. सम्प्रेषण-क्षमता की वृद्धि करना ।

३. कार्यालयी-पत्र लेखन की क्षमता विकसित करना ।

४. हिंदी के व्याकरणिक एवं सैद्धांतिक स्वरूप की जानकारी हासिल करना ॥

SEMESTER-II

EVS_AEC 202 : Environmental Science

Course Outcomes:

After completion of the course, the students will be able to:

CO1: Understand multidisciplinary nature of environmental studies.

CO2: Understand the concept and types of natural resources and environmental pollution.

CO3: Evaluate the anomalies created due to haphazard population growth and its impact on environment.

CO4: Understand about the organizations, conventions and legislations working on mitigation of environmental issues.

SEMESTER-II

IRS_SEC301 : Inter-Religious Studies

Course Outcomes:

After completion of the course, the students will be able to:

CO1: Develop Inter-religious harmony & better understanding of other religions.

CO2: Interpret the different religions of the world.

CO3: Identify the common elements that bind different religions together.

CO4: Acquaint with the salient features of different religions.