



SHIKSHAN MAHARSHI DR. D.Y. PATIL SHIKSHAN SANSTHA'S

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COLLEGE OF COMPUTER & BUSINESS STUDIES

(Affiliated to Savitribai Phule Pune University)

AISHE CODE: C-41976 PUNCODE: CAAP014520

COURSE OUTCOME (UG)

Name of the Program: B.Sc. Microbiology-NEP

A.Y. 2024-25

Class	Course Code	Course Name	Course Outcome
F.Y.B.Sc. SEM I	MB-101-T	Introduction to Microbiology	<p>CO1: Describe the origin of microbial life on earth by outlining the experiment relating to the formation of organic matter in a laboratory set-up.</p> <p>CO2: Explain the evolution of the microbiology field and the scientific discoveries relating to each field</p> <p>CO3: Outline the relatedness of the different upcoming areas of biological sciences to the field of microbiology.</p> <p>CO4: Classify different species according to the different classification systems.</p> <p>CO5: Review the differences between the basic types of cells found in all biological systems.</p> <p>CO6: Write about the morphological and differential characteristics of different groups of microorganisms</p>



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<p>F.Y.B.Sc. SEM I</p>	<p>MB-101-P</p>	<p>Laboratory Techniques in Microbiology-I</p>	<p>CO1: Demonstrate proficiency in basic microbiological laboratory techniques Students will be able to perform fundamental microbiological techniques such as aseptic transfer, streak plating, serial dilution, and microscopic examination of microorganisms.</p> <p>CO2: Apply various methods of microbial culturing and isolation Students will be able to isolate pure cultures of bacteria, fungi, and other microorganisms using different media and techniques (e.g., solid agar plates, liquid broth cultures).</p> <p>CO3: Identify microorganisms using classical and modern microbiological techniques Students will develop skills in the identification of microorganisms based on morphological, biochemical, and molecular characteristics.</p> <p>CO4: Perform antimicrobial susceptibility testing Students will learn how to test the susceptibility of microorganisms to antibiotics using techniques like the disk diffusion method and minimum inhibitory concentration (MIC) determination.</p> <p>CO5: Interpret and analyze microbiological data Students will be able to analyze and interpret laboratory results, including the growth patterns of cultures, staining results, and test outcomes (e.g., Gram stain, catalase test).</p>
<p>F.Y.B.Sc. SEM I</p>	<p>SEC-101- MB</p>	<p>Basic Skills in Microbiology Laboratory I</p>	<p>CO1: Understand principle, working and calibration of various instruments used in microbiology laboratory and their SOPs</p> <p>CO2: Perform aseptic transfer of cultures</p> <p>CO3: Differentiate between different forms of microorganisms depending upon their microscopic and cultural characteristics</p> <p>CO4: Able to cultivate microorganisms on various natural and laboratory media</p> <p>CO5: Apply their knowledge and skills in clinical, pathological, food testing, environmental testing, etc.</p>



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Class	Course Code	Course Name	Course Outcome
S.Y.B.Sc SEM-III	MB-211	Medical Microbiology and Immunology	<p>CO1: To inculcate knowledge in relationship between human diseases and microorganisms.</p> <p>CO2: Help student to understand different concepts in medical microbiology.</p> <p>CO3: Give the student knowledge about various chemotherapeutic agent and their mode of action.</p> <p>CO 4: Develop the knowledge about human immune response towards microorganism concept related to cells and organs of immune system, immune response and immune mechanism</p> <p>CO 5: To acquaint with human pathogens & normal flora of the human body systems.</p>
	MB-212	Bacterial physiology and Fermentation Technology	<p>CO 1: To develop fundamental knowledge about various biomolecules.</p> <p>CO2: Understand the basic concept related to enzyme.</p> <p>CO 3: To understand various biochemical pathways.</p> <p>CO4: Student will be able to define various modes and techniques of fermentation.</p> <p>CO 5: Enable the student to get sufficient knowledge about development of industrially important strains.</p> <p>CO6: Students will able to understand commercial application of microorganism to produce commercially important product on large scale.</p>
	MB-213	Practical course based on MB-211 &MB-212	<p>CO 1: The aim is to deliver practical knowledge about implementation of the concept studied.</p> <p>CO2 :It enable the students to perform lab diagnostic techniques like blood grouping, various biochemical reactions and to screen industrially important microorganisms</p>



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			<p>CO3: To get acquainted with measurement of cell dimensions using micrometry.</p> <p>CO4: Practicing screening of industrially important microorganisms.</p> <p>CO5: To implement fundamentals of Medical Microbiology in determining Pathogenesis & Lab diagnosis.</p>
S.Y.B.Sc SEM-IV	MB-221	Bacterial genetics	<p>CO 1: Enable the student to get sufficient knowledge about concept of genes, chromosomes & mutations.</p> <p>CO 2: Help the student to understand deciphering of genetic code.</p> <p>CO3: Developing interest by studying history of genetics.</p> <p>CO4: Paraphrasing central dogma of life.</p> <p>CO5: Analysing different mutagens and their mechanism.</p> <p>CO6: Basic understanding of plasmid genetics and eventually plasmid as one of the tools in genetic engineering</p>
	MB-222	Air, Water & Soil microbiology	<p>CO 1: To inoculate knowledge about micro flora of air, water and soil.</p> <p>CO 2: To introduce method of air sanitization water purification and sewage treatment.</p> <p>CO3: Able to check the potability of water by using appropriate tests.</p> <p>CO4: Students will acquire a fairly good understanding about rhizospheric microorganisms.</p> <p>CO5: A brief review on composting and humus formation.</p>



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			<p>CO6: Students will get the knowledge about biogeochemical recycling, nitrogen fixing and use as biofertilizers.</p> <p>CO7: Students will understand the significance of various texts involving use of enumerating fecal <i>E. coli</i> for assessing quality of water</p>
	MB-223	Practical course based on MB-221 & MB-222	<p>CO1: Enable the students to calculate the air flora.</p> <p>CO2: Enable the student to test potability of water to prepare bio-inoculant and to apply it.</p> <p>CO3: Students are able to isolate mutants by suitable method.</p> <p>CO4: Determination of settling velocity, & diversity of air flora.</p> <p>CO5: Learn to perform staining of cell organelles.</p>



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T.Y.B.Sc SEM-V	MB-351	Medical Microbiology-I	<p>CO 1: To analyse the human anatomy & pathogen associated with disease.</p> <p>CO 2 : Acquire knowledge of principles underlying establishment of pathogens in human body.</p> <p>CO 3: Comprehend of pathogenesis of specific pathogens causing microbial diseases.</p> <p>CO 4: Assess epidemiological patterns of microbial disease transmission by various modes, intensity at local and global level.</p> <p>CO 5: Gain Knowledge principles of chemotherapy of microbial diseases and development of drug resistance among pathogens and strategies to mitigate</p>
	MB-352	Immunology- I	<p>CO 1: Understand the importance of primary lymphoid organs in immune system.</p> <p>CO 2 : Detailed study about structure and functioning of the its secondary lymphoid organ</p> <p>CO 3: Students should be aware about cellular components of the immune system.</p> <p>CO 4: Students will learn the Concepts of complement system.</p> <p>CO 5: Educating the students about the peculiar and key concepts falls under the Allograft rejection mechanism. & its prevention</p> <p>CO 6: Comprehending & Exemplifying Immune complexes by the means of diverse techniques such as ELISPOT, RIA.</p>
	MB-353	Enzymology	<p>CO 1: To understand methods of active site determination, role of enzymes and its cofactor in microbial physiology.</p>



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			<p>CO 2 : To learn to perform enzyme assay, purification and quantification of enzymes activity, enzyme kinetics in terms of initial, final velocity, mathematical expression of enzyme kinetic parameters.</p> <p>CO 3 : To correlate regulation of metabolism at enzymatic levels and apply, methodology</p> <p>CO4: To get acquainted with mechanism of allosteric enzymes, enzyme inhibition, feedback inhibition.</p> <p>CO5:To get good knowledge of different methods of immobilization of enzyme and its industrial applications.</p> <p>CO6:To learn about zymogens and their activation, isozymes</p>
	MB-354	Genetics	<p>CO 1: To exhibit a knowledge base in Genetics and Molecular Biology</p> <p>CO 2 : To understand the central dogma of Molecular Biology</p> <p>CO 3 : To construct genetic map of bacteria and fungi</p> <p>CO 4: To get introduced to concept of recombination and bacteriophage Genetics</p> <p>CO 5: To understand the concept cloning in bacteria</p> <p>CO 6: To demonstrate the knowledge of common and advanced laboratory practices in Molecular Biology</p>
	MB-355	Fermentation Technology– I	<p>CO 1: Student's will be able to define various modes and techniques of fermentation</p> <p>CO 2 : Isolate, identify and develop the microbial inoculum for industrial processing.</p>



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			<p>CO 3 : Students will be able to give examples of industrially important microorganisms and their applications.</p> <p>CO 4: Student's will grasp about fermentation economics, parent ability and validation of process.</p> <p>CO 5: Students will learn about upstream and downstream processes.</p> <p>CO 6: Student's will attain the knowledge about fundamentals of Intellectual Property Rights (IPR), Parent designs.</p> <p>CO 7: Students will get the information of different methods for quality assurance of fermentation products.</p> <p>CO 8: Students will learn strain improvement strategies, media optimization methods for production of various valuable products</p>
	MB-356	Agricultural Microbiology	<p>CO 1: To understand plant growth improvement with respect to disease resistance, environment tolerance.</p> <p>CO 2 : To correlate stages of plant disease development, epidemiology, symptom based classification, control methods.</p> <p>CO 3 : To understand the importance of microorganisms in sustainable</p>
	MB-357	Diagnostic Microbiology and Immunology	<p>CO 1: Application of identification systems for microbial disease diagnosis, disease treatment and preventives measures.</p> <p>CO 2: Students can develop strategies for diagnosis of diseases based on antigen and antibody reactions with emphasis on prevailing communicable diseases.</p>



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			<p>CO 3 : Graduates can perform different hemato-pathological tests.</p> <p>CO 4 : To get acquaint to the epidemiological survey and its questionnaire preparation.</p> <p>CO 5: estimation and interpretation of the different hematological indices</p>
	MB-358	Enzymology and Genetics	<p>CO 1: Students can prepare buffers and able to calibrate pH meter.</p> <p>CO 2: Students can perform qualitative analytical tests using flow charts for Proteins.</p> <p>CO3: Students are able to separate and identify sugars from mixtures.</p> <p>CO4: Students will able to do isolation of genomic DNA from bacteria.</p> <p>CO5: Practicing quantitative estimation of DNA by Diphenylamine method.</p> <p>CO6: Students can perform quantitative estimation of carbohydrates</p>
	MB-359	Fermentation Technology- I and Agricultural Microbiology	<p>CO 1: Experimenting isolation of <i>Aspergillus niger</i> from black rot of onion.</p> <p>CO 2 : Performing and determining the outcomes MIC & MBC of antibacterial compounds.</p> <p>CO 3 : Detecting the sterility of Pharmaceuticals as test culture given as per IP Guidelines</p> <p>CO 4 : Validation of commercial formulation of bioinoculants based on BIS Standards.</p>



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			CO 5 : Executing the standard methodology to perform antibiotic assay.
	MB-3510	Marine Microbiology	<p>CO 1: Help the students to impart the awareness of unseen and unexplored niche of marine ecosystem of microbes.</p> <p>CO 2 : Student acquire advances in the knowledge of marine microbes and marine ecology.</p>
	MB-3511	Dairy Microbiology	<p>CO 1: Students acquire skills of processing of milk and dairy products.</p> <p>CO 2 : Students are able to assess quality control in dairy industry.</p>
T.Y.B.Sc SEM-VI	MB-361	Medical Microbiology II	<p>CO 1: To get acquainted with different drug for designing of effective treatment.</p> <p>CO 2 : To gain knowledge of development of drug resistance among pathogens & strategies to mitigate.</p> <p>CO 3 : To become familiar with the various routes of drug administration.</p> <p>CO 4 : Graduates acquire knowledge about cultivation of viruses and viral as well as fungal diseases of humans and animals.</p> <p>CO 5: To get acquainted with establishment human viral pathogens, animal viral pathogens, fungal & protozoal pathogens.</p> <p>CO 6 : To establish preventive measures to cope with transmission & treatment of viral, fungal & protozoal diseases</p>



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	MB-362	Immunology– II	<p>CO 1: Highlighting the properties, attributes and Biological functions of cytokines.</p> <p>CO 2: Tweeting about social values in vaccination programs.</p> <p>CO 3: Extending the basic knowledge about Antigen processing and presentation.</p> <p>CO 4: Assimilation of basic ideas behind the immune response against tumors.</p> <p>CO 5: Thorough overview of key concepts lies in general principles of different types of hypersensitivity reactions</p> <p>.</p>
	MB-363	Metabolism	<p>CO 1: To learn mechanisms of transport of solutes across the membrane.</p> <p>CO 2: To get acquainted with mechanism of biosynthesis and degradation of biomolecules.</p> <p>CO 3: To comprehend basic concept of autotrophic mode of metabolism of prokaryotes.</p> <p>CO4: To learn laws thermodynamics, free energy, entropy, enthalpy.</p> <p>CO5: To get knowledge of electron transport chain.</p> <p>CO6: Protein metabolism, role of urea cycle.</p>
	MB-364	Molecular Biology	<p>CO 1: Graduates get introduced to concept of recombination and bacteriophage Genetics</p> <p>CO 2: To understand the concept cloning in bacteria</p> <p>CO 3: To demonstrate the knowledge of common and advanced laboratory practices in Molecular Biology</p> <p>CO 4: Understanding of phage life cycle and its application in genetic engineering.</p>



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			<p>CO 5: Applications of tools of genetic engineering.</p> <p>CO 6: Basic understanding of techniques used in recombinant DNA technology</p>
MB-365	Fermentation Technology – II		<p>CO 1: Students will be able to describe each step required for successful fermentation and note any potential problems so they can be resolved.</p> <p>CO 2 :Students will get knowledge about large Scale production of milk and milk products.</p> <p>CO 3 : Students will acquire knowledge of production of primary metabolite & secondary metabolites.</p> <p>CO 4 : Students will get introduced to microbial transformation of Steroids.</p> <p>CO 5: Students will get acquainted with the concept of Immune sera.</p> <p>CO 6 : Student's will learn about the industrial production of Alcohol, beer, wine etc.</p>
MB-366	Food Microbiology		<p>CO 1:Enable the student to get sufficient knowledge in relationship between food and microbes, techniques used in food microbiology and food processing.</p> <p>CO 2 :Introduce the graduates about preservation technique used in food industries,</p> <p>CO 3 : Aware the students about microbial food borne illnesses.</p> <p>CO 4 : Introduction of concept of prebiotic and probiotic.</p>
MB-367	Diagnostic Microbiology		<p>CO 1: Students are able to identify and differentiate different fungal and parasitic pathogens.</p>



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		and Immunology	<p>CO 2: Can perform antibiotic sensitivity testing of the bacterial pathogens.</p> <p>CO 3: Students get acquainted to different immune-haematological techniques.</p> <p>CO 4: Graduates will practically study different blood components.</p> <p>CO 5: To get acquainted with the egg inoculation techniques required for cultivation of viruses.</p> <p>CO 6: To know importance of cross matching useful in blood transfusion.</p>
	MB-368	Metabolism and Molecular Biology	<p>CO 1: Students will implement knowledge of biochemistry to detect the different bio-elements in the blood and serum.</p> <p>CO 2: Students will acquire the knowledge of large scale production of enzyme its purification, quantification and immobilization.</p> <p>CO 3: Students are able to isolate and enumerate the bacteriophage.</p> <p>CO4: Student will able to observe mitotic cell division.</p> <p>CO5: Students are able to isolate plasmid DNA.</p>
	MB-369	Fermentation Technology- II and Food Microbiology	<p>CO 1: Lab scale production and estimation of ethanol.</p> <p>CO 2 : Understanding the solid state fermentation with taking reference of mushroom cultivation.</p>



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			<p>CO 3 : students will get acquainted with different guidelines of with HACCP (Hazard Analysis and critical control point) for food industry.</p> <p>CO 4: Students will get the knowledge about isolation and Identification of probiotic microflora and health benefits associated with it.</p> <p>CO 5: Examining the values TDP and TDT.</p> <p>CO 6: Testing the Aflatoxin using UV trans-illuminator.</p>
	MB-3610	Waste Management	<p>CO 1: To learn the design and working of treatment plants and methods used for liquid and solid waste treatment.</p> <p>CO 2 :To impart the understanding of kinetics of biological systems used in waste treatment.</p> <p>CO 3 : To learn the standards of waste management and competent authorities involved at National and international level</p>
	MB-3611	Nano-biotechnology	<p>CO 1:To learn fundamentals of nanotechnology as to Synthesis and characterization techniques of nanoparticles.</p> <p>CO 2 :To acquire knowledge of applications of nanomaterials in different disciplines of human life.</p> <p>CO 3 : To compare the merits of using nanotechnology with existing technologies.</p>