

Bhavan's Vivekananda College
of Science, Humanities and Commerce
Sainikpuri, Secunderabad – 500 094
Autonomous College Affiliated to Osmania University
Accredited with 'A' grade by NAAC

M. Sc Microbiology

Program Outcomes:

PO1: Knowledge: Apply the knowledge of basic concepts, fundamental principles and scientific theories and processes related to the fields of life sciences with their relevance in day-to-day life.

PO2: Analytical Skills: Select and implement the analytical skills acquired, in design of experiments followed by its effective execution in scientific research, industry and entrepreneurship.

PO3: Investigations and Problem analysis: Identify and investigate socially relevant issues using knowledge of Science and technology by design of experiments, analysis, interpretation of data and provide valid conclusions.

PO4: Design and development of solutions: Design innovative solutions for various societal needs like health care, food, water and energy through research and development with appropriate consideration for cultural, societal, environmental, public health and safety.

PO5: Communication: Communicate effectively on problems, issues and solutions with community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO6: Ethics & Environment: Apply ethical principles and commit to professional ethics and responsibilities and norms in research and the functional areas, understand the issues of environmental context and sustainable development.

PO7: Individual and Team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

PO8: Self-directed and Life-long Learning: Acquire the ability to engage in independent and life-long learning in the broadest context of socio, economic and technological changes.

Program Specific Outcomes:

PSO1: Apply the knowledge of Microbiology, Immunology, Virology, Molecular biology, Biochemistry, Nanobiotechnology and Bioinformatics as per the demands of research and Industry

PSO2: Design, perform and analyse the procedures as per laboratory standards in the areas of medical, food, agriculture, pharma, environmental, industrial microbiology in production, down streaming and Quality control and Quality assurance of microbial products.

PSO3: Integrate the knowledge of Microbiology, Molecular biology, Nanobiotechnology and Computational Biology to solve research problem which has societal relevance.

Course Outcomes:

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| Name of the Course | | General Microbiology and Microbial physiology |
| Course Code | | PMB 101 |
| CO1 | Apply concepts of microscopy for identifying various microbes | |
| CO2 | Experiment different microbial culturing techniques | |
| CO3 | Experiment different microbial culturing techniques | |
| CO4 | Distinguish bacteria based on taxonomy | |
| CO5 | Summarize factors on microbial growth | |

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| Name of the Course | | Virology |
| Course Code | | PMB102 |
| CO1 | Classify the virus based on structure, and replication | |
| CO2 | Distinguish lytic and lysogenic viruses | |
| CO3 | Interpret concepts of recombination in phages | |
| CO4 | Summarize applications of viruses in various areas | |

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| Name of the Course | | Research Methodology & Techniques (Core) |
| Course Code | | PMB 103 |
| CO1 | Select the right method for probing a given property of a sample molecule | |
| CO2 | Apply the most appropriate method for separation of molecules in a given mixture. | |
| CO3 | Use Excel and apply appropriate statistical analysis. | |
| CO4 | Write an organized scientific manuscript for a project. | |

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| Name of the Course | | Microbial Biochemistry |
| Course Code | | PMB 104 |
| CO1 | Determine pH of solutions and prepare Buffers for laboratory work | |
| CO2 | Analyze the bio molecules by qualitative analysis | |
| CO3 | Perform enzyme assay and calculate enzyme activity | |
| CO4 | Identify enzymes from various sources and purify them | |

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| Name of the Course | | Communicative English |
| Course Code | | PMB 105 |
| CO1 | The students are able to understand that effective communication is important to express their views, thoughts and opinions | |
| CO2 | The students improve their listening, speaking, reading and writing skills. The students are confident enough to participate in group discussion and debate | |

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| Name of the Course | | Molecular Biology & Microbial Genetics |
| Course Code | | PMB 201 |
| CO1 | Compare the structural variations of DNA and genome organization | |
| CO2 | Illustrate Replication, Transcription, translation and gene regulation | |
| CO3 | Differentiate the types of mutations, DNA damage and repair mechanisms | |
| CO4 | Solve problems in genetic recombination for genetic mapping | |

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| Name of the Course | | Environmental and Agricultural Microbiology |
| Course Code | | PMB 202 |
| CO1 | Construct a mind map on role of microbes in air and water pollution | |
| CO2 | Summarize the role of microbes in bioremediation technologies | |
| CO3 | Interpret the role of microbes in decomposition | |
| CO4 | Apply the concepts of bio-fertilizers for better and sustainable agricultural practice. | |

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| Name of the Course | | Immunology |
| Course Code | | PMB 203 |
| CO1 | Illustrate the Antibody structure and diversity | |
| CO2 | Summarize the types of immunity and immunological responses to various antigens | |
| CO3 | Apply immunological techniques practically | |
| CO4 | Relate between cancer and immunology | |

| Name of the Course | | Pharmaceutical Microbiology |
|---------------------------|---|------------------------------------|
| Course Code | | PMB 204 |
| CO1 | Analyze microbial spoilage, prevention and preservation of pharmaceutical products, GMP | |
| CO2 | Discriminate the mode of actions of various anti microbial agents | |
| CO3 | Use Practical skills in preservation and testing of various industrial products | |
| CO4 | Perform microbiological assays in pharmaceutical industry | |
| CO5 | Analyze microbial spoilage, prevention and preservation of pharmaceutical products, GMP | |

| Name of the Course | | Computer Skill |
|---------------------------|---|-----------------------|
| Course Code | | PMB 205 |
| CO1 | Understand the applications of word processing using MS Word) and data analysis using MS. excel | |
| CO2 | Able to learn basics of poster designing and computer graphics | |

| Name of the Course | | Food Microbial Technology |
|---------------------------|---|----------------------------------|
| Course Code | | PMB 301 |
| CO1 | Discuss the significance of fermented foods in daily lives and describe the overall role of microbes involved in food processing. | |
| CO2 | Explain Dairy Microbiology and measure the role of different types of microbes and their significance. | |
| CO3 | Validate the concept and importance of Probiotics and Prebiotics. | |
| CO4 | Comprehend the overall concept involved in Microbial Intoxication (Bacterial and Fungal) and review detoxification measures. | |

| Name of the Course | | Medical Bacteriology |
|---------------------------|---|-----------------------------|
| Course Code | | PMB302 |
| CO1 | Explainthe clinically important microorganisms and Normal flora of human body | |
| CO2 | Describethe nature and basic concepts of pathogenic microorganisms, infection and process of diagnosis and perform the requisite diagnostic protocols | |
| CO3 | Discuss of air borne and sexually transmitted bacterial pathogens bacterial pathogens. | |
| CO4 | Illustratewater borne bacterial pathogens and wound infections of bacteria. | |

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| Name of the Course | Microbial Biotechnology |
| Course Code | PMB303 |
| CO1 | Understand the industrial important microorganisms and basic awareness on fermentor design .Perform practical procedures to screen industrial important microorganisms &analyze their fermentative products. |
| CO2 | Understand the nature and basic concepts of. optimization of fermentation media , process of fermentation and perform the requisite experiments on scale up & down stream processes |
| CO3 | Awareness of fermentative production of microbial products and Understand production and commercial application of microbial enzymes |
| CO4 | Update knowledge in new frontiers of industrial microbiology – steroid transformation, microbial bio pesticides, genetically modified microbes and immobilization |

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| Name of the Course | Microbial Ecology and Plant Microbe Interactions |
| Course Code | PMB 304 |
| CO1 | Describe microbial diversity and calculate statistical indices for diversity and explain molecular methods of diversity analysis |
| CO2 | Explain direct and indirect mechanisms of plant growth promotion by PGPR and develop microbial formulations for field application |
| CO3 | Detect different bacterial and fungal pathogens based on signs and symptoms of plant diseases and their management using integrated pest control |
| CO4 | Explain molecular mechanism of pathogen recognition, induced and systemic resistance in plants and describe different quorum sensing circuits of microbes |

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| Name of the Course | | Microbiological Quality Control and Quality Assurance in Food & Pharma Industry |
| Course Code | | PMB 305 |
| CO1 | Equip with fundamentals of GMP, GLP and SOP and understand the validation principles in food and pharma industry and Quality control . Awareness on procedures in quality assurance (QA) of finished product. | |
| CO2 | Practical knowledge in Microbial Standards for Different Foods and Water and sterility testing methods. Acquire practical knowledge in Microbial quality testing of Milk and Water. Understand importance of Quality control and Quality assurance in Food and Pharma products | |

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| Name of the Course | | Personality Development |
| Course Code | | PMB 305 |
| CO1 | Students are confident enough to use interpersonal skills. | |
| CO2 | Students developed self-confidence and empathetic | |

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| Name of the Course | | Cell and Molecular Biotechnology |
| Course Code | | PMB 401 |
| CO1 | Describe the mechanism of cell cycle regulation, apoptosis and Cancer induction & inheritance, Signal transduction pathways | |
| CO2 | Choose appropriate cloning vectors, sequencing methods for DNA /Protein, molecular library construction and cloning techniques in prokaryotes and eukaryotes | |
| CO3 | Identify the Molecular Techniques like-PCR, RT PCR, RAPD, RFLP, SSR for application in molecular diagnostics and Discuss on Site directed mutagenesis, Reverse genetics, Gene knock and Gene Silencing, Gene therapy. | |
| CO4 | Categorize Transgenic Plants and Animals with their applications; Explain the significance of Stem Cell technology and Genome Engineering applications in biology. | |

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| Name of the Course | | Medical Virology and Parasitology |
| Course Code | | PMB 402 |
| CO1 | Explain the process of diagnosis and perform the requisite diagnostic procedures for identification of viruses and list out air borne viral pathogens | |
| CO2 | Classify water borne viral pathogens and Zoonotic viral pathogens | |
| CO3 | Describe sexually transmitted viral pathogens | |
| CO4 | Categorize parasitic and mycotic infections | |

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| Name of the Course | | Tax Planning for Individuals |
| Course Code | | PMB 403 A |
| CO1 | The subject will enable the students to understand basic concepts of tax the Income Tax Act 1961 | |
| CO2 | Relevance of tax planning while computing the tax liability of individuals. | |

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| Name of the Course | | Elements of Marketing |
| Course Code | | PMB 403 A |
| CO1 | Understand marketing concepts and techniques | |
| CO2 | Apply marketing concepts in the pharmaceutical industry. | |

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| Name of the Course | | Bioinformatics |
| Course Code | | PMB 403 B |
| CO1 | Understand and find sequences for nucleic acid and protein of interest, and explain evolutionary relationships between sequences. Understand to design primers to amplify genes of interest | |
| CO2 | Understand and find alternatively spliced transcripts, tissue-specific expression levels and gene-editing technologies | |

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| Name of the Course | Nanobiotechnology |
| Course Code | PMB 404 |
| CO1 | Review the origin, properties and types of nanoparticles |
| CO2 | Describe the methods of synthesis and characterization of nanoparticles |
| CO3 | Discuss the applications of nanoparticles in the field of environmental Nanobiotechnology |
| CO4 | Explain the therapeutic role of nanoparticles in human health. |

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| Name of the Course | Seminar |
| Course Code | PMB 406 |
| CO1 | Understand and present the scientific literature |
| CO2 | Develop presentation skills |