



NEW PRINCE SHRI BHAVANI ARTS & SCIENCE COLLEGE

(Co - Educational & Affiliated to University of Madras)

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PG DEPARTMENT OF MICROBIOLOGY

MSc., Applied Microbiology- Program File

Program Objectives (POs):

- ✚ The objective of the Master's Programme in Microbiology is to equip the students to apply knowledge of prokaryotic and eukaryotic cellular processes, classification, interaction of microorganisms among themselves, with physical and chemical agents and higher order organisms.
- ✚ The laboratory training in addition to theory is included to prepare them for careers in the industry, agriculture, and applied research where biological system is increasingly employed.
- ✚ Basics and current molecular updates in the areas of Industrial Microbiology, Fermentation Technology, Agriculture & Environmental Microbiology are included to train the students and also sensitize them to scope for research.
- ✚ To provide basic understanding of the principles of modern applied microbiology.
- ✚ To provide teaching and research activities in applied microbiology.
- ✚ The Master's Programme in Microbiology will address the increasing need for skilled scientific manpower with an understanding of research ethics involving microorganisms to contribute to application, advancement and impartment of knowledge in the field of microbiology.

Program Specific Outcomes (PSOs):

- ✚ The two years study of Master in Microbiology will impart in-depth understanding of basic aspects of microbiological science pertaining to industrial applications. The student will be able to assess treatment strategies

including the appropriate use of antimicrobial agents and common mechanisms of antimicrobial action and resistance.

- ✚ The courses of Industrial Microbiology & Fermentation Technology, Genetic Engineering, Microbial Genetics, Bio-analytical Techniques, Molecular Microbial Physiology, Agriculture & Environmental Microbiology, Animal Biotechnology, and Vaccinology will make the students ready to contribute to; Molecular, Biochemical, Industrial, medical and other basic and applied applications of better understanding of the key principles of microbial functioning at an advanced level.
- ✚ Production of substantial original research of significance and quality sufficient for publication. Awareness of ethical issues in Microbiology research and career options.

BSc.. Program File

Program Objectives (POs):

- ✚ To create a centre of Academic Excellence in the field of education in Microbiology.
- ✚ Provide a sound academic background for overall development of personality for a successful career in Microbiology.
- ✚ Provide an environment that fosters continuous improvement and innovation in the subject.
- ✚ Inculcate in student's right skills oriented towards self-development.
- ✚ To inculcate in students the need for the value of dignity of labor and the attitude and proper community orientation and civic responsibilities in their outlook.
- ✚ Develop an orientation towards the society as responsible citizens for excellent academic programme, involvement of students in day today management for specific duties.

Program Specific Outcomes (PSOs):

- ✚ Students will be able to describe diversity of microorganisms, bacterial cell structure and function, microbial growth and metabolism, and the ways to control their growth by physical and chemical means.
- ✚ Students will explain the role of microorganisms in food production and preservation, their ability to cause food-borne infections and demonstrate practical skills in fundamental microbiological techniques.
- ✚ Students will demonstrate engagement in the Microbiology discipline through involvement in their post-graduation period, research or internship activities, and outreach their goals specific to microbiology.

**NEW PRINCE SHRI BHAVANI ARTS AND SCIENCE
COLLEGE, MEDAVAAKAM, CH-100**

PG Department Of

Microbiology M.Sc., Course Objectives &

Course Outcomes

YEAR: I M.Sc.,

SEMESTER: I

SUBJECT: MICROBIAL TAXONOMY

SUBJECT CODE: MDT1A

COURSE OBJECTIVE:

The purpose of studying the paper is to gain detailed taxonomic classification of microbes.

COURSE OUTCOMES:

CO-1. Understanding and gaining knowledge in concepts and techniques for identification.

CO-2. Concepts related to extremophilic microbes and archaea.

CO-3. Significance and characteristics of algae and fungi.

CO-4. Characteristics of virus.

YEAR: I M.Sc.,

SEMESTER: I

SUBJECT:

SUBJECT CODE: MDT1B

GENERAL MICROBIOLOGY & LABORATORY ANIMAL SCIENCE

COURSE OBJECTIVES:

- Explain the theoretical basis of the tools technologies and methods common to general microbiology and immunology.
- Demonstrate practical skills in the use of tools, technologies and methods common to Microbiology and immunology.
- Describe methodological information.
- Apply concepts, basic research findings through description interpretation and analysis.

COURSE OUTCOMES:

CO-1. Understand the structures and functions of biomolecules.

CO-2. To know the functions of DNA replication, recombination and their repair mechanism.

CO-3. Gain the knowledge about protein synthesis and protein regulations.

CO-4. To Study the concepts of Genetic code, Gene silencing and gene regulations.

YEAR:I M.Sc.,

SEMESTER: II

SUBJECT:Immunology

SUBJECT CODE:MDT1C

COURSE OBJECTIVES:

- Knowledge the structure and function of organ systems.
- Study the pathogenesis of diseases, effective treatment and mechanisms of health maintenance to prevent diseases.
- To provide knowledge on how the immune system works building on their previous knowledge from biochemistry, genetics, cell biology and microbiology.
- Overview of the Immune system learning.

COURSE OUTCOMES:

CO-1.Gain knowledge about immunesystem.

CO-2.Studied the structure and functions of Antibody andAntigen.

CO-3.Skills in immunologicaltechniques.

CO-4.Provided knowledge in various mechanism of immunefunction.

CO-5.Importance in public health and awareness about immunologicaldiseases.

YEAR:I M.Sc.,

SEMESTER: I

SUBJECT:

SUBJECT CODE:MDT11

Practical-I:GENERAL MICROBIOLOGY &LABORATORY ANIMAL SCIENCE

COURSE OBJECTIVES:

- To develop skills and competencies in standard microbiological laboratory techniques.
- Train students in the proper use and maintenance of the research grade laboratory microscope with emphasis on oil immersion methods.
- Train students in aseptic technique, prophylaxis, and the proper methods relating to the safe manipulation and maintenance of microorganism.
- Train students in fundamental laboratory methodology to include the use of differential media, metabolic/enzymatic testing and associated reagents.
- Provide students with a hands-on familiarity with basic research procedure and associated critical and investigative thinking skills utilizing identification of unknown microorganismal specimens & Provide students with an understanding of important facts, concepts, and the investigative procedures of a microbiology producing accurate, skilled clinical laboratory workers with strong ethical and professional values.

COURSE OUTCOMES:

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

- CO-1.** Properly prepare and view microbiological specimens for examination using brightfield microscopy.
- CO-2.** Use pure culture and selective techniques to enrich for and isolate microorganisms, using proper aseptic technique.
- CO-3.** Estimate the number of microorganisms in a sample using viable plate counts
- CO-4.** Evaluate a microbiological problem in the context of an unknown microorganism, using appropriate media-based methods for identification. Accurately document and report observations and interpretations made during laboratory exercises.
- CO-5.** Use appropriate microbiological lab equipment and methods, in order to conduct and analyze experimental measurements relevant to microbiology. Practice safe microbiology, using appropriate protective and emergency procedures.

YEAR:IMSc

SEMESTER:I

SUBJECT:MetabolicPathway

SUBJECTCODE:MDTAA

COURSE OBJECTIVE:

Students will learn about the fundamental energetic of biochemical process biosynthesis of various amino acids, carbohydrate and lipid metabolism, understand about pathway regulation

COURSE OUTCOMES:

- CO-1:** Students gain knowledge about enzymes, mechanism and regulation of enzyme
- CO-2:** Understand and learn about bioenergetics and phosphorylation,
- CO-3:** Students gain knowledge about various biosynthesis process of biomolecules
- CO-4:** Students have clear idea about respiration and fermentation and about energy yield
- CO-5:** Students can describe amino acid structure, properties, interconversion of an amino acid.

YEAR:I M.Sc.,

SEMESTER:I

SUBJECT:MICROBIALDIVERSITY

SUBJECT CODE: MDTAB

COURSE OBJECTIVE:

The course helps students to acquire knowledge on the classification, cell wall membranes, genetic functionality, characteristic feature and adaptation features of different extremophiles for their survivability in their different ecosystems.

COURSE OUTCOMES:

- CO-1.** Describes the common groups of bacteria and archaea and their distribution and ecological niche.
- CO-2.** Understand the classification, habitats, biogeochemical process and applications of thermophiles and methanogens.
- CO-3.** It provides knowledge on the classification, cell wall membrane, solutes and osmoadaptation of halophiles and barophiles.
- CO-4.** Understand the objectives of space research, life detection methods for metabolism, photosynthesis, ATP production and Sulphur uptake.
- CO-5.** Learn about Antarctica as a model for mars and to search for life on mars by sending various mission, landers and conducting biology box experiment. As well monitoring of microflora in Martian environment and within astronauts.

YEAR:IM.Sc.,

SEMESTER:II

SUBJECT:Virology

SUBJECT CODE: MDT2A

COURSE OBJECTIVES:

- To understand the architecture of viruses.
- Understand the interactions between viruses and the host immune system.
- The terms Oncogenes and tumor suppressor genes, and how tumor viruses interact with these products and their intersecting pathways and cause oncogenesis.
- To know about the vaccine strategies and mechanisms of antiviral drugs and interferons.
- To know how viruses can be used as tools to study biological processes, as cloning vectors and for gene transfer.
- To study of epidemiology, diagnosis and treatment of viral diseases.

COURSE OUTCOMES:

- CO-1.** The process of entry into the cells, control of gene transcription and where relevant translation and gene product stability, control of and mechanism of genome replication, virion assembly and release from the cell.
- CO-2.** Define the growth behavior differences between normal cells and cells transformed by oncogenic DNA and RNA Viruses.
- CO-3.** Define the process of virus latency and describe in molecular terms control of the process and activation of viral genomes during reactivation.
- CO-4.** Describe the processes involved in the anti-tumor effects of “anti-tumor” viruses.

YEAR:I M.Sc.,

SEMESTER:II

SUBJECT:Medical Systematic Bacteriology

SUBJECT CODE:MDT2B

COURSE OBJECTIVES:

- Proforma development and direct examination of infectious human samples.
- Exposure of laboratory methods used in identifying infectious agents.
- Antibiotic sensitivity testing for pathogens.

- Epidemiology of infectious agents.
- Employing different staining methods for bacterial and fungal pathogens.
- Studies on the viral infections and cultivation.

COURSE OUTCOMES:

- CO-1.** Rationale and basis of classification of bacteria and to enumerate the order, family, genus and species.
- CO-2.** The morphology, cultural, biochemical and other biological properties and characteristics of medically important bacteria.
- CO-3.** The mechanism of virulence and pathogenesis and pathology.
- CO-4.** The disease caused by them, epidemiology, treatment, prevention and control.

YEAR:I M.Sc.,

SEMESTER:II

SUBJECT:Mycology&Parasitology

SUBJECT CODE:MDT2C

COURSE OBJECTIVES:

- Describe basic morphology, physiology of fungi and parasites.
- Classify parasites and fungi.
- Principles of safety, quality assurance and quality control.

COURSE OUTCOMES:

- CO-1.** To provide students both academic instruction and professional training in the field of laboratory medicine.
- CO-2.** To carry out the education of each student in a manner this encourages further education, participation in community service and maintenance of special interests in the field.
- CO-3.** Evaluate specimen acceptability.

YEAR:I M.Sc.,

SEMESTER:II

SUBJECT:BIOSTATISTICS&BIOINFORMATICS

SUBJECTCODE:MDTBA

COURSE OBJECTIVES:

- This course helps students emphasis on the application of bioinformatics and biological databases to problem solving in real research problems.
- This course helps students to learn computational tools to find sequences, analysis of protein and nucleic acid sequences by various software packages (BLAST, FASTA, Gen Bank etc.,)
- This course helps students gain knowledge on the different protein structure – MOTIFs, DNA Microarray and SystemMedicines.

COURSE OUTCOMES:

- CO-1.** Describes the contents and properties of the most important bioinformatics

databases, perform text- and sequence-based searches.

CO-2. Understand the major steps in pairwise and multiple sequence alignment by dynamic programming and predict the secondary and tertiary structures of protein and DNA sequences.

CO-3. Familiarized with various tools in identifying sequences for enhancing the advancements in system medicines.

YEAR:IM.Sc.,

SEMESTER:II

SUBJECT: Practical-II Systematic Bacteriology SUBJECT CODE:

MDT21 Mycology, Virology & Parasitology

COURSE OBJECTIVES:

- Identify common infectious agents
- Evaluate methods used to identify infectious agents
- Specific mechanisms by which an infectious agent causes disease
- Epidemiology of infectious agents
- Appropriate use of antimicrobial agents and common mechanisms of antimicrobial action and resistance
- Infection control measure and vaccines.

COURSE OUTCOMES:

CO-1. Rationale and basis of classification of bacteria and to enumerate the order, family, genus and species.

CO-2. The morphology, cultural, biochemical and other biological properties and characteristics of medically important bacteria.

CO-3. The mechanism of virulence and pathogenesis and pathology.

CO-4. The disease caused by them, epidemiology, treatment, prevention and control.

YEAR: I M.Sc.,

SEMESTER: II

SUBJECT: Industrial and pharmaceutical Microbiology SUBJECT CODE: MDTAC

COURSE OBJECTIVES:

- Enable Graduates to enter industry with an appropriate level of understanding of the need for both the science.
- Ability to apply the techniques used in industries.
- To produce new drug.

COURSE OUTCOMES:

CO-1. Get equipped with a theoretical and practical understanding of industrial microbiology.

CO-2. Know about design of bioreactor, factors affecting growth and production.

CO-3. Understand the rationale in medium formulation and design for microbial fermentation, sterilization of medium and air.

CO-4. Discuss microbial contamination , product spoilage and antimicrobial preservation of cosmetic products.

YEAR:IIM.Sc.,

Semester:III

SUBJECT:MicrobialGenetics

Subject Code:MDT3A

COURSE OBJECTIVES:

- To understand the structure and function of Plasmids and Transposons.
- Understand the importance of mutations.
- Understand how gene expression is controlled.
- To understand the mechanism of transfer of genetic material from one species to another.
- To understand the organization of gene and chromosome.
- To understand the mechanism, control and models in molecular recombination.

COURSE OUTCOMES:

CO-1. To analyze processes involved in gene mutation and transfer in microorganisms.

CO-2. To apply valid microbial genetic knowledge to commercial applications.

CO-3. Students can able to identify and distinguish genetic regulatory mechanisms at different levels

CO-4. To gain the knowledge of gene mapping and strain construction.

CO-5. Students can able to differentiate phenotypic and genotypic relationship.

CO-6. Students can gain the knowledge of organization of chromosome in Prokaryotes and Eukaryotes.

YEAR:IIM.Sc.,

SEMESTER:III

SUBJECT:Genetic Engineering

SUBJECT CODE:MDT3B

COURSE OBJECTIVE:

The purpose of this course is to introduce the basic molecular biological concepts and techniques used in the fields of genetic engineering.

COURSE OUTCOMES:

CO-1. Gaining an appreciable knowledge of dealing with ethical issues relating to science

CO-2. Gaining and understanding basic molecular and cellular biology concepts and techniques.

CO-3. Gaining the knowledge about current experimentation in genetic engineering.

YEAR:II M.Sc.,

SEMESTER: III

SUBJECT:Molecular Biology

SUBJECT CODE:MDT3C

COURSE OBJECTIVES:

- Provide knowledge about molecular biology and inheritance at the molecular, cellular and phenotypic levels.

- Gain laboratory skills in molecular biology techniques such as micro pipetting, PCR and electrophoresis.
- Study about the terminology of cell and molecular biology.

COURSE OUTCOMES:

- CO-1.** Understand the structures and functions of biomolecules.
- CO-2.** To know the functions of DNA replication, recombination and their repair mechanism.
- CO-3.** Gain the knowledge about protein synthesis and protein regulations.
- CO-4.** To Study the concepts of Genetic code, Gene silencing and gene regulations.

YEAR: IIM.Sc.,

SEMESTER: III

**SUBJECT: Microbial Genetics, Molecular Biology
Genetic Engineering**

SUBJECT CODE: MDT31 And

COURSE OBJECTIVE:

The purpose of this course is to provide knowledge about various separation, isolation techniques students will learn about electrophoresis and also advanced techniques.

COURSE OUTCOMES:

- CO-1:** Students can able to isolate DNA, RNA and perform electrophoresis.
- CO-2:** Students can isolate and estimate RNA.
- CO-3:** Students can perform SDS-PAGE, and also separate amino acids by thin layer chromatography and paper chromatography.
- CO-4:** They can able to separate proteins, immobilized enzyme, isolation of protoplast and spheroplast.
- CO-5:** Have clear idea about competent cells and also perform transformation.

YEAR: II M.Sc.,

SEMESTER: III

SUBJECT: Soil & Agricultural Microbiology

SUBJECT CODE: MDTAD

COURSE OBJECTIVE:

This course helps students to gain knowledge on the types of soil, microbial interactions in soil, nitrogen fixing organisms, bio fertilizer and bio pesticide production using microbes and plant disease management to promote prevention and enhance the plants growth.

COURSE OUTCOMES:

- CO-1.** Understand the properties of different types of soil and interaction of microbes with plants, insects and microbes itself.
- CO-2.** Insight knowledge on nitrogen fixing organisms, their cultivation on usage for biofertilizer and biopesticides.
- CO-3.** Learn the types of pathogen causing plant disease and their defense mechanism

by pathology, biochemical and molecular aspects.

CO-4. Efficient in understanding the different symptoms, epidemiology and management of various plant diseases like Tobacco Mosaic Diseases, Leaf spot of paddy etc.,

CO-5. Ability to use biotechnological methods to manage plant diseases, sanitation and plant disease forecasting.

YEAR:II M.Sc.,

SEMESTER: III

SUBJECT: ENVIRONMENTAL BIOTECHNOLOGY SUBJECT CODE: MDTBB

COURSE OBJECTIVE: To provide knowledge for environmental engineering, bioremediation control and monitoring, study on microbial growth kinetics.

COURSE OUTCOME:

CO-1: Students gain knowledge on biofilm occurrence, effect and control measures.

CO-2: Understand and learn about various bioreactor and its usage, effluent recycle

CO-3: Able to learn about waste water treatment, drinking water treatment, denitrification process.

CO-4: Learn about various hazardous chemical and biodegradation process

CO-5: Gains knowledge about control and bioremediation of various industry

YEAR:II M.Sc.,

SEMESTER:IV

**SUBJECT: FOOD, DAIRY & ENVIRONMENTAL
MICROBIOLOGY**

SUBJECT CODE:MDT4A

COURSE OBJECTIVES:

- This course helps students to learn the microflora in different foods and their role in spoilage, contamination, preservation and disease causing nature
- This course concentrates on the preparation of different fermented products (cheese, yogurt etc.), dairy microbiology, food sanitation process and different food control agencies and their regulations.
- The course provides knowledge on Micro flora in air – techniques to assess air quality, air sanitation and air borne disease causing pathogen
- It helps students learn about water microbiology – fauna and flora in aquatic habitat and ecology factors on environment.
- As a part of serving nation this course provides knowledge on treatment of liquid and solid wastes by different method (composting, silage, saccharification etc.,)
- It also helps students to study how to degrade xenobiotic compounds like petroleum, paper, wood etc., to reduce the load of pollutants in environment
- To provide students knowledge on bioaccumulation of heavy metals, biofouling and bioleaching to control pollution.

COURSE OUTCOMES:

CO-1. Understand the role of intrinsic and extrinsic factors on growth and survival of microorganisms in foods, their spoilage mechanism and preservation and prevention methods.

CO-2. Learn the basis of food safety regulations and the use of standard methods and procedures for the microbiological analysis of food.

CO-3. Know the beneficial role of microorganisms as well as the methods of processing and preparing different fermented foods like cheese, soy sauce etc.,

- CO-4.** Acquire the knowledge of different air micro flora and how to sanitize and assess the quality of air by various techniques.
- CO-5.** Learning about water microbiology helps to understand the different methods of water quality check and their related factors of microflora.
- CO-6.** Enhances the knowledge of students on waste treatment methods and methods to control pollution on the earth.
- CO-7.** Understand the role of microflora in degradation of xenobiotic compounds like petroleum, paper, wood etc., to reduce the load of pollutants in environment as well as emphasis on biofouling and bioleaching to control pollution.

YEAR:II M.Sc.,

SEMESTER: IV

SUBJECT:

SUBJECT CODE:MDT41

**SOIL, AGRICULTURAL, FOOD AND ENVIRONMENTAL MICROBIOLOGY
(PRACTICAL-IV)**

COURSE OBJECTIVES:

- It will provide an introduction to the microbial world and its impacts, both positive and negative on humans.
- Discuss about soil micro organisms
- Describe Food and dairy microorganisms and its impacts.

COURSE OUTCOMES:

- CO-1.** Introduction to a wide range of microbial life, to the techniques used to study microorganisms and to the interactions, both beneficial and adverse, between microbes and humans.
- CO-2.** Learn how to manipulate data from Microbiological experiments and how the results may be used for the benefits of mankind.
- CO-3.** Evaluate specimen acceptability.

YEAR:II M.Sc.,

SEMESTER: IV

SUBJECT:Research Methodology

SUBJECT CODE:MDTAE

COURSE OBJECTIVES:

- Problem identification.
- Reviewing information.
- Recent techniques in applied biology.

COURSE OUTCOMES:

- CO-1.** An overview of Education Research.
- CO-2.** Knowledge of the various research designs.
- CO-3.** Knowledge of how to do quality scholarly research including, identifying a research problem, review of literature, hypotheses, data collection, analysis the data, reporting and evaluating research.

PG Department Of Microbiology

B.Sc.,Course Objectives & Course Outcomes

YEAR:IB.Sc.,

SEMESTER:I

SUBJECT: GeneralMicrobiology&MicrobialPhysiology

SUBJECT CODE:TAN1A

COURSE OBJECTIVES:

- To understand the key features of the structure, growth, physiology and behavior of bacteria.
- To provide basic knowledge to deal with the study of genetic, metabolic strategies and ecology of microorganisms.
- To understand the main microbiological techniques to be applied in the laboratory.
- Students acquire knowledge to the use of bacteria in the lab and the main sterilization techniques.
- To provide students with the basis to face the study of the major fundamentals of microbiology including bacteriology, virology and immunology.

COURSE OUTCOMES:

After successful completion of this course students are expected to be able to:

- CO-1.** Demonstrate theory and practical skills in microscopy and their handling techniques and staining procedures.
- CO-2.** Understand the basic microbial structure and function and study the comparative characteristics of prokaryotes and eukaryotes.
- CO-3.** Know various Culture media and their applications and also understand various physical and chemical means of sterilization.
- CO-4.** Know General bacteriology and microbial techniques for isolation of pure cultures of bacteria, fungi and algae
- CO-5.** Know the various Physical and Chemical growth requirements of bacteria and get equipped with various methods of bacterial growth measurement.

YEAR: I B.Sc.,

SEMESTER: I

SUBJECT: Practical-I:

GeneralMicrobiology&Microbial Physiology

SUBJECT CODE: TAN21

COURSE OBJECTIVES:

- To develop skills and competencies in standard microbiological laboratory techniques.

- Train students in the proper use and maintenance of the research grade laboratory microscope with emphasis on oil immersion methods.
- Train students in aseptic technique, prophylaxis, and the proper methods relating to the safe manipulation and maintenance of microorganism.
- Train students in fundamental laboratory methodology to include the use of differential media, metabolic/enzymatic testing and associated reagents.
- Provide students with a hands-on familiarity with basic research procedure and associated critical and investigative thinking skills utilizing identification of unknown microorganismal specimens & Provide students with an understanding of important facts, concepts, and the investigative procedures of a microbiology producing accurate, skilled clinical laboratory workers with strong ethical and professional values.

COURSE OUTCOMES:

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

- CO-1.** Properly prepare and view microbiological specimens for examination using brightfield microscopy.
- CO-2.** Use pure culture and selective techniques to enrich for and isolate microorganisms, using proper aseptic technique.
- CO-3.** Estimate the number of microorganisms in a sample using viable plate counts
- CO-4.** Evaluate a microbiological problem in the context of an unknown microorganism, using appropriate media-based methods for identification. Accurately document and report observations and interpretations made during laboratory exercises.
- CO-5.** Use appropriate microbiological lab equipment and methods, in order to conduct and analyze experimental measurements relevant to microbiology. Practice safe microbiology, using appropriate protective and emergency procedures

YEAR: IB.Sc.,

SEMESTER: I

SUBJECT: NME (Cellular Organization)

SUBJECT CODE: SNN1A

COURSE OBJECTIVES:

- Students will understand the structures and purposes of basic components of prokaryotic and eukaryotic cells, especially macromolecules, membranes, and organelles.
- Students will understand how these cellular components are used to generate and utilize energy in cells.
- Students will understand the cellular components underlying mitotic cell division.
- Students will apply their knowledge of cell biology to selected examples of changes or losses in cell function. These can include responses to environmental or physiological changes, or alterations of cell function brought about by mutation.

COURSE OUTCOMES:

- CO-1.** Understand and utilize the scientific vocabulary used in communicating information in cell and molecular biology.

- CO-2.** Understand and apply general concepts of cell and molecular biology to relevant, specific problems.
- CO-3.** Represent and illustrate the structural organization of genes and the control of gene expression.
- CO-4.** Explain the structure of membranes and intracellular compartments and relate these to function.
- CO-5.** Summarize the processes of energy transduction in cells and explain their significance.
- CO-6.** Outline the processes that control both prokaryotic and eukaryotic cell cycle and cell death.

YEAR:IB.Sc.,

SEMESTER:II

SUBJECT: Immunology&MicrobialGenetics

SUBJECT CODE: TAN2A

COURSE OBJECTIVES:

- The students will be able to identify the cellular and molecular basis of immune responsiveness.
- The students will be able to describe the roles of the immune system in both maintaining health and contributing to disease.
- The students will be able to describe immunological response and how it is triggered and regulated.

COURSE OUTCOMES:

- CO-1.** Students will understanding the key concepts in immunology.
- CO-2.** Understand the overall organization of the immune system
- CO-3.** Conceptualize how the collection of individual clones of lymphocytes (termed the “immune repertoire”) arises from rearrangement within two genetic loci: the Ig gene in B cells and the antigen receptor in T cells.
- CO-4.** Learn how “clonal selection” allows for the expansion of a limited number of antigen-recognizing lymphocytes in response to a specific antigenic stimulus
- CO-5.** To make them understand the salient features of antigen antibody reaction & its uses in diagnostics and various other studies.
- CO-6.** Learn about immunization and their preparation and its importance

YEAR:IB.Sc.,

SEMESTER:II

SUBJECT: PRACTICAL-II:

Immunology and microbial genetics

SUBJECT CODE: TAN22

COURSE OBJECTIVES:

- Developing a working knowledge of the principles and procedures of serology by utilizing Immunological laboratory techniques.
- Producing accurate, skilled clinical laboratory workers with strong ethical and professional values.

- Promoting respect and understanding of allied health professionals through renewed understanding of the clinical laboratory technician's role as a member of the allied health care team.

COURSE OUTCOMES:

- CO-1.** Apply principles of safety, quality assurance and quality control in Immunology/Serology.
- CO-2.** Evaluate specimen acceptability
- CO-3.** Describe the principles involved in the immune response.
- CO-4.** Explain the principles of and perform serological tests.
- CO-5.** Evaluate and correlate test results with associated diseases or conditions.

YEAR:IB.Sc.,

SEMESTER:II

SUBJECT: NME(InheritanceBiology)

SUBJECT CODE:SNN2E

COURSE OBJECTIVES:

- Student will be able to develop and demonstrate an understanding of structure and function of genes.
- Students will be able to understand about pedigree analysis.
- To gather various knowledge about Mendelian principle.

COURSE OUTCOMES:

- CO-1.** Student should be able to discuss the causes of mutation.
- CO-2.** Student should be able to explain the basic about gene mapping methods.
- CO-3.** Students should be able to explain the pedigree analysis.

YEAR:II B.Sc.,

SEMESTER:III

SUBJECT:MolecularBiology

SUBJECT CODE:TAN3A

COURSE OBJECTIVES:

- To describe the general principles of gene organization and expression in both prokaryotic and eukaryotic organisms.
- Discuss the various macromolecular components of cells and their functions.
- To understand the chemical synthesis of polynucleotide, transcription and translation process.
- To study the various types of mutations can alter the structure of a polypeptide chain.
- To study the processing of protein and distribution.
- To learn the role of enzymes involved in the replication, transcription and translation process.

COURSE OUTCOMES:

- CO-1.** Students can explain concepts such as gene structure and function, gene

regulation, microbial genetics, mutation and DNA repair, DNA sequencing.

- CO-2.** Students can gain insight into the most significant molecular and cell-based methods used today to expand our understanding of biology.
- CO-3.** They can understand the chemical and molecular processes that occur in and between cells.
- CO-4.** Students can understand the synthesis, structure, and function of nucleic acids and proteins in prokaryotes and eukaryotes.
- CO-5.** To gain the knowledge of functions of polycistronic mRNA and monocistronic mRNA.
- CO-6.** To understand the concept of Operon like Lactose, Tryptophan, Arabinose and Galactose in gene expression studies.

YEAR:II B.Sc.,

SEMESTER:III

SUBJECT:Practical-III: MolecularBiology

SUBJECT CODE: TAN41

COURSE OBJECTIVES:

- To review critically the fundamental and key concepts of Molecular Biology and gene cloning.
- To grasp a common and valuable techniques used in molecular Biology.
- To understand a broad range of experimental techniques used in molecular biology and how they are used to improve the concepts of replication, transcription and translation.
- To gain the knowledge of the theories underlying both basic and some advanced methods in molecular biology
- To know the knowledge of the special experimental methods like Isolation of chromosomal DNA and Plasmid DNA.

COURSE OUTCOMES:

- CO-1.** To understand the concepts such as gene structure and function, gene regulation, microbial genetics, mutation and DNA repair, PCR and sequencing.
- CO-2.** Use basic laboratory equipment, apparatus and procedures for molecular study.
- CO-3.** Safely carry out a range of laboratory techniques used for the isolation, purification and manipulation of biomolecules, for example PCR, DNA recombination techniques and electrophoresis.
- CO-4.** Laboratory exercise provides the students skills about the DNA manipulation and routine laboratory techniques.

YEAR:II B.Sc.,

SEMESTER:III

SUBJECT:Bioinstrumentation

SUBJECT CODE:TBN3A

COURSE OBJECTIVE: To provide knowledge & understanding of various advance instrument, radioisotopes and its application. Gains knowledge of various spectroscopy, electrophoresis and its operation

COURSE OUTCOMES:

CO-1: Students gain knowledge about various apparatus and its principles, working and application

CO-2: Understand and learn about chromatography.

CO-3: Students understand the principles of electrophoresis and its usage.

CO-4: Understand the theoretical knowledge of spectroscopy.

CO-5: Able to understand the usage and effect of radioisotopes

YEAR:II B.Sc.,SEMESTER: III

SUBJECT: Practical–IIIBioinstrumentationSUBJECT CODE: TBN41

COURSE OBJECTIVE:

Introducing the basic concepts of qualitative and quantitative analysis of a give sample. The basic understanding of principles and applications of instruments.

COURSE OUTCOMES:

CO-1.Defining and explaining various fundamentals of spectroscopy for qualitative and quantitative analysis.

CO-2.Learning about various separation techniques of instrumentation.

CO-3.Differentiating instrumental operations and applications.

YEAR:II B.Sc.,

SEMESTER:IV

SUBJECT: Soil andAgriculturalMicrobiology

SUBJECT CODE:TAN4A

COURSE OBJECTIVES:

- To provide students with useful information regarding the taxonomical, physiological, and environmental aspects of soil microorganisms.
- To learn the roles of soil microbes, such as decomposing dead organic matter, enriching the soil with nutrients, increasing water infiltration, improving soil texture, etc.
- To provide students with knowledge concerning soil microorganisms both harmful and beneficial and how to control and enhance eachrespectively.
- To acquire knowledge on such topics as: organisms and interactions, mycorrhizal symbiosIs, biological dinitrogen fixation (both symbiotic and non-symbiotic).
- To know the role of microorganisms in bio geo chemical cycles.

- To study about the symptoms, Etiology, Epidemiology and Management of several plant diseases.
- To help students keep abreast of the most recent advances in soil microbiology.

COURSE OUTCOMES:

- CO-1.** On completion of the course, students will develop skill regarding various methods used in agriculturally important microbes and disease management of plant diseases.
- CO-2.** Students will develop the knowledge in soil texture and soil fertility.
- CO-3.** Students will learn that the soil is an excellent habitat for multitude of microorganisms balancing the soil ecosystem.
- CO-4.** Attainment of course objectives will mean realization of the various beneficial effects of soil microorganisms on soil health. Conversely, students learned that some soil microbes are deleterious.
- CO-5.** The knowledge acquired in Soil Microbiology will enhance the student's competency in the performance of their duties as future employees in the field of Agronomy/Soil Science.

YEAR:II B.Sc.,

SEMESTER:IV

SUBJECT:Practical-IV: Soil and Agricultural Microbiology SUBJECT CODE: TAN42

COURSE OBJECTIVES:

- To gain knowledge of the role played by microorganisms in agriculture.
- To gain basic knowledge and skill in microbiological techniques.
- To gain knowledge on the biology of different groups of microorganisms of importance in agriculture.
- To know about the enzyme producing soil microorganisms.
- To isolate and identify the root nodule bacteria.
- To study of several important plant diseases.

COURSE OUTCOMES:

- CO-1.** Appreciate the impact of microbial processes in agricultural production.
- CO-2.** Use basic laboratory equipment, apparatus and procedures for the study of microorganisms.
- CO-3.** Isolate and recognize major groups of microorganisms.
- CO-4.** Understand the key basic characteristic features that differentiate the different groups of microorganisms

YEAR:IIIB.Sc.,

SEMESTER:V

SUBJECT:MedicalBacteriology

SUBJECT CODE: TAN5A

COURSEOBJECTIVE:

To learn the different types of medically important bacteria, their properties, collection, transportation, isolation, identification of bacteria from different clinical specimens based on their virulence nature, pathogenesis and diagnosis methods and also provides immense knowledge on treatment and prophylaxis for each pathogenic bacterium.

COURSE OUTCOMES:

- CO-1.** This course helps to understand the properties of various pathogenic bacteria and to know the procedure for collecting, transporting and isolation of pathogens from clinical specimens
- CO-2.** It provides the knowledge on the sensitivity of pathogen to a particular antibiotic which can be given for treating patients against pathogen.
- CO-3.** It helps students to know the pathological conditions and virulence nature of pathogen inside the host
- CO-4.** The course describes the diagnosis methods to identify the pathogen by various tests and also helps to suggest particular antibiotics against the bacteria.
- CO-5.** The course also helps to students to know the epidemiology and prophylaxis methods related to the pathogen.

YEAR:III B.Sc.,

SEMESTER:V

SUBJECT:Medical Mycology and Parasitology

SUBJECT CODE :TAN5B

COURSE OBJECTIVES:

- Describe Morphology, Lifecycle, Pathology and laboratory diagnosis of fungi and parasites.
- Classify parasites and fungi.
- Perform appropriate laboratory techniques used in the processing of specimens and identification of parasites and fungi.

COURSE OUTCOMES:

- CO-1.** Understand the classification and characteristics of fungi and parasites.
- CO-2.** Provide knowledge about collection and transport of Specimens.
- CO-3.** Studied the pathogenesis and laboratory diagnosis of disease caused by parasites and fungi.
- CO-4.** Prevention and awareness of public health.

YEAR:III B.Sc.,

SEMESTER:V

SUBJECT:Medical Virology

SUBJECT CODE:TAN5C

COURSE OBJECTIVE:

To provide knowledge about virus their structure, DNA and RNA viruses, effect of virus on cell growth, cultivation virus and vaccine preparation.

COURSE OUTCOMES:

- CO-1.** Students gain knowledge of properties, diagnosis and cultivation of virus.
- CO-2.** Understand and learn about various virus life cycle and treatment of viral infections
- CO-3.** Able to learn about immunization schedule.
- CO-4.** Learn about various types of bacteriophage, their structure, and life cycle of bacteriophage
- CO-5.** Gains knowledge about antiviral agents and also about vaccine production

YEAR:IIIB.Sc.,

SEMESTER:V

SUBJECT: Practical V –MedicalMicrobiology

SUBJECT CODE: TAN61

COURSEOBJECTIVE:

This course helps to learn about collection, transportation, processing of different clinical specimens and also enhances the skills of techniques to isolate and identify pathogenic bacteria, fungi, bacteriophages and parasites from clinicalspecimens.

COURSE OUTCOMES:

- CO-1.**Learntheprocedureforcollecting, transporting ofclinicalspecimens and processing by staining techniques and enumerationmethods.
- CO-2.** Enhances the skills of isolation, identification and sensitivity of pathogen to a particular antibiotic which can be given for treating patients against pathogen.
- CO-3.** Helps students to isolate bacteriophages from sewage sample by plaque assay method
- CO-4.** The course describes the diagnosis methods to identify the pathogen by various tests and also helps to suggest particular antibiotics against the bacteria.
- CO-5.** The course also helps to students to know the epidemiology and prophylaxis methods related to thepathogen.

YEAR:IIIB.Sc.,

SEMESTER:V

SUBJECT:GeneticEngineering

SUBJECT CODE: TEN5A

COURSE OBJECTIVE:

The purpose of this course is to introduce the basic molecular biological concepts and techniques used in the fields of genetic engineering.

COURSE OUTCOMES:

- CO-1.** Gaining an appreciable knowledge of dealing with ethical issues relaying to science
- CO-2.** Gaining and understanding basic molecular and cellular biology concepts and techniques.
- CO-3.** Gaining the knowledge about current experimentation in genetic engineering.

YEAR:IIIB.Sc.,

SEMESTER:VI

SUBJECT:EnvironmentalMicrobiology

SUBJECT CODE:TAN6A

COURSE OBJECTIVES:

To provide a basic understanding of environmental microbiology including

- The functional diversity of microorganisms in the environment in relation to human welfare and ecosystem health
- Microbial interactions with pollutants in the environment and the fate of microbial pathogens in the environment.
- To learn the basic principles of environmental microbiology and be able to apply these principles to understanding and solving problems in water quality and bioremediation.
- To become familiar with current research in environmental microbiology.

COURSE OUTCOMES:

Upon successful completion of the course, students are expected to be able to:

- CO-1.** Appreciate the diversity of microorganism and microbial communities inhabiting a multitude of habitats and occupying a wide range of ecological habitats.
- CO-2.** Learn the occurrence, abundance and distribution of microorganism in the environment and their role in the environment and also learn different methods for their detection and characterization
- CO-3.** Competently explain various aspects of environmental microbiology and microbial ecology and to become familiar with current research in environmental microbiology.
- CO-4.** Understand the basic principles of environmental microbiology and be able to apply these principles to understanding and solving environmental problems – waste water treatment and bioremediation
- CO-5.** Know the Microorganisms responsible for water pollution especially Water-borne pathogenic microorganisms and their transmission
- CO-6.** Comprehend the various methods to determine the sanitary quality of water and sewage treatment methods employed in waste water treatment

YEAR:III B.Sc.,

SEMESTER:VI

SUBJECT: Food & Dairy Microbiology

SUBJECT CODE: TAN6B

COURSE OBJECTIVES:

- This course helps students to learn the different microflora in different foods and factors influencing their growth.
- This course provides knowledge on the role of food microbiota in spoilage, contamination and Preservation.
- It also helps students to study the food borne diseases and their outbreaks along with their investigation methods.
- This course concentrates on the preparation of different fermented products (cheese, yogurt, oriental fermented foods, etc.,)

COURSE OUTCOMES:

- CO-1.** Understand the significance and activities of various microorganisms in Food.
- CO-2.** Ability to learn the different preservation techniques such as low temperature, freezing, etc., chemical preservation to prevent food spoilage and contamination.
- CO-3.** Know the important spoilage organisms and their mechanisms in foods and thus identify methods to control.
- CO-4.** It provides the knowledge on the basis of food safety regulations and the use of standard methods and procedures for the microbiological analysis of food.
- CO-5.** It helps students to know the beneficial role of microorganisms in fermented foods and in food processing of different types of fermented food products.

YEAR: III B.Sc.,

SEMESTER: VI

SUBJECT:

Practical VI – ENVIRONMENTAL, FOOD & DAIRY MICROBIOLOGY

SUBJECT CODE: TAN62

COURSE OBJECTIVE:

This course helps students to learn the different analysis techniques in isolation, enumeration of bacteria, yeast and mold from different food samples, water, air, milk etc., It provides the skills for handling the samples for disease outbreak. Thereby helps in creating basic skills in handling laboratory procedures.

COURSE OUTCOMES:

- CO-1.** Helps to learn the enumeration of bacteria in milk sample by Standard Plate Count Method.
- CO-2.** Ability to learn the rapid test to check the quality of milk samples and determine the reason for contamination.
- CO-3.** Know the presence of important and common spoilage organisms in various spoiled foods like nuts etc., by their morphological features, staining techniques and biochemical studies.
- CO-4.** Enhances the knowledge on finding the BOD and COD level of waste water and report the quality of drinking water by standard procedures.
- CO-5.** It provides the knowledge on the prevalence of air microflora in different locations by settle plate method. Helps to create knowledge on detection of aflatoxins from food samples.

YEAR: III B.Sc.,

SEMESTER: VI

SUBJECT: Industrial & Pharmaceutical Microbiology

SUBJECT CODE: TEN6A

COURSE OBJECTIVES:

- To provide knowledge and understanding of Pharmaceutical Microbiology relevant to health care.
- To provide knowledge about use of microorganisms to manufacture antibiotics, protein.

- Ability to apply the techniques used in different phase of industry.

COURSE OUTCOMES:

- CO-1.** Discover new useful microorganism and store for later use
- CO-2.** Describe the main steps and process used to produce biological products in industry.
- CO-3.** Understand ethical and commercial issues such as patenting and licensing.

YEAR:IIIB.Sc.,

SUBJECT:Biotechnology

SEMESTER:VI

SUBJECT CODE: TEN6B

COURSEOBJECTIVE:

The objective of this course is to understand the basics of biotechnology.

COURSE OUTCOMES:

- CO-1.** To understand the principles of animal culture and media preparation.
- CO-2.** To get insight into applications on recombinant DNA techniques in agriculture and production of therapeutic drugs.
- CO-3.** To explain microbial degradation of pesticides, bioremediation and bio fertilizers.