



Department of Microbiology

On successful completion of **B.Sc Microbiology** Programme, the students will

PSO1:	Prepare the students with basic knowledge in microbiological, medical, immunological and biochemical techniques in order to continue their career in higher degree.
PSO2:	Perform and communicate the experimental results in an understandable manner.
PSO3:	Evaluate and transmit knowledge in the field of microbiology.
PSO4:	Provide opportunity in the variety of fields including microbial ecology, cell and molecular biology, medical diagnostic microbiology.

Course Outcomes

I B.Sc Microbiology

FUNDAMENTALS OF MICROBIOLOGY

SUBJECT CODE: U1MBC11

In this course, the students will

CO1:	Gain knowledge on the introduction to the history and scope of Microbiology.
CO2:	Understand the classifications of microorganisms.
CO3:	The structure and functions of cell and cellular components of bacteria.
CO4:	Acquire knowledge about the salient features of <i>Archae</i> bacteria, virus and protozoa.
CO5:	Salient features of algae and fungi will be well known.

MICROBIAL PHYSIOLOGY

SUBJECT CODE: U2MBC2

In this course, the students will

CO1:	Gain knowledge on common nutrients, growth factors and types of media.
CO2:	Learns about the nutrient uptake by cells.
CO3:	Learn about the growth curve, generation time, measurement and factors affecting microbial growth.
CO4:	Compass the respiratory metabolism in microbes and photosynthetic accessory pigments.
CO5:	Gain the knowledge on bacterial photosynthesis, bioluminescence, sporulation in bacteria and fungi.



LAB: MAJOR PRACTICAL I (FUNDAMENTALS OF MICROBIOLOGY)

SUBJECT CODE: U1MBC1P

In this course, the students will

CO1:	Understand the working principle of different type of microscopy.
CO2:	Perform the basic techniques of media preparation, pure culture technique, hemocytometry, hanging drop technique and staining methods.

LAB: MAJOR PRACTICAL II (MICROBIAL PHYSIOLOGY)

SUBJECT CODE: U2MBC2P

In this course, the students will

CO1:	Learn the protocol for differential media and selective media preparation.
CO2:	Perform the various biochemical tests for the identification of bacterial & fungal culture.
CO3:	Gain the basic knowledge about the growth of bacteria by the measurement of growth curve analysis.

II B.Sc Microbiology

IMMUNOLOGY

SUBJECT CODE: U1MBC31

In this course, the students will

CO1:	Understand the types of immunity and human immune response.
CO2:	Gain knowledge on the structure and characteristics of antigen and antibody.
CO3:	Describe the general organization of MHC and antigen processing.
CO4:	Study about the autoimmune diseases and transplantation.
CO5:	Interpret the outcome on the basic immunological techniques.

MICROBIAL BIOCHEMISTRY

SUBJECT CODE: U2MBC4

In this course, the students will

CO1:	Deal with the basics of pH, buffer and bioenergetics.
CO2:	Understand the classification, structure, importance and metabolism of carbohydrates.
CO3:	Describe the structure and classification of proteins and enzymes.
CO4:	Explain the classification, properties and biological role of lipids.



CO5:	Discuss about the structural basics of nucleic acids.
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LAB: MAJOR PRACTICAL III (IMMUNOLOGY) SUBJECT CODE: U1MBC3P

In this course, the students will

CO1:	To make the students knowledgeable with respect to the subject and its practicable applicability.
CO2:	To give exposure to the students to different techniques used in clinical laboratory to detect the diseases.
CO3:	To develop the ability to apply the knowledge of microbiology in day to day life.

LAB: MAJOR PRACTICAL IV (BIO CHEMISTRY) SUBJECT CODE: U2MBC4P

CO1:	Estimate the biomolecules and preparation of buffers.
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III B.Sc Microbiology

MICROBIAL GENETICS AND MOLECULAR BIOLOGY

SUBJECT CODE: U2MBC51

In this course, the students will

CO1:	Give the basic information about the structure, function and types of nucleic acid.
CO2:	Explain the various types of mutation and repair mechanism.
CO3:	Elaborate the mechanism and enzymes involved in DNA replication in prokaryotes.
CO4:	Describe the mechanism of bacterial translation and transcription process.
CO5:	Give the basic concepts on the gene expression and regulation in prokaryotes.

ENVIRONMENTAL AND AGRICULTURAL MICROBIOLOGY

SUBJECT CODE: U2MBC5P

In this course, the students will

CO1:	Understand the distribution and interactions of microbial population in soil fertility.
CO2:	Enlighten on the beneficial role of biogeochemical cycle.
CO3:	Evaluate the microbial utilization in waste water management.
CO4:	Understand the beneficial microbes & its applications in increasing soil fertility and as biocontrol agents.
CO5:	Give a clear idea about plant pathogens in agricultural field.



MEDICAL MICROBIOLOGY

SUBJECT CODE: U2MBC53

In this course, the students will

CO1:	Understand the characteristics of infectious diseases.
CO2:	Explain the mechanism of pathogenesis.
CO3:	Acquire knowledge about the bacterial diseases.
CO4:	Study the cause, symptoms and prevention of viral and fungal infections.
CO5:	Describe about protozoan infections, antimicrobial agents and resistance mechanism of bacteria to those agents.

LAB: MAJOR PRACTICAL III (ENVIRONMENTAL, AGRICULTURAL AND MEDICAL MICROBIOLOGY)

SUBJECT CODE: U1MBC3P

In this course, the students will

CO1:	To develop skills required in various industries, research labs and in the field of human health.
CO2:	To focus on detection, selection and validation of drugs against human pathogens.
CO3:	To learn the basic technique to evaluate the role of microorganisms in agriculture field.

RECOMBINANT DNA TECHNOLOGY

SUBJECT CODE: U2MBC61

In this course, the students will

CO1:	Understand the basic enzymatic tools used in recombinant DNA production.
CO2:	Understand the structure of various vectors.
CO3:	Provide basic knowledge on extraction, purification and sequencing of nucleic acids.
CO4:	Give the idea about various techniques involved in the construction of recombinants.
CO5:	Deal with the applications of recombinant products and its frame work on patenting.

FOOD AND INDUSTRIAL MICROBIOLOGY

SUBJECT CODE: U2MBC62

In this course, the students will

CO1:	Describe the role of microorganisms in food and food borne diseases.
CO2:	Explain the various methods of food preservation.
CO3:	Give the knowledge on the basic design of fermentor and its types.



CO4:	Describe industrially important and application of microorganism in the production of fermented foods.
CO5:	Gain awareness on the food adulteration and detection of adulterants.

BIOINFORMATICS

SUBJECT CODE: U2MBC63

In this course, the students will

CO1:	Give the basic idea about bioinformatics and types of database.
CO2:	Elaborate the nucleotide sequence and genomic database. (TIGR)
CO3:	Explain the various database of protein such as PDB SWISS PORT etc.
CO4:	Give the basic idea about the sequence alignment methods using BLAST aid FASTA and metabolic database such as KEGG etc.
CO5:	Describe the methods, application of multiple sequence alignment and phylogentic analysis.

LAB: MAJOR PRACTICAL IV (MICROBIAL GENETICS, FOOD AND INDUSTRIAL MICROBIOLOGY)

SUBJECT CODE:

In this course, the students will

CO1:	To expose the students to various emerging areas of Microbiology.
CO2:	To expose the students to different processes used in food industries and in research field.
CO3:	Learning the industrial aspects and techniques such as DNA isolation, screening of microbial pathogens in food and microbial fermented foods.

M.Sc Microbiology

On successful completion of **M.Sc Microbiology** Programme, the students will

PSO1:	To acquire knowledge and gain exposure to upcoming areas including genetic engineering, bioinformatics, medical and immunological microbiology, food and industrial microbiology.
PSO2:	To facilitate the latest technological information pertaining to the emerge of molecular biology, infectious disease, laboratory safety and self preventive measures from hazardous agent.
PSO3:	To acquire the practical skills necessary for small and medium scale production of



	microbial products in the laboratory.
PSO4:	To prepare the students with in-depth knowledge and inculcate research skills for professional careers in microbiology.
PSO5:	To enhance the intellectual foundation and preparation of students for their life in complex, dynamic, technological world.

I.M.Sc Microbiology

GENERAL MICROBIOLOGY AND MICROBIAL DIVERSITY

SUBJECT CODE: P2MBC11

In this course, the students will

CO1:	Gain knowledge on the history, classification and structure of microorganisms.
CO2:	Explain the basic principle and applications of microscope.
CO3:	Understand the microbial taxonomy.
CO4:	Gain information about virus, algal, fungal and algal classification.

BIOCHEMISTRY

SUBJECT CODE: P2MBC12

In this course, the students will

CO1:	To describe the various energy concepts their kinetic properties.
CO2:	Gain a wide knowledge about the structure and metabolism of carbohydrates.
CO3:	Make awareness on protein structure, classification, synthesis and breakdown into amino acids.
CO4:	Acquire knowledge in the classification, properties and metabolism of lipids.
CO5:	To explain the structure and functions of nucleic acids and describe the dietary source, daily requirements, & deficiency of vitamins.

MICROBIAL PHYSIOLOGY

SUBJECT CODE: P2MBC13

In this course, the students will

CO1:	Focus the types of nutrients and its transport to the microorganisms.
CO2:	Explain the various methods of microbial culture and the influence of various environmental parameters on microbial growth.
CO3:	Explain photosynthetic mechanisms, the pigment system and adaptation of microorganisms to the unfavorable environment.



CO4:	Deal with the microbial metabolism, ionic utilization, cell wall formation and their reproductive methods.
CO5:	Deal with the microbial metabolism, ionic utilization, cell wall formation and their reproductive methods.

LAB: GENERAL MICROBIOLOGY AND MICROBIAL DIVERSITY

SUBJECT CODE: P2MBC1P1

In this course, the students will

CO1:	Understand pure culture techniques, microbial observation and biochemical test to identify the organisms.
CO2:	Acquire knowledge in isolation of thermophiles, cyanobacteria, halophiles and actinomycetes.
CO3:	Interpret the knowledge on identifying the new entities.

LAB: MICROBIAL BIOCHEMISTRY AND MICROBIAL PHYSIOLOGY

SUBJECT CODE: P2MBC1P2

In this course, the students will

CO1:	Enable the students to estimate the biomolecules and measurement of bacterial growth and its effect on pH, temperature and osmotic pressure.
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IMMUNOLOGY

SUBJECT CODE: P2MBC21

In this course, the students will

CO1:	Give an overview on the importance of cells and lymphoid organs on generation of the immune response.
CO2:	Understand the structure and biological activities of different classes of immunoglobulins.
CO3:	Interpret the outcome of experiments that involve the use of various laboratory techniques in immunology.
CO4:	Understand the concept of immune based diseases as either a deficiency of components or excess activity as hypersensitivity.
CO5:	Define the current approaches and future strategies to immunoprophylaxis and immunotherapy of immune mediated and nonimmune mediated disease.



MEDICAL MICROBIOLOGY

SUBJECT CODE: P2MBC22

In this course, the students will

CO1:	Introduce the normal and pathogenic microbiota in the human system with its sources
CO2:	Deal with the general characteristics
CO3:	Describe general characteristics
CO4:	Explain the general characteristics
CO5:	Focus on the various sources of sample collection

MOLECULAR BIOLOGY AND MICROBIAL GENETICS

SUBJECT CODE: P2MBC23

In this course, the students will

CO1:	Give the brief knowledge on nucleic acid and DNA replication process.
CO2:	Understand the theory and mechanism of recombination and gains knowledge on transposable elements.
CO3:	Delineate the process of DNA translation and transcription.
CO4:	Describe the types and origin of gene mutation.
CO5:	Understand the basic principle of gene transfer mechanism for produce transformed cells.

LAB: MEDICAL MICROBIOLOGY AND IMMUNOLOGY

SUBJECT CODE: P2MBC2P1

In this course, the students will

CO1:	Provide the opportunity to diagnose the human diseases and the application of drugs in optimal level against the human pathogens.
CO2:	Give the broad knowledge to detect the blood antigens, disease causing agents and immunological reactions in the serum of human body.



LAB: MOLECULAR BIOLOGY AND MICROBIAL GENETICS

SUBJECT CODE: P2MBC2P2

In this course, the students will

CO1:	Understand the principle of replica plating, gradient plate and other isolation procedures.
CO2:	Give training on the production of transformation and UV mutant organism.

II M.Sc Microbiology

ENVIRONMENTAL & AGRICULTURAL MICROBIOLOGY

SUBJECT CODE: P2MBC31

In this course, the students will

CO1:	Provide knowledge on soil microflora and microbial interactions.
CO2:	Acquire knowledge about biogeochemical cycle, nitrogen fixation and microbes in waste water treatment.
CO3:	Give the basic knowledge about pollution types and its effects.
CO4:	Describe the role of microbes for sustainable agriculture.
CO5:	Elaborate the study on plant pathogens.

GENETIC ENGINEERING

SUBJECT CODE: P2MBC32

In this course, the students will

CO1:	Describe the general principle and role of enzymes in molecular biology.
CO2:	Gain the knowledge on various vector systems involved in gene cloning.
CO3:	Describe the various gene transfer technique in animal cell.
CO4:	Analyse the plant gene transfer techniques.
CO5:	Explain the application of recombinant DNA technology.

FERMENTATION TECHNOLOGY

SUBJECT CODE: P2MBC33

In this course, the students will

CO1:	Understand the basic principles of fermentation process, industrially important microorganism, screening, cultivation and their maintenance.
CO2:	Describe various types of fermentor and fermentation process.



CO3:	Learn about the fermentation kinetics and fermentation protocols.
CO4:	Describe downstream processing.
CO5:	Under the applications of fermentation technology.

LAB: MOLECULAR BIOLOGY AND MICROBIAL GENETICS

SUBJECT CODE: P2MBC2P2

In this course, the students will

CO1:	Acquire knowledge in water quality analysis, antibiosis, isolation of plant growth promoting bacteria and fermentation techniques.
CO2:	Provide the opportunity to act as a quality controller in water plant.

LAB: GENETIC ENGINEERING

SUBJECT CODE: P2MBC3P2

In this course, the students will

CO1:	Get hands on training in the isolation, separation and transformation of bacterial DNA.
CO2:	Develop skill on operating PCR instrument for getting future opportunities.

RESEARCH METHODOLOGY

SUBJECT CODE: P2MBC4

In this course, the students will

CO1:	Understand the concept of research and interpret the results in Thesis writing.
CO2:	Gain knowledge on principle and applications of separation techniques.
CO3:	Learn the applications of advanced molecular based techniques.
CO4:	Gain the knowledge on the methods of Biostatistics.
CO5:	Create awareness on the concept of biosafety and Intellectual property rights.

MICROBIAL NANOTECHNOLOGY

SUBJECT CODE: P2MBE4

In this course, the students will

CO1:	Understand the fundamentals, synthesis and characterization techniques involved in nanotechnology.
CO2:	Give general introduction of different classes of nanomaterials and their role in medicine.



CO3:	Give the potential uses of biosensors in today world.
CO4:	Understand the importance of nanofabricated materials in drug delivery.
CO5:	Make the learner familiarize with nanotechnology potentialities day today life.

Project & Viva-voce

SUBJECT CODE: P1MB4PV

In this course, the students will

CO1:	Enable the students to get the knowledge on pursuing research through experimental Biostatistical methods and computational areas of the subject.
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M. Phil., Microbiology

Programme Specific Outcomes

M.Phil., Microbiology on successful completion of M.Phil Programme the students

PSO1:	Will gain exposure to upcoming areas including recombinant DNA technology, bioinformatics, biostatistics and industrial microbiology.
PSO2:	Learn the mechanics of research and to obtain data.
PSO3:	Provide an additional learning experiences by means of structured project and expanding the student's exposure to particular area of microbiology.
PSO4:	Encourage students to take part in the research project and work towards publications and patents.
PSO5:	Prepare the students with in-depth knowledge and inculcate research skills for professional careers in microbiology.

Course Objectives

On successful completion of **M.Phil Microbiology** Programme, the students will

RESEARCH METHODOLOGY

SUBJECT CODE: M1MBC11

In this course, the students will

CO1:	Acquire knowledge about technologies concern with biological instruments.
CO2:	advanced molecular based techniques.
CO3:	Have broad knowledge to spectroscopic and other tracer techniques in microbiology.
CO4:	Know the concept on research and interpret the results in Thesis writing.
CO5:	Acquire knowledge on the methods of Biostatistics.



MICROBIAL BIOTECHNOLOGY AND BIOINFORMATICS

SUBJECT CODE: M2MBC12

In this course, the students will

CO1:	Know the describe various types of fermentor and fermentation process.
CO2:	Learn about the fermentation kinetics and fermentation condition.
CO3:	Provide knowledge on the production of fermentation products.
CO4:	Explain the concept of computer and nucleotide database.
CO5:	Describe the protein sequencing and genomic database.

RECOMBINANT DNA TECHNOLOGY AND NANOTECHNOLOGY

SUBJECT CODE: M2MBE11

In this course, the students will

CO1:	Describe the enzymes involved in recombinant DNA technology.
CO2:	Learn about the vectors involved in gene cloning.
CO3:	Understand the methods of gene transfer and gene expression.
CO4:	Explain the concept of gene sequencing and application of transgenic organisms.
CO5:	Give general information of different classes of nanomaterials and their role in medicine.