



THE MADURA COLLEGE

An Autonomous Institution affiliated to Madurai Kamaraj University

Re-accredited (3rd cycle) with 'A' grade by NAAC

Vidya Nagar, T.P.K. Road, Madurai – 625 011

DEPARTMENT OF MICROBIOLOGY

PROGRAMME STRUCTURE

PROGRAMME : M.Sc. (Microbiology)

Course Code	Course Title	CLO		Mapping of CO with PO				
				PO1	PO2	PO3	PO4	PO5
21P1RMC1	Microbial Taxonomy	1	Classify the microorganisms	2	3	1	2	3
		2	Compare and contrast prokaryotes and eukaryotes	3	3	2	2	3
		3	Interpret the characteristics and significance of fungi	3	2	3	2	3
		4	Compare algal and cyanobacterial members	3	2	3	3	3
		5	Explain the classification and nomenclature of viruses	2	2	3	2	3
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21P1RMC2	Biochemistry	1	Explain the bioenergetics process and functions of enzymes.	2	2	3	3	2
		2	Outline the classification and properties of carbohydrates.	2	2	2	2	2
		3	Determine the structure and properties of aminoacid and enzyme.	3	3	2	2	2
		4	Classify the types and functions of Lipids.	2	2	2	1	2
		5	Analyze the quantity of Nucleic acid.	2	1	2	3	2
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21P1RMC3	Microbial Physiology	1	Outline the concept of microbial growth and nutrition.	1	1	1	1	1
		2	Define the basic concept of photosynthesis and bioluminescence.	1	1	1	1	1
		3	Summarize the concept of catabolism and catabolic pathways in microbes	1	1	1	1	1
		4	Interpret the microbial anabolic pathways and nitrogen metabolism	1	2	2	2	2
		5	Illustrate anaerobic respiration and microbial stress response	2	2	2	2	2
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21P1RME1	Bioinstrumentation	1	Demonstrate the working mechanism and usage of different microscopes	3	1	2	1	3

		2	Describe the principle and applications of various instruments used in biology	3	1	1	1	3
		3	Apprise spectroscopic data for laboratory and project work	3	3	3	3	3
		4	Separate and determine different components present in biological samples using appropriate separation techniques	3	3	3	3	3
		5	Categorize and discriminate dosage and safety aspects for various radioisotopes	1	2	2	2	1
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21P1RMP1	Lab in Microbial Taxonomy and Biochemistry	1	Recall the fundamental techniques in the field of microbiology.	2	2	2	2	3
		2	Analyze the morphology of microorganisms under microscope.	2	2	2	2	3
		3	Determine physiological characteristics of microorganisms.	2	3	3	2	3
		4	Estimate the quantity of carbohydrates and proteins.	2	2	2	2	3
		5	Measure the quantity of DNA.	2	2	2	2	3
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21P1RMP2	Lab in Microbial Physiology and Bioinstrumentation	1	Illustrate bacterial growth by turbidity method	2	2	1	1	2
		2	Calculate glucose uptake by microbes	3	2	1	2	2
		3	Apply oxidation and fermentation techniques	1	1	2	1	1
		4	Demonstrate photosynthetic pigments and their estimation	2	1	1	2	2
		5	Standardize Beer-Lambert's law	3	2	3	2	1
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21P2RMC4	Cell and Molecular Biology	1	Compare the structure of cell organelles with their function and explain the importance of cell division in organisms	1	1	1	1	1
		2	Illustrate the different types of DNA	1	1	1	1	1
		3	Distinguish the transcription in prokaryotes and eukaryotes	1	1	1	1	1
		4	Compile the protein synthesis and Post translational modifications	1	2	2	2	2
		5	Justify the significance of mutation in the evolution of species	2	2	2	2	2
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21P2RMC5	Microbial Genetics	1	Outline the history of microbial genetics and mutation	2	1	2	2	1
		2	Delineate the basic concepts of bacterial genetics	2	2	2	2	3
		3	Predict the significance of phage in genetics	2	2	1	1	2
		4	Interpret the roles of transposable elements in microorganisms	2	2	2	2	2
		5	Elaborate the mechanisms of gene expression in microbes	3	2	2	2	2

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21P2RMC6	Immunology	1	Summarize the fundamental concepts of immunity, compare the basic mechanism of innate and acquired immunity; humoral and cell mediated immunity.	1	2	2	1	2
		2	Demonstrate the various antibodies and complement system	2	1	1	2	2
		3	Analyze the significance of Major Histocompatibility Complex in terms of immune response and Realize how the MHC molecules functions.	1	2	2	1	1
		4	Explain the interaction between the immune system and pathogens and allergic reactions.	1	2	1	2	1
		5	Define the properties of cancer cells, immune recognition of tumors, immune evasion of cancers and basis of transplantations.	2	2	1	2	1
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21P2RME2	Research Methodology	1	Understand the basic concepts of research methodology and scientific writing	1	1	1	1	1
		2	Analyze the Research Problem & Hypothesis making for the scientific problem	1	1	1	1	1
		3	Explain research, research methods, preparation of research reports, research articles, books, book chapters, impact factors, citation index.	2	2	2	2	1
		4	Apply concepts of biostatistics and computers, analysis and interpretation of data, writing of thesis, and preparation of manuscript for publication.	2	2	2	3	2
		5	Analyze the basic concepts of statistical and other softwares	3	2	3	3	2
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21P2RMP1	Lab in Cell and Molecular Biology and Microbial Genetics	1	Describe the key concepts in DNA isolation and demonstration	2	2	1	1	2
		2	Illustrate the significance of bacterial mutants	3	2	1	2	2
		3	Apply scientific principles in the interpretation of yeast mutants	1	1	2	1	1
		4	Demonstrate life cycle of phage	2	1	1	2	2
		5	Demonstrate titration of phage particles	3	2	3	2	1
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21P2RMP2	Lab in Immunology and Research Methodology	1	Describe an understanding of the key concepts in immunology	2	2	1	1	2
		2	Illustrate the salient features of antigen antibody reaction and its uses in diagnostics and various other studies	3	2	1	2	2
		3	Apply scientific principles in the interpretation of immunological responses and data	1	1	2	1	1

		4	Demonstrate suitable statistical program for research experiments	2	1	1	2	2
		5	Explain the significance of difference using statistical tools	3	2	3	2	1
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21P3RMC7	Clinical Microbiology	1	Explain the methods of collection and processing of clinical specimens and presumptive identification of microorganisms	1	2	3	2	2
		2	Identify the pathogenic bacteria clinically	2	0	3	2	3
		3	Devise the methods of clinical identification of pathogenic fungi	2	2	0	3	0
		4	Explain clinical significance of pathogenic animal viruses	2	2	2	2	2
		5	Analyze laboratory identification of pathogenic parasites	3	2	2	2	0
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21P3RMC8	Agricultural Microbiology	1	Summarize the concept and scope of agricultural microbiology	2	3	1	2	3
		2	Outline the process of microbial insecticides	3	3	2	2	3
		3	Analyze various aspects of biofertilizers	3	2	0	2	3
		4	Explain the mechanisms of microbial plant diseases	3	2	3	0	3
		5	Describe the applications of microorganisms in agriculture	2	2	3	2	3
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21P3RMC9	Industrial Microbiology	1	Recognize industrially important micro-organisms involved in production to get desired yield.	0	2	3	2	2
		2	Identify different bioreactor designs, specialized features of fermenters and transport phenomenon in fermentation.	2	1	3	2	3
		3	Develop inoculum for industrial fermentations, microbial growth and product formation kinetics, media formulation and sterilization, storage of inoculums.	2	2	0	3	3
		4	Classify various downstream processing that has to be adapted on the basis of the product to be recovered.	2	2	2	2	0
		5	Rationalize the processes of industrial production and purification of various microbial products	3	2	3	3	2
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21P3RMDC	Forensic Science	1	Distinguish the basic concepts involved in the forensic science	1	1	1	1	1
		2	Analysis and Infer the crimes using various identification techniques	1	1	1	1	1
		3	Identify and estimate the toxic substances involved in crime, identify the digital evidences of crime and identify the physical trace evidences.	1	1	1	1	1

		4	Analyse the basic principles of computer forensics and capture the crime scene evidences through digital evidences.	1	2	2	2	2
		5	Explain and analyse the firearm usage and blood stain pattern analysis using forensic mathematics.	2	2	2	2	2
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21P3RMP5	Lab in Clinical Microbiology and Agricultural Microbiology	1	Apply different clinical laboratory techniques for collection and analysis of body fluids	3	3	2	3	2
		2	Isolate and identify pathogenic bacteria from clinical specimens	0	3	2	3	2
		3	Prepare antibiogram for pathogenic isolates	3	2	1	1	3
		4	Experiment with microbial ecology and its interactions	2	2	0	3	0
		5	Analyse the methods used in agriculture	2	0	3	3	2
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21P3RMP6	Lab in Industrial Microbiology and Nanotechnology	1	Utilize the microbes for production of industrial products	2	2	3	2	2
		2	Screen and produce antibiotic using microorganism	2	3	2	2	2
		3	Outline the fermentation process and estimation of ethanol	1	2	3	3	3
		4	Synthesize nanomaterials using biological methods	2	3	2	2	2
		5	Characterize synthesized nano materials using various analytical methods	2	2	2	3	3
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21P4RMC10	Environmental Microbiology	1	Explain the concept of omnipotence of microorganisms	1	0	1	1	1
		2	Elaborate the role and interaction of microbes in biogeochemical cycles	2	2	3	2	2
		3	Analyze the role of microbes in the air and their sampling	2	2	1	2	0
		4	Apply analytical techniques of quality control sector in microbiological industry	2	2	2	2	2
		5	Summarize the bioremediation and microbial leaching techniques	3	2	3	3	2
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21P4RMC11	Microbial Biotechnology	1	Elaborate the importance of microbes in biotechnology and discuss the pros and cons and other ethical issues pertaining to biotechnology	3	1	2	3	3
		2	Differentiate various cloning vectors, other molecular tools and their applicability in gene cloning	3	3	3	3	3
		3	Apprise the mechanism of mutagenesis and various techniques for transferring recombinant genes to the host cell	3	2	0	3	3

		4	Explain the principle, procedure for producing transgenic animals and its biological significance	3	3	3	3	3
		5	Describe various methods involved in transformation of plant cells and the importance of GM crops	2	2	2	1	0
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21P4RMC12	Genomics and Proteomics	1	Discern the structure and organization of prokaryotic and eukaryotic genome	1	1	1	1	1
		2	Analysis and Infer the various sequencing technologies	1	1	1	1	1
		3	Construct phylogenetic tree and explain molecular phylogeny	0	1	1	1	1
		4	Formulate and assess proteomic tools for detection and quantification of proteins	1	2	2	0	2
		5	Explain different tools involved in genomics and proteomics	2	2	0	2	2
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21P4RME3	Entrepreneurial skill in Microbiology	1	Comprehend the concept of entrepreneurship and its development	1	0	1	1	1
		2	Apply the basic skills to become an entrepreneur	1	1	1	1	1
		3	Explain the concepts of entrepreneurial management	1	1	1	0	1
		4	Utilize the skills needed to manage the start-up and run an organization	1	0	2	2	2
		5	Explore the various entrepreneurial avenues in microbiology	2	2	2	2	2
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21P4RME3	Medical Laboratory Technology	1	Emphasize basic laboratory technology, instrument and their role as a medical laboratory technician.	1	1	0	1	1
		2	Summarize the epidemiological and ecological aspects of parasites causing diseases to humans.	2	2	3	2	2
		3	Demonstrate knowledge and understanding of the principles that govern the structures of macromolecules and their participation in molecular recognition.	2	2	1	2	1
		4	Perform clinical laboratory procedures within acceptable quality control parameters in Haematology.	2	2	2	2	2
		5	Appraise the basic structure of cells, tissues and organs and describe their contribution to normal function	3	0	3	3	2
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21P4RMP7	Lab in Environmental Microbiology and	1	Isolate and identify microorganisms found in different habitat	3	3	2	3	2
		2	Determine the water quality based on its microbiological characteristics	2	3	2	3	2

	Microbial Biotechnology	3	Demonstrate biogas production by using methanogenic bacteria	3	2	0	0	3
		4	Acquaint basic biotechnological tools, vectors and techniques involved in transformation	2	2	3	3	2
		5	Produce and validate recombinant strains	2	2	3	3	2
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21P4RMP8	Lab in Genomics & Proteomics and Entrepreneurial skill in Microbiology	1	Extract and Quantify genomic DNA from Eukaryotes	2	2	3	2	0
		2	Separate DNA and protein molecules using electrophoresis	2	0	2	2	2
		3	Predict the domains and Phylogenetic relationships among the organisms	1	2	3	0	3
		4	Build 3D structure of proteins using bioinformatics tools	2	0	2	2	2
		5	Bloom as an entrepreneur in the field of Microbiology	2	2	2	3	0


Chairman/BoS
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