

M.Sc. Microbiology Course Outcomes

M.Sc. Microbiology

Course Outcomes

M.Sc. Microbiology is 4 semester course conducted by RTMNU, Nagpur as per the syllabus provided by Rashtrasant Tukadoji Maharaj Nagpur University, Nagpur. Each semester students have to take four theory papers, two Practicals based on four theory papers and a Seminar. Fourth semester has a four month Research Project Work. Course work is according to theory paper, practicals and seminar conducted throughout the program.

M. Sc. MICROBIOLOGY

Semester I

Paper – I (Code: 1T1) MICROBIAL METABOLISM (MM)

Course outcome

Students will be able to

•Course Objective The course learning objectives is to provide the core principles and specialized knowledge of— Carbohydrates, Lipids, Proteins, Vitamins, Porphyrin, cellular transport, law of thermodynamics, Lipid and Nitrogen metabolism.

Learning Outcomes Overview of major bio-molecules- carbohydrates, lipids, proteins, amino acids.— Conceptual knowledge of Proteins and its classification. Primary, secondary, super secondary,— tertiary and quaternary structure. The peptide bond- Ramachandran plot. The knowledge of vitamins, its classification, porphyrins and porphyrin ring system.— Specify the biological significance of cellular permeability and transport process.— 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. Concepts of lipid and nitrogen metabolism, oxidation of fatty acid, assimilation of nitrates,— ammonia assimilation.

Enzymology and Techniques (ET)

Paper -II (Code:1T2)

Course Objective To impart basic knowledge of enzyme kinetics, the parameters of the enzymatic reaction,— mechanisms of action of enzymes and inhibitors, dependence on the temperature and pH of the enzymatic activity, knowledge of the structure of enzymes and amino acids that build active sites of enzymes. To integrate the practical aspects of enzymology with the kinetic theories to provide a mechanistic— overview of enzyme activity and regulation in cells. To develop and understanding of enzyme development and rational drug designing.

Learning Outcome : The students will be able to make qualitative and quantitative description of the basic enzymatic— phenomena and processes. Understand the importance of mathematical and statistical methods required for the description,— interpretation of enzymatic phenomena and processes. Knows the basic concepts, terms and techniques used in enzymology.— Develop ability to link theoretical knowledge of enzymology with its practical application in— industry, health care and environmental protection.

Advance Techniques in Microbiology (ATM)

Paper-III (Code: 1T3)

Remember and comprehend techniques and instrumentation involved in studying basic biological phenomenon focusing on Spectrophotometry, Chromatography, Electrophoresis, Centrifugation viscosity and radioactivity.

• Evaluate the application of each technique in providing solution to Microbiology problems.

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Membrane structure and Signal Transduction (MSST)

Paper-IV (Code: 1T4)

Learning outcomes

After studying this course, you Student should be able to:

- understand the basic principles of signal transduction mechanisms, in particular the concepts of response specificity, signal amplitude and duration, signal integration and intracellular location
- give examples of different types of extracellular signals and receptors, and explain their functional significance
- describe the mechanisms by which different receptors may be activated by their respective ligands
- describe and give examples of the structure and properties of the major components of signal transduction pathways.

PRACTICAL-I (Code: 1P1)

Course outcome

Students will be able to

- Perform major experiments in cell biology and enzymology
- Work well and carefully in laboratory environment and with instruments

PRACTICAL-II (Code: 1P2)

Students will be able to

- Perform major basic in molecular biology
- Perform basic techniques in understanding biomolecules and Biophysical techniques

SEMESTER – II

Microbial Methods for Environment Management (MEM)

Paper-I (Code: 2T1)

Course Outcome

students will be able to

know and understand the role of microbes in biogeochemical processes in different ecosystems. The students will learn the basic microbiological principles, the methods in microbial ecology and their theoretical and practical use.

The knowledge can give the base for understanding processes and changes in the environment.

The students can get some skills to recognise the ecological problems and critical evaluation of the human impacts on pollution, climate changes and as well as environmental protection.

The lectures will be implemented with individual practical work in the laboratory and presentations of the seminars.

The students can get general competences in microbial ecology.

Microbial Metabolites

Paper-II (Code: 2T2)

Course Outcome

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Student will be able to

Understand Microbial metabolites, its classification, role of biopolymer and polyamines
Antimicrobial drugs types of antibiotic, mode of action.

Basic concept of vitamins their structure and chemistry, deficiency diseases of vitamins in human.

Medical Microbiology and Parasitology (MMP)

Paper-III (Code: 2T3)

Course Outcome

Student will be able to

Students will have clear understanding of microbial diseases, host- pathogen dynamics and challenges involved in keeping drug resistant microbes under control.

Immunology and Immunodiagnostics (IID)

Paper-IV (2T4)

Course Outcome

Student will be able to

- Remember and Understand basic concepts of Immunology.
- Appreciate and assess the various immunological techniques used for public health.

PRACTICAL-III (2P1)

Course outcome

Students will be able to

Acquire basic Microbiology laboratory skills like bacterial pure culture isolation, microscopy, Gram staining and biochemical analysis of pathogenic microbes

- Antibiotic resistant pattern and their clinical application.

PRACTICAL-IV (2P2)

Course outcome

Students will be able to

Understand experiments in Immunology

SEMESTER-III

Molecular Biology and Genetics (MBG)

Paper-I (3T1)

Course outcome

Students will be able to

Exhibit a knowledge base in genetics, cell and molecular biology, and anatomy and physiology

Demonstrate the knowledge of common and advanced laboratory practices in cell and molecular biology

Exhibit clear and concise communication of scientific data

Engage in review of scientific literature in the areas of biomedical sciences

Critique and professionally present primary literature articles in the general biomedical sciences field

SEMESTER-III

Recombinant DNA technology and Nano Biotechnology (RDTN)

Paper-II (3T2)

Course outcome

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Students will be able to

Acquire knowledge from basics to recent advancement in rDNA technology, concept of nanobiotechnology and its application.

Microbial Diversity, Evolution and Ecology (MDEE) – 1

Paper-III (3T3)

Course outcome

Students will be able to

Have developed a fairly good knowledge and understanding of different types of environments and habitats where microorganisms grow .

Microbial interaction with environment and their role

Student will get an knowledge of bacterial diversity with their extreme environment

Bioinformatics (BIF) – 1

Paper-IV (3T3)

Course outcome

Students will be able to

Understand the underlined concepts of Bioinformatics, genomics and its application in the field of Microbiology.

Core (Subject Centric)

(To be opted by students of Microbiology only)

Paper –IV (3T4)

Drugs and Disease Management (DDM)

Course outcome

Students will be able to

Understand various physicochemical properties of drug molecules in the designing the dosage form

Different antifungal agent and their role in diseases management.

PRACTICAL-V (Code: 3P1)

Course outcome

Students will be able to

Acquire basic knowledge of molecular biology techniques and their application in microbiology

PRACTICAL-VI (Code: 3P2)

Course outcome

Students will be able to

Acquire knowledge regarding tissue culture media preparation and basic techniques.

SEMESTER – IV (Code: 4T1)

Virology (VIR)

Paper-I

Course outcome

Students will be able to

This course imparts the knowledge on various groups of virus and their detail study. The main features of this syllabus apart from the recent advances in the virology like antivirals &

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their mode of action, general method of diagnosis course structure for better understanding of the up to date developments in the field of virology.

SEMESTER – IV (Code: 4T2)

Microbial Fermentation Technology (MFT)

Paper-II

Course outcome

Students will be able to

The students became trained manpower in microbial production of beverages, Antimicrobials, Organic acids and enzymes, downstream process and different fermentation products .

SEMESTER – IV (Code: 4T3)

Microbial Diversity, Evolution and Ecology (MDEE) – 2

Paper-III

Course outcome

Students will be able to

Demonstrate an understanding of what microorganisms are and what drives their metabolic activities (energetically, physiologically, evolutionarily).

Students will be able to recognize how evolution (via selective pressures and global habitat diversity) has led to microbial diversity.

Students will learn how to predict the functional roles of microorganisms in processes that maintain the biosphere's ecosystems, waters, soils, sediments, and atmosphere.

Students will understand the roles of microorganisms in ecosystem sustainability, and how microorganisms may be harnessed, via biotechnology, to ameliorate anthropogenic problems pertinent to ecosystem management, wastewater treatment, bioremediation, and public health issues.

SEMESTER - IV

Core (Subject Centric)

(To be opted by students of Microbiology only)

Paper – IV

4T4

Vaccines and Delivery System (VDS)

Course outcome

Students will be able to

Understand types of vaccines their mode of action, advance vaccine coming in market and their mode of action and learn drug delivery system.

PRACTICAL-VII (Code:4P1)

Course outcome

Students will be able to

Acquired basic knowledge of virus isolation, bacterial identification in food, enzyme kinetic study etc.

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their mode of action, general method of diagnosis course structure for better understanding of the up to date developments in the field of virology.

SEMESTER – IV (Code: 4T2) Microbial Fermentation Technology (MFT)

Paper-II

Course outcome

Students will be able to

The students became trained manpower in microbial production of beverages, Antimicrobials, Organic acids and enzymes, downstream process and different fermentation products .

SEMESTER – IV (Code: 4T3) Microbial Diversity, Evolution and Ecology (MDEE) – 2

Paper-III

Course outcome

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SEMESTER - IV

Core (Subject Centric)

(To be opted by students of Microbiology only)

Paper – IV

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Acquired basic knowledge of virus isolation, bacterial identification in food, enzyme kinetic study etc.


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