



DEPARTMENT OF MICROBIOLOGY GOVT. V.Y.T. PG AUTONOMOUS COLLEGE, DURG



Programs: B.Sc. Microbiology, M.Sc. Microbiology, Ph.D. Microbiology

Vision

To be a department of repute in the field of Microbiology for advancement of students with the help of modern educational practices towards skill development and subject professional

Mission

- ❖ To provide modern teaching tools, advanced research facility and competent faculties to justify a department of repute in the field of Microbiology
- ❖ To impart various features of Microbiology through focused lectures, activities, assignments and practical
- ❖ To develop students with advance academic background for an overall personality upgradation towards a successful career in Microbiology
- ❖ To facilitate latest learning aids, guest lectures, internship, field work, study tours to accomplish the norms
- ❖ To design a curriculum and academic calendar for gradual knowledge enhancement of students aimed at skill development and become a subject professional

Program Specific Outcomes (PSOs): B.Sc. Microbiology

- To Recognize various kinds of prokaryotic and eukaryotic microbes and their importance
- To Explain and describe importance of organic compounds and their chemistry
- To Make clear the molecular structure of biomolecules
- To Comprehend the importance of instruments and techniques in microbiology
- To Understand concept of medical microbiology and Immunology
- To Know the Environmental, Agricultural, Industrial insight of microorganisms

Course Outcomes of B.Sc. Microbiology

B.Sc. Part I

BMB 01 GENERAL MICROBIOLOGY AND BASIC TECHNIQUE

Upon successful completion of the course students will be able to –

CO 1: Learn history, development and fundamentals of microbiology

CO 2: Understand basic techniques to study microorganisms

CO 3: Get information about different branches of microbiology

CO 4: Acquire awareness about the life cycle of significant individuals

CO 5: Gain the knowledge of economic importance of microorganisms

BMB 02 BIOCHEMISTRY AND PHYSIOLOGY

Upon successful completion of the course students will be able to –

CO 1: Familiar with structure and functions of main building blocks of life

CO 2: Learn about structure, types and functions of DNA and RNA

CO 3: Know the role of catalysts in vital activities

CO 4: Get overview of microbial metabolism

CO 5: Grasp the mechanism of microbial growth and nutritional transport for growth

BMBL01 Lab Course B.Sc. Part I

Upon successful completion of the lab course students will be able to –

CO 1: Conversant with common laboratory tools and techniques of microbiology

CO 2: Understand the methods of obtaining microorganisms under lab conditions for study

CO 3: Differentiate microorganisms on the basis of microscopic features

CO 4: Retain information regarding the properties of biochemical compounds and their detection in biological system

CO 5: Study the production of enzymes and their role

B.Sc. Part II

BMB 03 MOLECULAR BIOLOGY AND GENETIC ENGINEERING

Upon successful completion of the course students will be able to –

CO 1: Trained with the fundamentals of molecular biology

CO 2: Understand the central dogma of protein synthesis

CO 3: Study the alteration, repair and regulation of gene

CO 4: Gain knowledge of genetic database

CO 5: Get approach of genetic modifications and its detection

BMB 04 BIOINSTRUMENTATION AND BIOSTATISTICS

Upon successful completion of the course students will be able to –

CO 1: Aware of different types of microscopes and their applications

CO 2: Understand the instruments used for separation and analysis of bio-molecules

CO 3: Acquainted with the molecular techniques

CO 4: Get an overview about the concept of biostatistics

CO 5: Know the methods of analysis of quantitative data

BMBL 02 Lab Course B.Sc. Part II

Upon successful completion of the lab course students will be able to –

CO 1: Understand the fundamental genetic properties of microorganisms

CO 2: Learn the genetic modification practices in microorganisms and their detection

CO 3: Perform the experiments based on analytical instruments

CO 4: Separate bio-molecules and study their properties

CO 5: Understand the behavior of genetic material under laboratory conditions

B.Sc. Part III

BMB 05 MEDICAL MICROBIOLOGY AND IMMUNOLOGY

Upon successful completion of the course students will be able to –

CO 1: Study the air born and water borne diseases

CO 2: Learn about the clinical diseases

CO 3: Familiar with diagnostic techniques of important diseases

CO 4: Understand basic knowledge of immunity

CO 5: Acquire immunodiagnostic techniques

BMB 06 ENVIRONMENTAL, INDUSTRIAL AND AGRICULTURAL MICROBIOLOGY

Upon successful completion of the course students will be able to –

CO 1: Understand the basics of relation between environment and microorganisms

CO 2: Correlate different habitats of microorganisms

CO 3: Recognize microbial interactions in soil

CO 4: Know the industrial uses of microorganisms

CO 5: Aware of the agricultural importance of microorganisms

BMBL 03 Lab Course B.Sc. Part III

Upon successful completion of the lab course students will be able to –

CO 1: Understand the possible sources of microbial infections

CO 2: Accustomed with the immunogenic reactions

CO 3: Get insight of Microbial –Environmental interactions

CO 4: Recognize agricultural and industrial importance of microorganisms

Program Specific Outcome (PSO): M.Sc. Microbiology

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

- To give comprehensive understanding about the microbes, their organizational units and response towards other life entities
- To inculcate the students to the knowledge of molecular characters and performance of microorganisms
- To make the hypothetical assumptions about the microbial forms and their behavior and establish the facts with data interpretation
- To develop capability of handling of instruments and to build inference for scientific conclusions
- To make the students approachable for problem solving skills and to introduce them towards research aptitude
- To create employable skills in the field of medical, food, Dairy and industrial microbiology
- To build the competency for use of knowledge in relation with environment consciousness, ethical values and socio-economical aspects
- To be able to analyze problems involving microbes, articulate this with peers/ team members/ other stake holders, and undertake remedial measures

Course Outcomes of M.Sc. Microbiology

Semester I

MMB101 BACTERIOLOGY AND VIROLOGY

After successful completion of course the students will be able to –

CO1: Learn the diversity among Bacteria and their respective forms

CO 2: Know about the classification and grouping of bacteria through diverse systems

CO3: Get an overview to the Viruses, Related agents and Bacteriophages and their organizations

CO 4: Have idea about the cultivation of Viruses and get impression of Viral diseases of plants and animals

MMB102 PHYCOLOGY AND MYCOLOGY

After successful completion of course the students will be able to –

CO 1: Know the diversity and life cycle of Eukaryotic Microorganisms

CO 2: Understand the importance and the life cycle patterns of major group of Algae and Fungi

CO 3: Relate the knowledge of evolutionary relationship among fungal groups

CO 4: Get insight into useful fungal activities and importance of representative members

MMB103 BIOCHEMISTRY

After successful completion of course the students will be able to –

CO 1: Learn the characters and classes of basic building blocks and their biological significance

CO 2: Familiar the students with bio-molecular derivatives and their importance

CO 3: Study the structure, properties and biological importance of DNA and RNA

CO4: Understand conceptual knowledge of properties, structure, function of enzymes, enzyme kinetics and their regulation

MMB104 FUNDAMENTALS OF IMMUNOLOGY

After successful completion of course the students will be able to –

CO 1: Know the concept of immune system and immunity and learn the methods of immunogenic reactions

CO 2: Understand variety of operation related to immune response

CO 3: Conceptualize the origin of lymphocytic clones, the theory of immunization and immune therapy

CO 4: Get an idea about tumor immunity, hypersensitive reactions and cytokines

MMBL 01 Lab Course IBacteriology and Virology and Phycology and Mycology

After successful completion of course the students will be able to –

CO 1: Identify the sources of Bacteria, Algae and Fungi for isolation under lab conditions

CO2: Study the cultural characteristics and morphological features of isolated microorganisms

CO 3: Get acquainted with biochemical identification of bacteria

CO 4: Study the special features of Lichens, Cyanobacteria and Diatoms etc.

MMBL 02 Lab Course IIBiochemistry and Immunology

After successful completion of course the students will be able to –

CO 1: Familiar with the different types of buffers and pH measurement

CO 2: Understand the quantification of biological molecules like Carbohydrates, Proteins and Lipids

CO 3: Study the immunogenic reactions for identification of antigen -antibody response

CO 4: Recognize the idea of immune electrophoresis

Semester II

MMB 201 CELL AND MOLECULAR BIOLOGY

After successful completion of course the students will be able to –

CO 1: Get an in depth understanding of DNA, its replication and inhibitors of DNA replication

CO 2: Understand the significance of central dogma of gene action and understand the molecular mechanisms involved in transcription and processing of RNA

CO 3: Gain knowledge of genetic code and molecular mechanisms in Protein synthesis

CO 4: Study and compare the regulation of gene expression in both prokaryotes and eukaryotes

MMB202 MICROBIAL GENETICS

After successful completion of course the students will be able to –

CO 1: Understand the mechanism of damage and repair of DNA in living system

CO 2: Gain the knowledge of causes and consequences of alterations or modifications in DNA structures

CO 3: Study the different ways of gene transfer in microorganisms

CO 4: Get an idea about the tools used in genetic analysis

MMB203 MICROBIAL PHYSIOLOGY AND METABOLISM

After successful completion of course the students will be able to –

CO 1: Get an overview of bioenergetics and understand the mechanism of anabolism and catabolism

CO 2: Study the metabolism of important bio-molecules

CO3: Acquainted with respiratory metabolic pathway, Pasteur effect and fermentation of carbohydrates

CO 4: Distinguish nitrogen metabolism and biosynthesis of polysaccharides

MMB204 BIOSTATISTICS AND COMPUTER APPLICATION

After successful completion of course the students will be able to –

CO 1: Get the concept of biostatistics in microbiology and learn about basic measures to compile the observation, analyze and make inference from observations

CO 2: Understand the correlation of obtained data and explain the significance of observations and discrepancy in results during scientific experiments

CO 3: Design an experiment and visualize the controlling factors

CO 4: Recognize and practice the tools of computers

MMBL 03 Lab Course ICell and Molecular Biology and Microbial Genetics

After successful completion of the course students will be able to –

CO 1: Study the stages of cell cycle

CO 2: Isolate DNA and RNA from different sources and their quantification

CO 3: Separate polypeptides and their characterization

CO4: Study the genetic expression in terms of antibiotic resistance, genetic transformation and transduction

MMBL 04 Lab Course IIMicrobial Physiology and Metabolism and Biostatistics and Computer Application

After successful completion of the course students will be able to –

CO 1: Study different physiological factors on microbial growth

CO 2: Get an idea about carbohydrate metabolism through microorganisms

CO 3: Present data statistically and apply different measuring tests to obtain significant results

CO 4: Understand and practice the tools of computers

Semester III

MMB 301 BIOPHYSICAL TECHNIQUE, INSTRUMENTATIONS AND BIOINFORMATICS

After successful completion of course the students will be able to –

CO 1: Gain the skill to deal with microscope and study the different separation techniques used for isolation and purification of bio molecules

CO2: Comprehend the mechanism of radioactive detection and applications and to study the importance and applications of spectroscopy, NMR, ESR and PCR

CO 3: Understand the concept of Bioinformatics and know the forms of biological information

CO 4: Learn the available resources and tools for bioinformatic studies

MMB302MEDICAL MICROBIOLOGY

After successful completion of course the students will be able to –

CO 1: Get an overview of discovery and development of medical microbiology and understand the infectious diseases

CO 2: Study the classification of different disease-causing agents like bacteria, viruses, fungi and protozoa with examples of some common diseases

CO 3: Learn the diagnostic skills for infectious diseases

CO 4: Recognize the measures taken for control of diseases through different systems

MMB303 A FOOD AND DAIRY MICROBIOLOGY

After successful completion of course the students will be able to –

CO 1: Understand the idea microorganisms associated with food and factor affecting their growth

CO 2: Acquainted with the principles of food preservation and detection food spoilage and food born infections

CO 3: Recognize the measures taken for food quality control

CO 4: Get an overview of various food types prepared through microbial fermentation

MMB 303 B AGRICULTURE MICROBIOLOGY

After successful completion of the course students will be able to –

CO 1: Understand the habitat of microorganisms with reference to Agriculture

CO 2: Familiar with the plant pathogenic characters of microorganisms

CO 3: Know the degradation and toxic effects of microorganisms for plants

CO 4: Study positive effects of microorganisms in terms of Agriculture

MMBL 05 Lab Course IBiophysical Technique, Instrumentation and Bioinformatics

After successful completion of the course students will be able to –

CO 1: Understand the working of instruments for analysis of biological samples

CO 2: Comprehend different biophysical techniques for separation and purification of biomolecules

CO 3: Assess the scientific data from literature data bases

CO 4: Apply the bioinformatic data for scientific validation

MMBL 06 Lab Course II Medical Microbiology and Food and Dairy Microbiology/ Agriculture Microbiology

After successful completion of the course students will be able to –

CO1: Understand the procedure of isolation and identification of microflora from different body parts and fluids

CO 2: Study different food materials as substrates for microorganisms and the methods for detection of food spoilage by microorganisms

CO 3: Evaluate the mechanism for microbiological examination of fresh and preserved food

CO 4: Study the plant diseases and evaluate agricultural importance of microorganisms

Semester IV

MMB 401ENVIRONMENTAL MICROBIOLOGY

After successful completion of the course students will be able to –

CO 1: Understand the different branches of environmental microbiology

CO 2: Study the interactions of microbes in different environments

CO 3: Get idea about the role of microorganisms in their respective environments

CO 4: Make acquainted with the concept of microbial decomposition

MMB402 INDUSTRIAL MICROBIOLOGY AND FERMENTATION TECHNOLOGY

After successful completion of the course students will be able to –

CO 1: Understand the history and scope of industrially important microorganisms

CO 2: Acquainted with the mechanism of strain improvement strategies

CO 3: Gain skill to deal with new ideas of modern fermentation techniques

CO 4: Get overview of different microbial products for commercial production

MMB403 A MICROBIAL BIOTECHNOLOGY

After successful completion of the course students will be able to –

CO 1: Learn about core techniques and cloning vectors used in rDNA Technology

CO 2: Estimate different strategies used for genetic manipulation

CO3: Study the sequential steps of genetic modification and understand genetically modified organisms and their impact on environment

CO 4: Gain the knowledge of rights, ethical issues and safety aspects about microbial biotechnology

MMB 403 B MICROBIAL GENOMICS AND PROTEOMICS

After successful completion of the course students will be able to –

CO 1: Understand the broader biology of microorganisms for their genetic composition

CO 2: Contributes substantial characteristics required for genomic studies

CO 3: Familiar with techniques of identification of genetic material

CO 4: Generate a basic knowledge about current applied techniques for proteomic studies

MMBL 07 Lab Course I Environmental Microbiology

After successful completion of the course students will be able to –

CO 1: Isolate microorganisms of eco-friendly attention

CO 2: Study the role and relation of microorganisms at different habitats

CO 3: Analyze the soil source as phosphate and nitrate supplying microorganisms

CO 4: Develop skill for water microbiological studies

MMBL 08 Lab Course II Industrial Microbiology, Fermentation Technology and Microbial Biotechnology/ Microbial Genomics and Proteomics

After successful completion of the course students will be able to –

CO 1: Isolate and identify industrially important microorganisms

CO 2: Establish the standard method and scale up procedures for industrial production of enzymes, antibiotics and ethanol

CO 3: Apply the knowledge for characterization of genetic material and its mapping

CO 4: Aware of IPR and understand the procedure of Patenting

CO 5: Generate the basic idea about genomics and proteomics

Program Specific Outcome (PSO): Ph.D. Microbiology

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

- To enable the students to plan and execute experiments and make analysis to interpret research data
- To develop an understanding of microbiological research and its role in industry, health and environment sector

- To optimize the written and oral skills to clearly present research to the scientific community
- To be well acquainted with IPR, bioethical, legal and social issues in research

Course Outcome (CO): Ph.D. Microbiology

DMB 01: Research Methodology, Advanced Tools & Techniques, Quantitative Data Analyses and Computer Fundamentals

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

- CO 1: Understand research methodologies
- CO 2: Use different tools and techniques for research
- CO 3: Analyze data to draw inference
- CO 4: Evaluate different computer fundamentals and their application in research

DMB 02: Review of Literature & Seminar

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

- CO 1: Search relevant literature and noteworthy contribution in the field
- CO 2: Write a systematic review article
- CO 3: Prepare a power point presentation using computer tools
- CO 4: Present the proposed work with proper relevance

Certificate in Applied Microbiology

CMB 01: Applied Microbiology

After successful completion of the course, candidates are expected to be able to –

- CO 1: Summarize and explain the roles of microbes in pharmaceutical, industrial and food processes
- CO 2: Relate their microbiological knowledge for identification and diagnosis of human as well as plant pathogens
- CO 3: Understand the roles of microorganisms in cleaning and fortification of environment
- CO 4: Know the up-to-date techniques of genetic manipulation of microorganisms

CMBL: Lab Course Applied Microbiology

After completion of Laboratory course, students will be able to –

- CO 1: Demonstrate aseptic technique to handle cultures, microbiological media, and environmental samples safely and effectively
- CO 2: Show the ability to efficiently and independently use a microscope to observe microorganisms and be able to describe observed characteristics
- CO 3: Select appropriate traditional and molecular biological methods to study and characterize microbial isolates
- CO 4: Devise experiments according to the scientific method and collect, interpret, and present scientific data in microbiology and related fields.

VMB 01: Value Added Course on Microbial Analysis and Food Safety

After successful completion of the course, candidates are expected to be able to –

- CO 1: Understand the significance and activities of microorganisms in food
- CO 2: Know the microbial spoilage mechanisms in foods and to learn various methods for isolation, detection and identification of microorganisms in food

- CO 3: Identify principles involving control of microorganisms in foods the basics of food safety regulations
- CO 4: Acquire, discover, and apply the theories and principles of food microbiology in practical and real-world situations

VMB 02: Value Added Course on Advance Learning in Biological Sciences

After successful completion of the course, candidates are expected to be able to –

- CO 1: Understand the application of statistical tools in biological experimentation
- CO 2: Familiar with concept of Bioinformatics
- CO 3: Gain the knowledge of research matrices and their importance
- CO 4: Develop skill on molecular techniques

Course Outcome (CO): Value Added Course on Microbial Inoculant Technology

After successful completion of the course, candidates are expected to be able to –

- CO 1: Understand the concept of Bio fertilizers
- CO 2: Identify different types of microorganisms used as bio fertilizers
- CO 3: Familiar with the techniques of bio fertilizer production
- CO 4: Get aware with marketing and economics related to bio fertilizer production




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