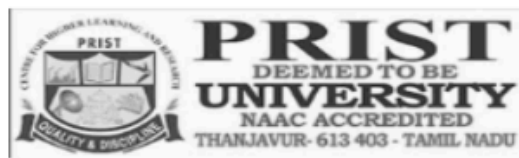


**SCHOOL OF ARTS AND SCIENCE
DEPARTMENT OF MICROBIOLOGY**

2022-2023


2.6.1.a The institution has stated learning outcomes (Program and Course outcomes)/graduate attributes which are integrated into the assessment process and widely publicized through the website and other documents and the attainment of the same are evaluated by the institution




School of Arts and Science
Department of Microbiology
22UGMBGEC
2022 Regulation
Program Outcomes and Course outcomes of
B.Sc., Mapping of COs and POs

PROGRAM EDUCATIONAL OBJECTIVES (PEO)	
PEO1	To gain and apply knowledge of microorganisms concept to solve the problems.
PEO2	To identify, analyse and understand the problems related to microbes.
PEO3	Ability to design and develop solution to environment using the microbes.
PEO4	Ability to design performs experiments, analyse, and interpret data for investigating complex problems.
PEO5	To decide and apply appropriate tools and techniques for manipulations.

PROGRAM SPECIFIC OUTCOME (PSO)	
PSO1	Expose input practical skills/competencies in working through microbes for study and use in the laboratory as well as outside, with the use of good microbiological practices.
PSO2	Obtain information and understanding of the microbiology perception as appropriate to various areas such as medical, industrial, environment, genetics, agriculture, food and others.
PSO3	Proficient enough to use microbiology knowledge and skills to study problems involving microbes, clear these with peers/ team members/ other stake holders, and undertake remedial measures/ studies etc.


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 Head of the Department
 Department of Microbiology
 School of Arts & Science
 Prist Deemed to be University, Thanjavur


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 Dean
 School of Arts & Science
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PSO4	Developed a broader standpoint of the regulation of Microbiology to facilitate individual to identify challenging societal troubles and plan their professional career to build up novel decision for such problems.
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PROGRAMME OUTCOMES (POS)	
PO1	Vital Thinking: Acquire knowledgeable actions after identifying the hypothesis that frame our idea and dealings, read-through out the degree to which these hypothesis are precise and suitable, and give the impression of being at our thoughts and assessments (academic, organizational and individual) from diverse perception.
PO2	Precious communication: Study about speak, read, write and listen noticeably in person and throughout electronic media in English and in one Indian language and build meaning of the globe by connecting people, thoughts books, media and technology.
PO3	Effectual citizenship: Reveal empathetic social concern and fairness centred national progress and the capability to act with and take part in civic life through volunteering.
PO4	Ethics: Be aware of diverse value systems including the individual, under the ethical dimensions of personal choice, and believe responsibility for them.
PO5	Environment and Sustainability: Analyze the importance of microbes for environmental clean-up and sustainable development.
PO6	Self directed and life-long learning: To gain the talent to employ in self-determining and life-long learning in the broadest circumstance socio technological transforms.
PO7	Economic liberty and employability potential: Attain the ability to be concerned in economically sustainable opening and pound entrepreneurial skill.

B.Sc., CURRICULUM MAPPING

Programme Educational Objectives vs Programme Outcome

Programme Outcome-PO	Programme Educational Objectives – PEO	PO1	PO2	PO3	PO4	PO5
	PEO1	*	*	*	*	
	PEO2	*		*		*
	PEO3		*		*	
	PEO4	*	*	*		*
	PEO5	*		*	*	


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Semester	Course Code	Title of the Course	Cos	POS						
				PO1	PO2	PO3	PO4	PO5	PO6	PO7
I	22110AEC11	Language-I (Tamil-I)	CO1- Learn the changes that have occurred in literature since the classical period.	1	2	1	0	1	2	1
			CO2- Make use of vocabulary systematically.	1	2	1	1	1	2	0
			CO3- Understand how to lead one's life realizing the modernity and its environment/atmosphere.	1	2	1	0	1	2	1
I	22111AEC11	Advanced English-I	CO1- Develop vocabulary	1	2	0	1	1	2	2
			CO2- Learn to edit and do proof reading	1	2	1	1	0	2	1
			CO3- Read and comprehend literature	1	2	0	0	1	0	0
I	22111AEC12	English-I	CO1- Read and comprehend literature	1	2	1	1	0	2	2
			CO2- Appreciate poetry and prose	1	2	0	1	1	0	0
			CO3- Familiarize students with fiction.	1	3	1	1	1	2	1
I	22111AEC13	Fundamentals of	CO1 – Describe the characteristics of microorganisms and classification of biological system	3	1	1	0	0	0	2
			CO2 – Understand concepts of growth and reproduction of microbes	2	0	0	2	0	2	0
			CO3 – Able to explain the beneficial and detrimental effects of microorganisms	2	1	3	0	3	0	3


22111AEC13

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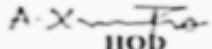
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			CO4 -- Gather theoretical background of microbial cultivation	3	1	0	2	3	0	2
I	22116AEC14L	Fundamentals of Microbiology Lab	CO1 – Develop basic skills in aseptic techniques for microbiology practical.	2	1	1	1	3	2	3
			CO2 – Hands on experience in handling various important instruments.	2	0	1	1	0	1	2
			CO3 - Able to perform basic experiments to grow and study microorganism in laboratory	2	1	1	1	1	1	3
			CO4 - Develop knowledge on identification of microorganisms	2	0	1	1	1	2	3
I	22115AEC15	Bio Chemistry I	CO1 – Develop fundamental knowledge about various biomolecules	3	1	1	1	1	0	3
			CO2 - Understand the basic concepts related to enzymes	2	0	1	1	1	0	3
			CO3 - Know various biochemical pathway	2	1	2	1	1	0	3
			CO4 - Understand the concept of microbial metabolism	3	0	1	0	1	0	3
I	22115AEC16L	Bio Chemistry I Lab	CO1 - Practical knowledge about various techniques used in Biochemistry	0	1	2	1	1	3	3
			CO2 - Exhibit the well practical knowledge about estimation of carbohydrates, protein.	0	0	1	0	0	2	3
			CO3 – Learn the quantitative and qualitative estimation biochemical analysis	2	1	2	1	1	0	3
II	22110AEC21	Language-II (Tamil-II)	CO1-Know what devotion really is.	2	2	0	0	1	2	3


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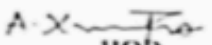

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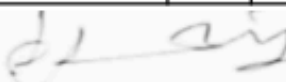
			CO2-Know the fruitfulness obtained through devotion	2	2	1	0	1	2	3
			CO3-Perceive the progress achieved in the society through devotion.	2	3	1	1	2	2	3
II	22111AEC21	Advanced English-II	CO1- Develop technological skills.	2	2	1	1	0	2	2
			CO2- Able to write in a variety of formats	2	2	0	0	0	0	0
			CO3- Read biographies and develop personality	2	3	0	0	1	0	0
II	22110AEC22	English-II	CO1- Appreciate different forms of literature	2	2	1	0	1	1	0
			CO2- Acquire language skills through literature	2	1	1	1	0	2	1
			CO3- Broadens the horizon of knowledge	2	0	1	1	1	1	1
II	22116AEC23	Microbial Physiology	CO1- Determining the growth features of the microbes with various environmental factors.	2	0	0	3	1	1	1
			CO2 – Analysis of essential nutrients ensuring microbial growth.	2	1	2	2	1	1	1
			CO3 -The significance of microbial surveillance like autotrophs, heterotrophs, etc...	1	1	2	2	1	2	1
			CO4- Electron transport and metabolic pathway of living systems	1	2	0	1	2	2	1
II	22116AEC24L	Microbial Physiology Lab	CO1- Understand and predict the various metabolic reactions in microbial cell.	1	2	1	0	2	2	0
			CO2-Predict the intermediate products which can be employed in industrial production.	2	2	1	1	0	2	2


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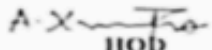

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			CO3- Environmental growth kinetics of microorganism	1	2	0	1	1	2	2
II	22115AEC25	Bio Chemistry II	CO1- Developed a very good understanding of various biomolecules	0	2	0	1	0	2	0
			CO2 - knowledge about lipids and fatty acids	2	2	1	1	1	2	1
			CO3- Well knowledge about multifarious function of proteins	1	2	1	1	0	2	1
			CO4- Gain knowledge about metabolism.	1	2	0	0	2	2	0
II	22115AEC26L	Bio Chemistry II Lab	CO1- To demonstrate an understanding of fundamental biochemical principles	1	2	0	0	0	2	0
			CO2- To learn the structure/function of biomolecules, metabolic pathways, and regulation	3	0	0	0	2	2	1
			CO3- Students are able to make buffers, study enzyme kinetics	3	0	1	1	2	2	0
II	22116RLC27	Research LED Seminar	CO1- Exposure to various research domains	3	1	1	1	1	1	1
			CO2- Acquaintance with languages of research	2	1	0	1	1	0	1
			CO3- Development of research aptitude	0	1	1	1	2	1	1
III	22110AEC31	Language-III (Tamil-III)	CO1- Achieve one's goal by following the ancestral path	3	1	1	1	1	3	1
			CO2- Learn to lead life of perfection by realizing the uncertainty in the life	2	0	0	1	2	2	1
			CO3- Attain happiness through honesty	3	0	1	0	0	2	1
III	22111AEC31	Advanced English-III	CO1- Understand phonetics.	2	0	0	1	1	1	1
			CO2- Develop writing skill	2	1	1	0	1	2	1


A. Xanthos
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Head of the Department
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School of Arts & Science



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			CO3- Able to develop creative writing	3	1	1	1	1	2	1
III	22111AEC32	English-III	CO1- Enable to appreciate different types of prose	2	1	1	1	1	1	1
			CO2- Develop the conversational skills through one-act plays	2	0	1	1	1	2	2
			CO3- Enhance the skill of making grammatically correct sentences.	2	0	1	0	1	2	2
III	22116AEC33	Immunology	CO1- Theory linked to cells and organs related to the immune system.	3	0	1	1	0	0	2
			CO2- Able to know Immune response and immune mechanism.	3	1	1	1	1	1	1
			CO3- Understanding the mechanism of Immunological disorders.	3	1	0	0	0	2	2
			CO4- Learn the importance and precautions of Immunodeficiency syndromes	2	2	0	1	2	2	2
III	22116AEC34	Cell Biology	CO1-To grasp the significance of cell and its components in living systems	2	2	0	0	2	2	3
			CO2-To understand the and describe the structures and basic components of prokaryotic and eukaryotic cells	2	2	0	0	1	2	3
			CO3-To understand the cyclical events of cell division and types of cell division	2	2	0	0	1	2	3
			CO4-To acquire the knowledge of cell biology for understanding various physiological process	3	3	0	0	1	2	2
			CO5-To understand the synthesis of cellular compounds and cell signaling	3	3	1	1	2	2	3


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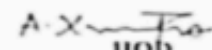

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III	22112AEC35L	Immunology Lab	CO1- Able to know about principles and techniques Blood grouping	1	1	0	2	2	2	2
			CO2- Understanding the immunological experiments for clinical field	0	0	0	0	0	2	0
			CO3- Counting of RBC, WBC and platelets	1	2	0	1	2	2	1
III	22112AEC36L	Cell Biology Lab	CO1- To grasp the significance of cell and its components in living systems	1	2	1	0	1	2	1
			CO2-To understand the and describe the structures and basic components of prokaryotic and eukaryotic cells	1	2	0	1	2	2	2
			CO3-To understand the cyclical events of cell division and types of cell division	1	2	1	0	1	2	2
III	20116RMC37	Research Methodology	CO1- Understanding research questions and tools	2	2	0	2	2	2	1
			CO2- Experience in scientific writings	0	0	0	0	0	0	0
			CO3-Practice in various aspects of scientific publications	2	2	1	1	1	2	2
			CO4-Inculcation of research ethics	1	2	0	1	1	2	1
III	22110AEC41	Language-IV (Tamil-IV)	CO1- Realize how the ancient people changed their lifestyle according to the ages	0	3	0	0	0	2	0
			CO2- Learn how to change one's lifestyle according to the needs of the future	1	3	0	0	0	2	0
			CO3- Accept the modern trends and its uses	3	0	1	1	1	2	2


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HOD
Head of the Department
Department of Microbiology
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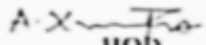

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IV	22111AEC41	Advanced English-IV	CO1- Develop writing skill.	2	0	1	1	1	3	2
			CO2- Comprehend and describe poems	2	1	1	1	1	3	2
			CO3- Learn interviewing skills	3	0	1	1	1	2	2
IV	22111AEC42	English-IV	CO1- Improve their ability to read and understand them	3	1	0	0	1	1	3
			CO2- Know the genius of Shakespeare	2	1	1	0	1	1	2
			CO3- Express in writing their views.	2	0	1	1	1	1	2
IV	22116AEC43	Virology	CO1- Understanding the characteristic features of viruses.	2	2	1	1	1	2	2
			CO2 – Gain the knowledge about the biology of bacteriophages.	2	2	1	0	1	2	2
			CO3 – Learn the range of plant viruses and animal viruses.	2	2	0	0	1	2	2
			CO4 - To know the role of viruses in causing of cancer	2	2	0	1	1	1	2
IV	22116AEC46L	Virology Lab	CO1- Knowledge on structure of plants, animals, bacteria and viruses.	2	1	1	1	1	1	1
			CO2- This paper also enables the student on isolation, propagation of various viruses	1	1	0	0	1	1	1
			CO3- Despite advances in clinical laboratory testing devices	3	2	1	0	1	3	1
IV	22116AEC45	Biostatistics and Bioinformatics	CO1- Developed skills to use computers for analysis of biological data.	3	2	2	1		3	1
			CO2 – Gains the biological databases and compares the data of the biological macromolecules.	3	2	1	1	1	3	3


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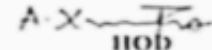

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 School of Arts & Science
 Ponnaiyah Ramajayam Institute of
 Science & Technology (PRIST)
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			CO3 – Analysis of data retrieval, representation, analysis and interpretation	3	2	0	1	1	2	2
IV	22116AEC47L	Biostatistics and Bioinformatics Lab	CO1 - Investigate the literature data of the given protein using PubMed.	1	3	1	1	2	2	3
			CO2 - Explore the nucleotide sequence data of the given species using NCBI / EMBL / DDBJ.	2	3	0	0	1	2	3
			CO3 - Investigate the protein sequence of the species using PIR and Swissprot / UniProt	2	3	0	0	2	2	1
IV	221ENSTU45	Environmental Studies	CO1- Understand eco-system	2	3	1	0	1	2	2
			CO2- Know social issues and the environment	2	2	0	0	2	2	2
			CO3- Learn keep the environment eco-friendly	2	2	0	0	1	2	1
V	22116AEC51	Food and Dairy Microbiology	CO1 – Illustrate the role of microorganisms in the production of food	2	2	0	1	1	2	0
			CO2 – Investigation of milk and foods quality test for detecting microorganisms	2	2	1	0	1	2	0
			CO3 – Gain the knowledge regarding food preservation	2	2	0	1	0	2	0
V	22116AEC52	Molecular Biology	CO1 - Concept of central dogma of the cell and gene regulation.	0	2	0	0	1	1	0
			CO2 - Principles and applications of various molecular techniques.	2	3	1	0	1	1	1
			CO3 - Concept, methods and application of r-DNA technology.	2	3	0	0	1	1	2
			CO4 - Gene library and gene mapping	2	3	1	0	1	1	1


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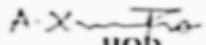

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V	22116AEC53	Agricultural and Environmental Microbiology	CO1 - Students acquire the information about microbes	2	3	0	0	2	2	1
			CO2 - Know about microbes and its role in the environment.	2	0	1	0	2	2	1
			CO3 - Able to understand about microbes in agriculture and environmental practice	0	3	0	0	0	2	0
V	22116AEC55L	Food and Dairy Microbiology and Molecular Biology Lab	CO1 - Analyze the microbes in food and dairy industry products	2	2	0	1	1	2	1
			CO2 - Production of Food and dairy products using microbes	0	2	0	0	0	2	0
			CO3 - Knowledge about Molecular Genome analysis and quantification	2	2	0	0	1	2	0
			CO4 - Isolation of DNA and amplification using PCR technique.	3	1	1	1	1	2	1
			CO5 - Protein and DNA separation technique	3	1	0	1	1	2	2
V	22116AEC56L	Agricultural and Environmental Microbiology Lab	CO1 - Students acquire the information about microbes role in agriculture	2	1	1	1	0	2	2
			CO2 - Learn about Biofertilizer production	3	0	1	1	0	2	2
			CO3 - Know about microbes and its role in environment	2	1	1	0	1	2	3
V	22116DSC54A	Bioinoculants	CO1- Students acquire knowledge in microbial products	3	1	1	1	1	1	3
			CO2-Separation of primary and secondary metabolites	2	2	1	1	1	1	2
			CO3- Applications of value added products	2	0	0	1	1	1	2
			CO4- Scope of microbial inoculants in agricultural practices	3	0	0	0	1	1	3
V	22116DSC54B	Bioremediation practices	CO1- Students acquire knowledge in remediation.	2	0	0	1	0	0	2
			CO2- Knowledge about biological degradation	3	2	1	1	1	1	2


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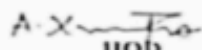

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			CO3- Study the role of microbes in pollution degradation	2	2	1	0	1	1	2
			CO4- Knowledge about environmental practices	1	2	1	0	1	1	2
V	22116DSC54C	Advanced immunology	CO1- Students acquire knowledge in immune system.	2	0	0	1	0	0	2
			CO2- Knowledge about host pathogen interaction	3	2	1	1	1	1	2
			CO3- Study the lymphoid organand their function.	2	2	1	0	1	1	2
			CO4- Knowledge about antigen and antibody interactions.	1	2	1	0	1	1	2
V			CO1- Students acquire knowledge in protein functional and expressions.	2	0	0	1	0	0	2
			CO2- Knowledge about 3-D structural prediction of proteins	3	2	1	1	1	1	2
			CO3- Study the protein purification with various chromatograpy techniques.	2	2	1	0	1	1	2
VI	22116DSC54D	Genomics and proteomics	CO4- Knowledge about MALDI-TOF (Matrix assisted laser Desorption and Ionization)	1	2	1	0	1	1	2
			CO1- Learning of different types of reactors or fermenters functions	2	3	0	0	1	2	0
			CO2-. Capable of understanding the vital role of various substrates used in fermentation.	3	1	1	0	2	1	2
			CO3 – Learn about Industrial Product production	2	1	2	1	2	1	2
	22116AEC61	Industrial Microbiology	CO4- knowledge about upstream and downstream processing	2	1	2	1	2	2	2
			CO1- Understood the basic and general concepts of Normal flora of the human body	2	3	0	0	1	2	0
VI	22116SEC62	Clinical Microbiology	CO2 –Understand the sources of infectious diseases and	3	1	1	0	2	1	2


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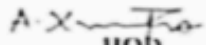

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			transmission							
			CO3 - Study the pathogenicity of bacterial, fungal, protozoa and viral diseases	2	1	2	1	2	1	2
			CO4- Understand the preventive measures of Hospital acquired infections.	2	1	2	1	2	2	2
VI	22116DSC63A	Bioethics	CO1- Students acquire knowledge IPR	2	0	0	1	0	0	2
			CO2-Gain knowledge about trading	3	2	1	1	1	1	2
			CO3- Applications of copywriting	2	2	1	0	1	1	2
			CO4- Knowledge about patent documents	1	2	1	0	1	1	2
VI	22116DSC63B	Biomolecules	CO1- Students acquire knowledge in molecules	2	0	0	1	0	0	2
			CO2- Knowledge about biological molecules	3	2	1	1	1	1	2
			CO3- Study the role of microbes and their bioactive compounds	2	2	1	0	1	1	2
VI	22116DSC63C	Medical Microbiology	CO1- Understood the basic and general concepts of Normal flora of the human body	2	0	0	1	0	0	2
			CO2 –Understand the sources of infectious diseases and transmission	3	2	1	1	1	1	2
			CO3 - Study the pathogenicity of bacterial, fungal, protozoa and viral diseases	2	2	1	0	1	1	2
			CO4- Understand the preventive measures of Hospital acquired infections.	1	2	1	0	1	1	2

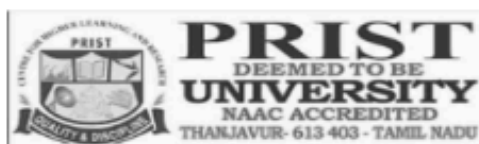

A. Xanthia
HOD
Head of the Department
Department of Microbiology
School of Arts & Science
Prist Deemed to be University, Thanjavur.


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School of Arts & Science
Ponnaiyah Ramajayam Institute of
Science & Technology (PRIST)
Deemed to be University
Valiam, Thanjavur-613 403.

			CO1- Understood the basic and general concepts of bacterial genomes	2	0	0	1	0	0	2
VI	22116DSC63D	Bacterial Genetics	CO2 –Understand the sources of nucleic acid components	3	2	1	1	1	1	2
			CO3 - Study the bacterial hereteditry analysis	2	2	1	0	1	1	2
			CO4- Understand the genome mapping of bacteria	1	2	1	0	1	1	2
VI			22116AEC64L	Industrial Microbiology Lab	CO1- Students acquire hands on training various microbes for industrial practices	3	2	1	1	1
	CO2- Screening of desired microbes	2			2	1	0	1	1	2
	CO3- Learn the optimization process for scale up process	1			2	1	0	1	1	2
	CO4- Well technical knowledge on upstream and downstream processing	3			1	1	1	1	1	3
VI	22116SEC65L	Clinical Microbiology Lab	CO1- Get practical knowledge in specimen collection and processing	2	2	1	1	1	1	2
			CO2- Knowledge about cyst and protozoa identification.	2	0	0	1	1	1	2
			CO3- Technical practice on diagnosis of pathogenic infection	3	0	0	0	1	1	3
			CO4- Determine antimicrobial activity of microorganisms	3	0	1	0	1	2	2
VI	22116PRW66	Project Work	CO1 - Understand basic concepts of research and its methodologies	2	2	1	1	1	2	1
			CO2 - Identify appropriate research problem and parameters	2	2	1	0	1	2	1
			CO3 - Prepare a research report	2	3	1	1	1	2	2


A. Xanthia
HOD
Head of the Department
Department of Microbiology
School of Arts & Science
Prist Deemed to be University, Thanjavur


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School of Arts & Science
Ponnaiyah Ramajayam Institute of
Science & Technology (PRIST)
Deemed to be University
Vallam, Thanjavur-613 403.



**School of Arts and Science
Department of Microbiology**

22PGMBGEC

2022 Regulation

**Program Outcomes and Course outcomes of
M.Sc., Mapping of COs and POs**

PROGRAM EDUCATIONAL OBJECTIVES (PEO)	
PEO1	To provide detailed knowledge of Microbiology and their application fields. To understand the beneficial and harmful role of microorganisms in the environment and in the industries.
PEO2	To understand the fundamentals of physiological reactions including metabolic pathways and biochemical reactions in microorganisms. To understand the fundamental concepts of immunology, biochemistry, biotechnology and genetics etc.
PEO3	To develop human resource and entrepreneurs in microbiology with the ability to independently start their own ventures or small biotech units in the field of biotechnology.
PEO4	Understand modern microbiology - practices and approaches with an emphasis in technology application in pharmaceutical, medical, industrial, environmental and agricultural areas.
PEO5	Gain experience with standard molecular tools and approaches utilized: manipulate genes, gene products and organisms. Become familiar with handling of Laboratory animals for the research purpose. Interpret differences in data distributions via visual displays.

PROGRAM SPECIFIC OUTCOME (PSo)	
PSO1	Upon master graduation, Microbiology majors will master a set of advanced skills, which would be useful to function effectively as professionals and to their continued development and learning within the field of Microbiology.

A. Xanthia
HOB
Head of the Department
Department of Microbiology

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PSO2	Able to explain why microorganisms are ubiquitous in nature, inhabiting a multitude of habitats and occupying a wide range of ecological habitats.
PSO3	Able to cite examples of the vital role of microorganisms in biotechnology, fermentation, medicine and other industries important to human well-being.
PSO4	Able to demonstrate that microorganisms have an indispensable role in the environment, including elemental cycles, biodegradation etc
PSO5	Able to systematically collect, record and analyse data, identify sources of error, interpret the result and reach logical conclusion.

PROGRAMME OUTCOMES (POS)	
PO1	Vital Thinking: Acquire knowledgeable actions after identifying the hypothesis that frame our idea and dealings, read-through out the degree to which these hypothesis are precise and suitable, and give the impression of being at our thoughts and assessments (academic, organizational and individual) from diverse perception.
PO2	Precious communication: Study about speak, read, write and listen noticeably in person and throughout electronic media in English and in one Indian language and build meaning of the globe by connecting people, thoughts books, media and technology.
PO3	Effectual citizenship: Reveal empathetic social concern and fairness centred national progress and the capability to act with and take part in civic life through volunteering
PO4	Ethics: Be aware of diverse value systems including the individual, under the ethical dimensions of personal choice, and believe responsibility for them.
PO5	Environment and Sustainability: Analyse the importance of microbes for environmental clean-up and sustainable development.
PO6	Self-directed and life-long learning: To gain the talent to employ in self-determining and life-long learning in the broadest circumstance socio technological transforms.

Programme Educational Objectives vs Programme Outcome


Programme Outcome-PO	Programme Educational Objectives PEO	PO1	PO2	PO3	PO4	PO5
	PEO1	*	*	*	*	
	PEO2	*		*		*
	PEO3		*		*	
	PEO4	*	*	*		*
	PEO5	*		*	*	


A. Xanthia
HOD
Head of the Department
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School of Arts & Science


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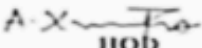
M.Sc., Mapping of COs and POs


Sem	Course Code	Title of the Course	COs	POS					
				PO1	PO2	PO3	PO4	PO5	PO6
I	22216SEC11	Prokaryotic Microbiology	CO1- Scope and historical importance of microbiology	3	1	0	1	2	2
			CO2- Understanding the features and classification of prokaryotes.	2	0	0	1	2	2
			CO3- study about isolation and identification of microbes	3	0	0	3	2	2
			CO4- Economic value of beneficial bacteria	2	2	1	0	1	2
	22216SEC12	Eukaryotic Microbiology	CO1- General Features and taxonomy of eukaryotes	2	1	1	0	0	1
			CO2- Knowledge about advanced research in mycology, phycology.	3	1	1	2	2	1
			CO3- Scope of Algae used as a food	3	2	1	0	2	2
			CO4- Economic importance of Lichens and algae	3	2	2	0	0	1
	22216SEC13	Microbial Physiology	CO1- Understand the factors influencing the growth of microbes in ecosystem	2	1	1	2	2	1
			CO2- Learn about Bioluminescence and their advantages.	2	1	1	1	1	1
			CO3- Learn about microorganisms to assimilate the nutrients for growth.	2	1	1	2	1	1
			CO4- Study about metabolic pathway	2	1	0	1	1	1
	22216SEC14L	Fundamentals of Microbiology Lab	CO1- practical knowledge about isolation and purification of microbes from various sources.	2	1	0	0	1	2


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 Head of the Department
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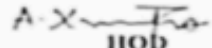

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		CO2- Training about staining experiments	1	2	0	1	1	3
		CO3- Handling on light and compound microscope.	2	2	1	1	2	2
		CO4- Learn essential biochemical analysis	1	2	1	1	2	2
22216DSC15A	Immunotechnology	CO1- Learn scope and history of immunology.	3	1	1	0	2	1
		CO2- Study about the immune system and lymphatic organs.	3	1	1	0	2	1
		CO3- Learn tumor immunology	3	1	1	1	2	1
		CO4- gain knowledge about various immunological techniques (RIA, ELISA, etc...)	3	0	0	2	1	2
22216DSC15B	Aquatic Microbiology	CO1- Understanding on the management of solid and liquid wastes	3	1	0	3	1	1
		CO2- Learn the principles of remedial measures of recycling, reuse and recover from the wastes.	2	1	0	3	1	1
		CO3- Understand the mechanism and role of microbes in the degradation of various pollutants	2	2	0	3	2	1
22216DSC15C	Food Technology	CO1 – Illustrate the role of microorganisms in the production of food	2	2	0	1	1	2
		CO2 – Investigation of milk and foods quality test for detecting microorganisms	2	2	1	0	1	2
		CO3 – Gain the knowledge regarding food preservation	2	2	0	1	0	2
	Modern Industrial Biotechnology	CO1- Learning of different types of reactors or fermenters	2	3	0	0	1	2


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	22216DSC15D		functions						
			CO2-. Capable of understanding the vital role of various substrates used in fermentation.	3	1	1	0	2	1
			CO3 – Learn about Industrial Product production	2	1	2	1	2	1
			CO4- knowledge about upstream and downstream processing	2	1	2	1	2	2
	22216RLC16	Research LED Seminar	CO1- Exposure to various research domains	1	1	0	1	1	1
			CO2- Acquaintance with languages of research	1	1	1	1	1	1
			CO3- Development of research aptitude	2	1	1	1	1	1
II	22216SEC21	Industrial Microbiology	CO1- Students will get knowledge on strain improvement.	3	0	2	2	2	1
			CO2- Enable them to work in the fermentation industry.	2	1	1	1	2	2
			CO3- Students will get idea on upstream and downstream fermentation process	2	1	2	1	1	2
			CO4- Economic importance of Bio products	2	2	2	1	1	2
II	22216SEC22	Environmental and Agricultural Microbiology	CO1- Huge Insights into these precious areas of Environmental microbiology.	2	0	0	1	1	2
			CO2- Students able to know detailed ideas about biofertilizer production and plant disease.	2	0	0	1	1	2
			CO3- Role of Microbes in marine and freshwater environment	2	1	1	1	1	2
			CO4- Scope of Recycling of Liquid and Solid wastes	3	0	1	1	1	2


A. Xanthia
HOD
Head of the Department
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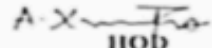
II	22216SEC23	Clinical Microbiology	CO1- Learn normal flora of human body	2	1	1	1	1	1
			CO2- Get information about various sources of infection and transmission	3	0	1	0	2	1
			CO3- Epidemiology, pathogenesis and treatment of bacterial, fungal and viral diseases	2	1	1	0	1	1
			CO4- Learn Strategy of antimicrobial therapy	3	1	2	0	2	1
II	22216SEC24L	Industrial, Clinical, Environmental and Agricultural Microbiology Lab	CO1- Get practical knowledge in specimen collection and processing	2	1	0	1	2	1
			CO2- Become technically expert which will helpful to work in clinical laboratory	2	0	0	1	2	2
			CO3- Learn practical understanding of diagnosis of pathogens.	1		0	1	2	2
			CO4- Acquire knowledge on fermentation process	1	1	1	1	1	2
			CO5- Learn bio fertilizer and inoculants production	1		0	1	1	2
II	22216DSC25A	Clinical research and development	CO1- Understood the basic and general concepts of Normal flora of the human body	2	0	0	1	2	1
			CO2 –Understand the sources of infectious diseases and transmission	2	1	1	3	1	1
			CO3 - Study the pathogenicity of bacterial, fungal, protozoa and viral diseases	2	2	1	1	1	1
II		Soil and waste	CO1- Students gain the knowledge about the interactions between the proteins	3	1		1	1	2


22216 DSC2

A. Xanthopoulos
HOB
Head of the Department
Department of Microbiology
School of Arts & Science

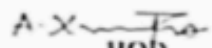
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			CO2- Get the information to predict cell behavior or develop drug targets.	1	0	2	0	1	1
			CO3- Rapidly evolving scientific area into genomes, proteomes and databases	3	0	2	0	1	3
			CO4- Learn to store various data NCBI, DDBJ and EMBL	3	0	2	1	2	3
II	22216 DSC25C	Fungal immunology	CO1- Understood the basic and general concepts of Normal flora of the human body	3	1		1	1	2
			CO2 –Understand the sources of infectious diseases and transmission	1	0	2	0	1	1
			CO3 - Study the pathogenicity of bacterial, fungal, protozoa and viral diseases	3	0	2	0	1	3
			CO4- Understand the preventive measures of Hospital acquired infections.	3	0	2	1	2	3
II	22216 DSC2D	Pollution research	CO1- Students will identify ethical issues in a research proposal	3	1		1	1	2
			CO2- Understand the Intellectual property Rights (IPR) and patent filing.	1	0	2	0	1	1
			CO3- Knowledge about to ensure ethical conduct of biomedical research	3	0	2	0	1	3
			CO4- Describe the basic concepts of legal, ethical,	3	0	2	1	2	3


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HOD
Head of the Department
Department of Microbiology
School of Arts & Science


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			economic, and regulatory measurements						
II	22216RMC26	Research Methodology	CO1- Understanding research questions and tools	3	1		1	1	2
			CO2- Experience in scientific writings	1	0	2	0	1	1
			CO3-Practice in various aspects of scientific publications	3	0	2	0	1	3
			CO4-Inculcation of research ethics	3	0	2	1	2	3
II	22216BRC27	Participation in Bounded Research	CO1-Hands on exposure to problem solving tools in contemporary research	2	0	0	0	1	2
			CO2- Evolution of research intuitiveness and orientation	2	0	0	0	1	2
			CO3- Familiarity with cutting edge research trends.	2	0	0	2	1	2
III	22216SEC31	Microbial Genetics	CO1- Understood genome organization of model organisms.	2	1	1	1	1	2
			CO2 - Learn molecular mechanisms that underlie mutations.	2	1	1	1	1	2
			CO3- Study about transformation, transduction and conjugation.	3	1	1	1	1	1
			CO4- Are able to describe the nature of the transposable elements	2	1	1	2	2	2
III	22216SEC32	Microbial Biotechnology	CO1- Developed an understanding in recombinant DNA technology.	2	2	3	2	2	1
			CO2- candidate to recollect the basics of Molecular Genetics and apply a cognitive thinking.	2	1	1	2	1	1


A. Xanthia
 HOD
 Head of the Department
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			CO3-Possibilities ranging from the treatment of human diseases to develop novel medicines	2	2	3	1	2	1
III	22216SEC33L	Microbial Genetics and Biotechnology Lab	CO1- Has acquired a fairly good knowledge of the tools and the methods for genetic engineering	2	0	1	1	2	2
			CO2- Separation of DNA and Protein by gel electrophoresis.	1	0	1	1	2	2
			CO3- Students can perform isolation of DNA, amplification of any gene by PCR	2	0	1	1	1	2
			CO4- Hands on experience on Molecular genome isolation and identification techniques	2	1	1	1	1	2
III	22216DSC34A	Plant Tissue Culture	CO1- To inculcate the basics of plant tissue culture	3	1	0	2	2	2
			CO2- To impart the knowledge about the various aspects of tissue culture and their applications	3	2	3	2	2	2
			CO3- Learn the role of micro and macro- nutrients in tissue culture plantation	2	2	0	1	1	2
III	22216DSC34D	Nano-technology	CO1- Describe the basic science behind the properties of materials at the nanometre scale	2	0	0	1	1	2
			CO2- Advanced experimental and computational techniques for studying nanomaterials.	2	0	2	1	2	2
			CO3- Learn clearly and effectively using conventional scientific and mathematical notation.	2	0	0	1	1	2
III	22216SRC37	Participation in Scaffold Research (Design/Societal	CO1- Sensitization of social needs for innovation	3	2	1	3	3	2
			CO2- Team work towards interdisciplinary synchronous research strategy.	3	2	1	3	2	1


A. Xanthia
HOD
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School of Arts & Science


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		projects)	CO3- Development of critical thinking and synergistic research approach.	3	2	1	2	1	1
IV	22216SEC41	Pharmaceutical Microbiology	CO1- Acquired detailed knowledge of antimicrobial agents, their mechanism of action	1	1	2	2	2	1
			CO2- Developed understanding of different types of disinfectants/antiseptics bactericidal and bacteriostatic actions	1	1	2	2	1	1
			CO3- Regulatory practices, biosensors and applications in Pharmaceuticals	1	1	1	1	1	2
			CO4- Quality Assurance and Validation	2	2	1	1	2	1
IV	22216SEC42	Biostatistics and Bioinformatics	CO1- Learn about probability/variable analysis and collection, classification of data	1	2	0	2	1	2
			CO2- Basic ideas of significance test (T-test, ANOVA)	2	0	0	2	2	2
			CO3- Understanding about the information on the search engines and various software tools	2	1	0	2	2	2
			CO4- Scope of Biological databases related software used in the bioinformatics	0	0	1	1	1	2
IV	22216SEC43L	Pharmaceutical Microbiology Lab	CO1 - Aseptic condition relevance to healthcare and the pharmaceutical industry.	1	0	1	2	1	2
			CO2 - Knowledge and understanding of the practical aspects of pharmaceutical microbiology.	1	1	1	2	2	3
			CO3 - Perform practicals on antimicrobial activity	1	1	0	1	1	3
			CO4- Learn the production of antibiotics from microbes.	1	1	0	2		2



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IV	22216DSC44A	Bioethics and IPR	CO1- Students will gain awareness about Intellectual Property Rights (IPRs)	1	2	0	1	2	3
			CO2- To take measure for the protecting their ideas	1	2	2	1	1	1
			CO3- Able to develop business strategies by taking account of IPRs	1	3	3	1	2	1
			CO4- Able to assists in technology up gradation and enhancing competitiveness	2	1	1	1	2	1
IV	22216DSC44B	Molecular Immunology	CO1 - Able to identify the cellular and molecular basis of immune responsiveness.	2	0	0	2	1	1
			CO2- Learn about Biosensor assays for assessing ligand –receptor interaction.	2	0	1	2	1	2
			CO3- Rationale for vaccine design about new generation antibodies	1	0	0	1	1	2
			CO4- Multi-gene organization of immunoglobulin gene	2	1	2	1	1	2
IV	22216PRW45	Project work	CO1- Experience from a master's project and international literature.	2	1	0	1	2	1
			CO2- Develop ability to independently carry out a complete scientific process.	2	1	1	1	2	1
			CO3- Learn about how to write dissertation and proposal for the scientific community	1	0	0	1	1	1
			CO4- Scope of Biological databases related software used in the bioinformatics	3	0	0	1	1	2

1- Low, 2-Medium, 3- Higher, 0 No correlation

A. Xanthos
HOD
Head of the Department
Department of Microbiology
School of Arts & Science


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Dean
School of Arts & Science
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Science & Technology (PRIST)
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