GOVERNMENT GENERAL DEGREE COLLEGE, NARAYANGARH

# PROGRAMME OUTCOME (PO)

# &

# COURSE OUTCOME (CO)

*(Based on Curriculum & Credit Framework for Undergraduate Programmes (CCFUP), 2023 & NEP, 2020)*

## DEPARTMENT OF MICROBIOLOGY

# BACHELOR OF SCIENCE (HONOURS)

# MAJOR IN MICROBIOLOGY

**(From Academic Session 2023-2024)**

## PROGRAMME OUTCOME (PO)

*(Based on Curriculum & Credit Framework for Undergraduate Programmes (CCFUP), 2023 & NEP, 2020)*



Programme outcomes are as follows: -

1. Students will gain knowledge about the different cell organelles of microorganisms and their detailed functions to apply them in pharma, agriculture, and industry. It will develop critical thinking ability to identify and analyze problems thereby capable them to design solutions that meet specified goals.

2. Students will learn about the prokaryotic and eukaryotic cells by studying their structures and types. The basic difference between these two groups of cells will enable students to learn the basics of drug targets to design new drugs. Additionally, with knowledge fruitful solutions to various environmental issues can be found to propose sustainable development in the environment.

3. The programme will offer several scopes to demo classes that help a student to communicate proficiently (written or oral) and finally make them a responsible, modern microbiologist.

4. It offers to understand the research methods and to analyze, interpret, and derive a real conclusion.

5. Different bacteriological techniques involved in microbiology will be inoculated in their mind to involve them in cutting-edge research dealing with different areas of biological sciences. The programme will develop an aptitude towards research through the internship in various fields which promote and infuse professional ethics and code of practice among learners, empowering them to work within a team with a multidisciplinary perspective.

# BACHELOR OF SCIENCE (HONOURS)

# MAJOR IN MICROBIOLOGY

**(From Academic Session 2023-2024)**

## PROGRAMME SPECIFIC OUTCOME (PSO)

*(Based on Curriculum & Credit Framework for Undergraduate Programmes (CCFUP), 2023 & NEP, 2020)*



By the end of the program, students will be able to:

1. Demonstrate a thorough understanding of cell organelles and their functions in microorganisms, applying this knowledge to solve problems in pharmaceutical, agricultural, and industrial contexts. This will also enhance their ability to critically analyze problems and design effective solutions.

2. Utilize their knowledge of prokaryotic and eukaryotic cell structures and differences to understand drug targets and contribute to the development of new pharmaceuticals. Additionally, apply this knowledge to address environmental challenges and propose sustainable development strategies.

3. Exhibit strong communication skills, both written and oral, developed through various practical and theoretical components of the program, preparing them to be responsible and modern microbiologists.

4. Understand and apply research methodologies to analyze, interpret, and derive conclusions from experimental data, fostering the ability to conduct meaningful research in microbiology.

# BACHELOR OF SCIENCE (HONOURS) MAJOR IN MICROBIOLOGY

## (From Academic Session 2023-2024)

# COURSE OUTCOME (CO)

*(Based on Curriculum & Credit Framework for Undergraduate Programmes (CCFUP), 2023 & NEP, 2020)*

## SEMESTER – I

### Major-1 MCBHMJ101(T): Introduction to Microbiology & Microbial Diversity

After the completion of the course-

- The students will develop a good knowledge of the expansion of the discipline of Microbiology and the contributions made by different scientists in this field.
- They will develop an excellent understanding of the characteristics of different types of microorganisms, methods to organize/classify them, and basic tools to study them in the laboratory.
- The program will allow them to explain the usefulness and harmfulness of microorganisms in different fields including agriculture, medicine, and industries.
- The students will be familiar with the basic handling of microorganisms and will be able to perform basic experiments to grow and study microorganisms in the laboratory.
- Students will gain a clear knowledge of the different types of microorganisms and their significance. The evolution of medical microbiology is summarized in chronological order to help the students relate the arrival of different techniques at different times.
- Students will study the growth of different types of microorganisms based on various environmental factors.
- Students will also learn about viruses and eukaryotic cell structure in detail.

### Major-1 MCBHMJ101(P): Introduction to Microbiology and Microbial Diversity - [Lab]

After the completion of the course-

- Students will study different modern techniques used in agriculture, medical or environmental microbiology.
- The concept of sterility with the tools to overcome contaminations will be learned practically.
- Students will grow a general idea regarding the structure of various pathogenic microbes.

### SEC MCBSEC01 (P): Biosafety and Instrumentation

After the completion of the course-

- Students will understand the basic concept of biosafety to work in any microbiology lab. Good laboratory practices are another important area to convey through this course.
- Students will acquire a full knowledge of working in a microbiology laboratory taking all safety measures, handling live bacteria, disposal of infectious waste, and care of the equipment requiring safety measures.
- Students will develop an understanding of principles, and applications of different microscopic and spectrophotometric methods.
- An all-around development in the understanding of principals, and applications of different separation techniques especially chromatographic, electrophoretic, and centrifugation techniques.
- Concepts of quantitative and qualitative analysis will be inoculated into the brain of the students which will help them to design experiments in different epigenetic changes related to research.



## SEMESTER – II

### Major-2 MCBHMJ102 (T): Bacteriology

After the completion of the course-

- It extensively describes the characteristics of bacterial cells, cell organelles, cell wall composition, and various appendages like capsules, flagella, or pili.
- Students will be efficiently able to differentiate a large number of common bacteria by their salient characteristics to classify them into different groups.

- Additionally, it describes the nutritional requirements of bacteria for growth which helps in developing knowledge and understanding that besides common bacteria several other microbes grow under extreme environments.
- Students will be able to perform basic laboratory experiments to study microorganisms; methods to preserve bacteria in the laboratory; and calculate the generation time of growing bacteria.

### Major-2 MCBHMJ102 (P): Bacteriology - [Lab]

After the completion of the course-

- Students will grow a practical knowledge of differential staining along with their protocol and significance. They will understand the basic difference between gram-positive bacteria and gram-negative bacteria
- Students will understand the protocol of Negative staining and Acid-fast staining or other staining related to unicellular organisms.
- Practical knowledge of bacterial growth and their numerical formula is another important area that students will acquire through this course. Students will understand the procedure of isolation of bacteria from different environmental sources.
- Not only isolation but preservation of these bacterial cultures by various approaches will also be learned in this course

### SEC MCBSEC02 (P): Microbial Analysis of Air and Water

After the completion of the course-

- This section will provide a clear understanding and skills in the analysis of air, water & soil.
- Additionally, students will develop a very good understanding of how analysis of water, air, and soil could be done and how different sectors of microbiology contribute to the control of environmental pollution.
- Students will understand the soured of different pathogenic microbes which are a global burden to human health.
- Students will learn different microbiological tests to characterize a particular group of microorganisms or differentiate various groups of microorganisms.