

Rayat Shikshan Sanstha's
Mahatma Phule Mahavidyalaya, Pimpri, Pune-17
Department of Microbiology
2021-2022
Course Outcomes
(UG)

Name of the Department	Class	Course code	Course Name	Course Outcome
B.Sc. (Microbiology)	B.Sc.I Sem-I	MB-111	Introduction to Microbial world	<p>CO 1: Introduce students about development of microbiology.</p> <p>CO2: Have developed a good knowledge of the development of the discipline of Microbiology and the contributions made by prominent scientists in this field.</p> <p>CO 3: Develop and understand the vast diversity and characteristics of microbial world.</p> <p>CO4: Provides an information about how to classify cellular microorganisms based on their general characteristics.</p> <p>CO 5: Introducing the student about morphological, structural characterization of microorganisms.</p>
		MB-112	Basic techniques in Microbiology	<p>CO 1: Introduction of the standard operating procedures in Microbiology</p> <p>CO 2: Introduce the student to different laboratory instruments.</p> <p>CO 3: Introduction of students to different staining techniques</p> <p>CO 4: Enable the student to understand basic techniques in laboratory.</p> <p>CO 5: To acquire the knowledge of different methods of disinfection and sterilization.</p>
		MB-113	Practical Course based on MB- 111 & MB-112	<p>CO 1: Enabling the students to perform good laboratory practices.</p> <p>CO 2: Developing the student's ability to handle laboratory instruments.</p> <p>CO 3: Enabling the student to perform staining techniques.</p> <p>CO4: Develop the keen observational skill using different microscopy techniques and staining techniques.</p> <p>CO5: Gain knowledge about common laboratory glass wares.</p> <p>CO6: Students will able to observe motility of bacteria.</p>

	B.Sc.I Sem-II	MB-121	Bacterial cell and Biochemistry	<p>CO 1: To understand the bacterial cell structure.</p> <p>CO 2: Helps student to learn different bacterial cell organelles</p> <p>CO 3: To understand the biochemical characterization of components of microorganisms.</p> <p>CO4: Describe characteristics of bacterial cells, cell organelles, cell wall composition and various appendages like capsules, flagella or pilli.</p> <p>CO5: To learn about ICTV classification of viruses.</p> <p>CO6: Acquainted with chemical and molecular structures of biomolecules.</p>
		MB-122	Microbial Cultivation and Growth	<p>CO 1:To understand the different nutritional requirement of microorganisms.</p> <p>CO 2 : Help the student to learn different methods of cultivation of microorganism.</p> <p>CO 3 : To understand the concept of bacterial growth.</p> <p>CO 4: Enable the students to understand the methods of bacterial growth measurements.</p> <p>CO 5: To gain the knowledge of different methods of measurements of bacterial growth.</p> <p>CO 6: To gain the knowledge of different factors affecting bacterial growth.</p>
		MB-123	Practical Course based on MB-121 & MB-122	<p>CO 1: Enable the students to prepare laboratory media.</p> <p>CO 2: Enable the students to isolate bacteria for different sources.</p> <p>CO 3: Students are able to study practically the effect of different environmental factors on growth of microorganisms.</p> <p>CO4: Students will gain the knowledge about preservation of cultures in laboratory.</p> <p>CO5: Students will able to check sterilization efficiency of autoclave.</p> <p>CO6: Enable the students to perform special staining techniques.</p>
	B.Sc. II Sem-III	MB-211	Medical	<p>CO 1: To inculcate knowledge in relationship between human diseases and microorganisms.</p> <p>CO 2: Help student to understand</p>

			Microbiology and Immunology	<p>different concepts in medical microbiology.</p> <p>CO 3: 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	MB212 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>CO 2 :It enable the students to perform lab diagnostic techniques like blood grouping, various biochemical reactions and to screen industrially important microorganisms</p> <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>

	B.Sc. II 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> <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	<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>
	B.Sc. III 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</p>

			<p>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>
		<p>MB 352:</p>	<p>Immunology - I</p> <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>
		<p>MB353:</p>	<p>Enzymology</p> <p>CO 1: To understand methods of active site determination, role of enzymes and its cofactor in microbial physiology.</p> <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</p>

				<p>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> <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>

			<p>agriculture, biotechnological application of bio films, edible vaccines.</p> <p>CO 4 : To correlate Soil Micro biome and Role of microorganisms in soil health</p> <p>CO 5 : To determine the use of Microorganisms as tools in plant genetic engineering.</p>
		MB – 357:	<p>Diagnostic Microbiology and Immunology</p> <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> <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:	<p>Enzymology and Genetics</p> <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	<p>Fermentation Technology- I and Agricultural Microbiology</p> <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</p>

				<p>BIS Standards. CO 5 : Executing the standard methodology to perform antibiotic assay.</p>
		MB-3510	Marine Microbiology	<p>CO 1:Help the students to impart the awareness of unseen and unexplored niche of marine ecosystem of microbes. 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. CO 2 :Students are able to assess quality control in dairy industry.</p>
	B.Sc. III Sem VI	MB 361	Medical Microbiology II	<p>CO 1: To get acquainted with different drug for designing of effective treatment. CO 2 : To gain knowledge of development of drug resistance among pathogens & strategies to mitigate. CO 3 : To become familiar with the various routs of drug administration. CO 4 : Graduates acquire knowledge about cultivation of viruses and viral as well as fungal diseases of humans and animals. CO 5: To get acquainted with establishment human viral pathogens, animal viral pathogens , fungal & protozoal pathogens . CO 6 : To establish preventive measures to cope with transmission & treatment of viral, fungal & protozoal diseases.</p>
		MB 362	Immunology– II	<p>CO 1: Highlighting the properties, attributes and Biological functions of cytokines. CO 2 :Tweeting about social values in vaccination programs. CO 3 : Extending the basic knowledge about Antigen processing and presentation. CO 4 : Assimilation of basic ideas behind the immune response against tumors. CO 5: Thorough overview of key concepts lies in general principles of different types of hypersensitivity reactions.</p>

				CO 6 : A brief understanding about autoimmune diseases.
		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> <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 gets introduced to microbial transformation of Steroids.</p> <p>CO 5: Studente will get acquainted with the concept of Immune sera.</p> <p>CO 6 : Student’s will learn about the</p>

				industrial production of Alcohol, beer, wine etc.
		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 and Immunology	<p>CO 1: Students are able to identify and differentiate different fungal and parasitic pathogens.</p> <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>

				<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>

