RATHINAM COLLEGE OF ARTS AND SCIENCE
DEPARTMENT OF MICROBIOLOGY

B.SC MICROBIOLOGY - COURSE OUTCOME

Core -Basic concepts of Microbiology	CO1	To describe the fundamental concepts of Microbiology, such as the classification and identification of microbes.
	CO2	To relate the use of different microscopic techniques according different laboratory purpose.
	CO3	To interpret the microscopic observation of microorganisms and maintenance of microbial cultures.
	CO4	To compare the core principles of sterilization and the different methods of sterilization.
	CO5	To illustrate the pure culture techniques and preservation of cultures
Core -Microbial Physiology and Metabolism	CO1	To identify and study the morphology of prokaryotic and eukaryotic cells.
	CO2	To understand nutritional requirements and physiological aspects of nutrient uptake in microbes.
	CO3	To analyze the role of different metabolic pathways involved in the nutrient metabolism.
	CO4	To grasp the aspect of anaerobic respiration in the microbial metabolism.
	CO5	To decipher the concept of various biosynthetic pathway involved in microbial metabolism.
Core -Microbial Genetics	CO1	To provide the basics knowledge on the historical perspective of Genetics.
	CO2	To describe the process of DNA replication.
	CO3	To understand the mechanism of Transcription and Translation.
	CO4	To analyze different types of mutation and its regulation.
	CO5	To study the various types of gene transfer mechanisms.
Core - Immunology	CO1	To describe the historical developments of Immunology and basic immune functions.
	CO2	To illustrate the various types of antigen and antibodies present in the immune system.

	CO3	To classify various types of immune diseases.
	CO4	To differentiate the methodologies involved in Immunohematology
	CO5	To elaborate on the various clinical techniques involved in Immunotechnology
Core -Food and Industrial Microbiology	CO1	To classify the microorganisms involved in food industry.
	CO2	To illustrate on the strain improvement strategies of industrially important microbes.
	CO3	To discuss on the working principles of different types of fermentors.
	CO4	To compare the food laws and regulation as per the WHO standards and HACCP.
	CO5	To elaborate on the applications of bioprocess technology.
Core - Environmental and Agricultural Microbiology	CO1	To summarize the various biogeochemical cycle with microbes and their application as biofertilizer
	CO2	To illustrate the occurrence, abundance and distribution of microorganisms in environment and their role
	CO3	To discuss about the diversity of microorganisms and microbial communities inhabiting the ecological habitats
	CO4	To identify the microbes responsible for air and water pollution.
	CO5	To know the suitable methods for managing Environmental problems.
Core Practical – I: Basic Concepts of Microbiology Practical	CO1	To review and understand different Microbiological lab accessories
	CO2	To experiment on preparing different reagents and media
	CO3	To learn basic techniques of cultivating microbes under *in vitro* conditions.
	CO4	To distinguish microbial characteristics from microbial colony morphologies
	CO5	To differentiate microorganisms using various staining methods
Core Practical – II : Microbial	CO1	To enhance knowledge on Microbial Physiology like growth.
	CO2	To gain information on cultivation of microbes on variable

Physiology and Metabolism Practical		factors.
	CO3	To determine the biochemical characterization of the microbial flora.
	CO4	To learn about the representative forms of various microbial cells.
	CO5	To determine the nature of microbial nutrient utilization.
Core Practical – III : Microbial Genetics Practical	CO1	To enhance knowledge on Microbial Genetics.
	CO2	To gain information on the isolation of mutants and auxotrophic microbes.
	CO3	To determine the techniques of DNA and Protein isolation
	CO4	To illustrate the plasmid and chromosomal DNA isolation from microbes.
	CO5	To assess the genetic information based on the qualitative analysis of gene data.
Core Practical – IV : Immunology Practical	CO1	To enhance knowledge on Immunology.
	CO2	To gain information on the agglutination reactions.
	CO3	To experiment on the various methods of ELISA.
	CO4	To illustrate different types of blood cells using hematological analysis.
	CO5	To assess the antigen-antibody reaction with the aid of immunoelectrophoresis techniques.
Core Practical – V : Food and Industrial Microbiology Practical	CO1	To demonstrate skill development on enzyme, beverages and organic acid production.
	CO2	To develop the practical skill on food analysis techniques.
	CO3	To illustrate the microbes of canned foods and assess the quality.
	CO4	To demonstrate the hygienic practices in industries
	CO5	To highlight both beneficial and harmful role of microbes in food industries.
Core Practical – VI : Environmental Microbiology Practical	CO1	To illustrate isolation of different types of nitrogen fixing bacteria.
	CO2	To explain the water quality analysis.

	CO3	To develop the practical skill on cultivation of Single Cell Proteins (SCP).
	CO4	To demonstrate the techniques for air quality assessment.
	CO5	To validate the parameters required for *in vitro* cultivation of cyanobacteria.
DSC - General Biology	CO1	To understand the structure and function of microbial cells.
	CO2	To explain the concept and information on comparative biology.
	CO3	To compare the process of cell divisions in prokaryotes and eukaryotes.
	CO4	To describe about the plant and animal cell morphology and functions.
	CO5	To interpret the different functional aspects of human organ systems.
DSC - Analytical Microbiology	CO1	To become proficient in operating various laboratory instruments.
	CO2	To acquire knowledge on operating principles of lab equipments.
	CO3	To learn basic techniques of cultivating microbes under *in vitro* conditions.
	CO4	To relate practical knowledge on troubleshooting problems with different instruments.
	CO5	To understand the ultimate purpose of the instruments in the laboratory based on the experimentation.
DSC - Microbial Taxonomy and Diversity	CO1	To understand the principle of microbial taxonomy and it's types.
	CO2	To describe common groups of bacteria and archaea in different ecosystems.
	CO3	To describe common groups of fungi, algae, protozoa, and virus in different ecosystems.
	CO4	To evaluate, synthesize and present scientific studies of genetic and functional microbial diversity.

	CO5	To infer the composition of microbial communities and for the function and occurrence of individual groups.
DSC - Medical Bacteriology	CO1	To provide the basics knowledge about infections.
	CO2	To describe the morphology and cultural characters of Gram positive bacteria.
	CO3	To understand the morphology and cultural characters of Gram negative bacteria.
	CO4	To compare the morphology and cultural characters of mycobacteria, spirochetes and intracellular parasites.
	CO5	To appraise the methods of diagnosis of infections.
DSC – Microbial Genome and Proteomics	CO1	To define genome and genetic assembly.
	CO2	To illustrate the practical use of genome maps and gene markers.
	CO3	To use different expression systems in microarray analysis.
	CO4	To compare the different proteome database generated from 2D electrophoresis.
	CO5	To interpret various techniques of analytical proteomics
DSC - rDNA Technology	CO1	To understand the importance of plasmid and viruses for genetic engineering.
	CO2	To analyze the different gene transfer techniques.
	CO3	To produce transgenic products and commercial products.
	CO4	To explain techniques in rDNA and to construct genomic libraries.
	CO5	To interpret various techniques involved in Genetic Engineering.
DSC - Dairy Microbiology	CO1	To inculcate knowledge on protective factors involved in milk production.
	CO2	To understand the methods of enhancing the quality of milk by different industrial techniques.
	CO3	To learn the principles, effects and application of homogenization in milk industries.
	CO4	To determine the process of advanced dairy product preservation.
	CO5	To gain insight on the problems involved in dairy industry and

		utilizing current trends to overcome problems.
DSC - Molecular Biology	CO1	To understand the genome organization in Prokaryotes and Eukaryotes
	CO2	To know the central Dogma of the organisms.
	CO3	To apply the mechanisms of gene regulation.
	CO4	To analyze the DNA repair mechanism of bacterial genetics
	CO5	To understand the chromosomal variation and mapping.
DSC – Practical - General Biology	CO1	To review and understand different Microbiological lab accessories
	CO2	To experiment on preparing different reagents and media
	CO3	To learn basic techniques of cultivating microbes under *in vitro* conditions.
	CO4	To distinguish microbial characteristics from microbial colony morphologies
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DSC Practical - Analytical Microbiology	CO1	To employ suitable methods for sample analysis
	CO2	To experiment on different microscopic and chromatographic techniques
	CO3	To learn basic techniques of separating protein samples.
	CO4	To distinguish and separate solutes using different centrifugation techniques.
	CO5	To infer on the cell morphology using microscopic techniques.
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		preservation.
	CO5	To gain insight on the problems involved in dairy industry and utilizing current trends to overcome problems.
Allied– Biostatistics and Computer Application	CO1	To provide the basics of Biostatistics.
	CO2	To describe the Measures of location and dispersion.
	CO3	To apply the concept of probability theory in research
	CO4	To identify the hardware parts in a computer
	CO5	To illustrate different utilities available in Microsoft Excel sotware
Allied – Biomolecules	CO1	To provide the basics of Biochemistry and it's applications.
	CO2	To describe the structure and functions of enzymes, proteins, lipids and carbohydrates.
	CO3	To understand the molecular basis of Cell regulation by Nucleic acid
	CO4	To understand the regulatory mechanism of physiological and biochemical reactions of cell.
	CO5	To present the basis behind the biosynthetic pathway of biomolecules.
Allied – Biochemistry	CO1	To provide the basics of Biochemistry and buffer systems.
	CO2	To describe the process of Bioenergetics.
	CO3	To understand the properties of vitamins and minerals.
	CO4	To understand the types of Hormones and its functions.
	CO5	To present the basis behind the inborn errors of metabolism.
Allied – Entrepreneurial Development	CO1	To know about the role of the entrepreneur in India and around and the globe, understand the benefits and drawbacks of entrepreneurship and students has to avoid them; entrepreneurial failure.
	CO2	To develop student's ability to create, lead and coordinate projects within the textile and fashion sector. It also intends to provide tools and methods in order to make use of

		entrepreneurial thinking to develop a business project.
	CO3	Students will be able to define, identify and/or apply the principles of new venture financing, growth financing, and growth financing for existing businesses.
	CO4	To understand process of women entrepreneur and how faced their problems.
	CO5	To understand difference between Micro, small and medium Enterprises.
Allied – Principles of Management	CO1	To discuss and communicate the management evolution and how it will affect future managers
	CO2	To observe and evaluate the influence of historical forces on the current practice of management
	CO3	Identify and evaluate social responsibility and ethical issues involved in business situations and logically articulate own position on such issues.
	CO4	Practice the process of management's four functions: planning, organizing, leading, and controlling
	CO5	Identify and properly use vocabularies within the field of management to articulate one's own position on a specific management issue and communicate effectively with varied audiences.
Allied – Research Methodology	CO1	To know the basic of research and formation of problems
	CO2	Understand and apply the major types of research designs and errors
	CO3	Formulate clearly defined scaling techniques and report writing
	CO4	Analyse and summarise the basic terms such as mean, medium and mode
	CO5	To deal with T-Test, Chi Square-Test etc
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Allied Practical – Biomolecules Practical	CO1	To perform qualitative identification of carbohydrate.
	CO2	To perform qualitative identification of amino acid.
	CO3	To perform separation of carbohydrates by paper chromatography.
	CO4	To perform Separation of amino acids by paper chromatography.
	CO5	To determine the acid number and iodine number of lipids.
Allied Practical – Biochemistry Practical	CO1	To perform quantitative identification of carbohydrate.
	CO2	To perform quantitative identification of proteins.
	CO3	To perform separation of carbohydrates by paper chromatography.
	CO4	To perform Separation of amino acids by paper chromatography.
	CO5	To determine the acid number and iodine number of lipids.
Skill Enhancement Courses – I Clinical Laboratory Technology	CO1	To understand different types of microbial diseases.
	CO2	To describe the process of collection of samples in labs.
	CO3	To understand the methods of processing clinical samples.
	CO4	To analyze and perform clinical serology.
	CO5	To study about the antibiogram analysis in lab.
Skill Enhancement Courses – II Waste Management	CO1	To provide the basics of municipal solid waste.
	CO2	To describe the process of collection and segregation of waste.
	CO3	To understand the importance of nuclear and e-waste.
	CO4	To analyze different methods involved in the management of wastes
	CO5	To study the health hazards and environmental effects caused by wastes.
Skill Enhancement	CO1	To apply microbiological techniques in creating novel textile material.

Courses – III Textile Microbiology	CO2	To describe the antimicrobial agents and the pathogens associated
	CO3	To discuss about the polymers used in textiles and antimicrobial textiles
	CO4	To demonstrate the standard Assessment methods used in textile industries
	CO5	To evaluate the validation of antimicrobial technology
Skill Enhancement Courses – IV Medical Mycology and Parasitology	CO1	To describe the fungal characteristics, classification and mycoses
	CO2	To compare the susceptibility testing- CLSI, EUCAST methods
	CO3	To illustrate the life cycle and pathology of parasitic infections
	CO4	To analyze the medically important helminthes
	CO5	To evaluate the validation of antimicrobial technology
Skill Enhancement Courses – V Virology	CO1	To describe the structure and cultivation of Viruses
	CO2	To demonstrate the life cycle of DNA phages
	CO3	To analyze the Life cycle of bacteriophages
	CO4	To evaluate the structure and replication of plant viruses.
	CO5	To test the best therapy for viral infection
Skill Enhancement Courses – V Human Anatomy and Physiology	CO1	To understand the structure of Human Body
	CO2	To able to know the tissue level of Organization.
	CO3	To become familiar with structure and functions of Nervous system.
	CO4	To know the cardiovascular systems.
	CO5	To learn about the respiratory and digestive system .

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Discipline Specific Elective - Management of Human Microbial Disease	CO1	To illustrate types of diseases affecting mankind
	CO2	To examine the clinical samples and deduce the infection route
	CO3	To maximize the knowledge on the mode of action of antibiotics
	CO4	To take part in the disease prevention scenario after gaining knowledge on the available measures
	CO5	To choose vaccines that best suits in the prevention of a disease.
Discipline Specific Elective - Marine Microbiology	CO1	To extend knowledge on Microbiology to the marine ecosystem
	CO2	To illustrate different marine organisms based on the ecology of growth
	CO3	To understand the different marine ecosystem and their role in natural balance
	CO4	To elaborate on the positive and negative aspects of microbes in marine environment
	CO5	To attribute to the methods used for exploring marine organism and their classification
Discipline Specific Elective - Biofertilizer and Biopesticide	CO1	To outline different microbes used for the preparation of biofertilizers
	CO2	To translate the beneficial role of naturally existing microbes to

		industrial scale for Biopesticide production
	CO3	To choose a best method for isolation of phosphate solubilizing microbes
	CO4	To elaborate the importance of mycorizzal inoculum in Biofertilizer production
	CO5	To prioritize the role of microbes in the production of bioinsecticides
Discipline Specific Elective - Bioethics, IPR and Biosafety	CO1	To describe the ethical values in Microbiological Research
	CO2	To apply and use of animal and human specimens for Research
	CO3	To discuss about Patenting in Biological research
	CO4	To illustrate biosafety in applying genetically modified organisms
	CO5	To prioritize the role of microbes in the laboratory process
Discipline Specific Elective - Bioprocess and Technology	CO1	To describe the various components of fermentors
	CO2	To identify the critical control points of the bioprocess
	CO3	To illustrate on the growth kinetics of the industrially important microbes
	CO4	To elaborate the process involved in the down streaming step
	CO5	To choose the prompt method for developing the industrially important microbes.
Discipline Specific Elective - Advances in Microbiology	CO1	To understand the evolution of the microbial genome
	CO2	To identify the importance of metagenomics in modern Science.
	CO3	To illustrate the applications of host –microbe interaction in modern Microbiology

	CO4	To elaborate the process involved in synthetic Biology
	CO5	To interpret the results of infectious diseases using Molecular diagnosis
Discipline Specific Elective - Plant Pathology	CO1	To understand the concept of plant diseases
	CO2	To identify the types of microbial infections in plants
	CO3	To illustrate mode of infections occurring in plants
	CO4	To elaborate the process of microbial pathogenicity in plants
	CO5	To choose the prompt method for preventing and managing plant diseases
Discipline Specific Elective - Inheritance Biology	CO1	To summarize the genetics analysis and experimentation of different organisms
	CO2	To relate the Mendelian principles to human gene inheritance
	CO3	To illustrate relationship between linkage and gene recombination
	CO4	To elaborate on the rules of inheritance
	CO5	To determine the structural organization in chromosomes
Discipline Specific Elective - Microbes in Sustainable Agriculture and Development	CO1	To summarize the genetics analysis and experimentation of different organisms
	CO2	To relate the Mendelian principles to human gene inheritance
	CO3	To illustrate relationship between linkage and gene recombination
	CO4	To elaborate on the rules of inheritance
	CO5	To determine the structural organization in chromosomes

Discipline Specific Elective - Instrumentation and Biotechniques	CO1	To learn the principles and instrumentation of Microscopes
	CO2	To relate the principles of chromatographic techniques
	CO3	To illustrate methodology of electrophoresis techniques
	CO4	To elaborate on the principles of centrifugation
	CO5	To determine the use of advanced instrumentation mechanism and biotechniques
Discipline Specific Elective - Microbiological analysis of Air and Water	CO1	To list the microbes responsible for air borne infection
	CO2	To experiment of air sample collection and quality control
	CO3	To illustrate control measure for air microbes
	CO4	To elaborate on the Microbiology of water
	CO5	To validate the quality of water samples using laboratory techniques
Discipline Specific Elective - Molecular Biology	CO1	To describe the structure of nucleic acids
	CO2	To interpret on the different modes of DNA replication
	CO3	To illustrate about DNA transcription and translation process
	CO4	To elaborate on the Regulation of DNA mechanism
	CO5	To infer the role of genetic material in controlling the cellular regulatory mechanism.
Discipline Specific Elective - Pharmaceutical Microbiology	CO1	To learn about Microbiological lab practices
	CO2	To determine the microbes in pharmaceutical and food samples
	CO3	To identify the pathogenic microbes of pharmaceutical industries

	CO4	To elaborate on the rapid detection methods of samples
	CO5	To infer the role of HACCP in microbiological standards