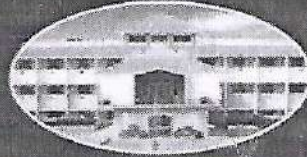


**K.S.Rangasamy College of Arts and Science,  
(Autonomous), Tiruchengode-637 215**

**DEPARTMENT OF MICROBIOLOGY**

**COURSES HAVING FOCUS ON EMPLOYABILITY/  
ENTREPRENEURSHIP/ SKILL DEVELOPMENT PROGRAMME**

**KSR  
COLLEGE  
OF ARTS AND SCIENCE**



**I N D I A**

*Knowledge is Power*

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TIRUCHENGODE - 637 215  
Mamakkal-Di. Tiruchengode, Tamil Nadu, India

**MASTER OF SCIENCE  
(APPLIED MICROBIOLOGY)**

K.S.Rangasamy College of Arts & Science, (Autonomous), Tiruchengode-637 215

Department of Microbiology

Courses having focus on Employability/ Entrepreneurship/ Skill Development

Programme : M.Sc., Applied Microbiology

S.No.	COURSE CODE	COURSE NAME	Employability/ Entrepreneurship/ Skill Development	Content
1	18PMBM101	Core I: Fundamentals of Microbiology and Taxonomy	Skill development	UNIT II: Bright field microscope - resolution, numerical aperture. Types of microscopy - Dark field microscope, Phase contrast microscope, Fluorescent microscope. Electron microscope - Scanning Electron Microscope and Transmission electron microscope- Confocal Microscope. Stains - simple, differential and special staining
2	18PMBM103	Core III: Microbial Genetics	Skill development	UNIT IV: Mutation: Types - somatic versus germ line mutation, morphological mutation, nutritional mutation, lethal mutations and conditional mutations. Molecular basis of mutation - Missense and nonsense mutations, spontaneous mutations, chemical mutagenesis, radiation - induced mutations, silent mutations and reversions. Detection of mutants- replica plate and gradient plate method. Carcinogenicity test.
3	18PMBM104	Core IV: Immunology	Skill development Employability	UNIT II: Antigen - Antibody reactions - agglutination, precipitation, complement fixation, immunofluorescence, ELISA and Radio Immunoassay.



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4	18PMBM105	Core V: Bioinstrumentation	Skill development  Employability	<p>UNIT II: Working Principle and applications of Paper, Thin layer, column, Ion exchange, Affinity chromatography, GC - MS, HPLC, LC - MS</p> <p>UNIT III: Types of electrophoresis - Paper electrophoresis, Agarose gel electrophoresis, Sodium Dodecyl Sulphate - Poly Acrylamide Gel Electrophoresis, Two Dimensional and Immuno electrophoresis, Capillary electrophoresis.</p> <p>UNIT V: Radioactivity - Measurement - GM Counter, Autoradiography and Liquid Scintillation Counter. FTIR.</p> <p>Experiment (1 to 17): Micrometry, Motility, Growth curve, staining methods, effect of temperature on growth, biochemical test, ABO Blood grouping, Agglutination tests, ODD, CIE and ELISA.</p>
5	18PMBMP101	Core Practical I	Skill development	
6	18PMBM201	Core VI: Soil and Agricultural Microbiology	Entrepreneurship  Employability	<p>UNIT III: Biofertilizers: Mass multiplication, field application and crop response to Rhizobium, Azotobacter, Azospirillum, Phosphobacteria, Cyanobacteria, Azolla and Mycorrhizae.</p> <p>UNIT V: Biopesticide and biocontrol agents: Mode of action, formulation and application methods of Bacteria - Bacillus thuringensis; Fungal- Breuvaria bassiana and viral- Nuclear polyhedrosis and Baculovirus. Trichoderma viridae and Pseudomonas fluorescens.</p>

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7	18PMBM202	Core VII: Medical Microbiology	Entrepreneurship	<p>UNIT I: Laboratory diagnosis and control of gram positive bacteria.</p> <p>UNIT II: Laboratory diagnosis and control of gram negative bacteria.</p> <p>UNIT III: Laboratory diagnosis and control of fungal disease.</p> <p>UNIT IV: Laboratory diagnosis and control of viral disease.</p> <p>UNIT V: Clinical manifestation and diagnosis of parasites.</p>
8	18PMBEL201	Elective I: Environmental Microbiology	Entrepreneurship	<p>UNIT II: Aquatic Microbiology - Potability of water quality - Indicator organisms - MPN index - eutrophication - waterborne diseases and their control measures.</p> <p>UNIT III: Sewage treatment - Physical, chemical and biological (trickling filter, activated sludge and oxidation pond) treatment - waste disposal.</p> <p>UNIT IV: Bioremediation/bioremediation-types and its applications- bioremediation of hazardous waste and metals--biodegradation of paper, oil and pesticide-bio-deterioration of leather and textiles - Bioleaching of ores- phytoremediation.</p> <p>UNIT V: Microbial conversion of solid waste to food- mushroomSCP - Bio-fuel - biofuel production- bioethanol, biogas, hydrogen and algal fuel - concepts of sustainable energy development. Microbial composting.</p>



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9	18PMBMP201	Core Practical II	<p>Entrepreneurship</p> <p>Employability</p>	<p><b>Experiment (1 to 07):</b> Collection and transportation of clinical specimens, Rhizobium from root nodules.</p> <p><b>Experiment (09 to 11): BOD, COD AND MPN</b></p> <p><b>UNIT II:</b> Collection and transport of clinical specimens: urine, pus, faeces, sputum and blood.</p> <p><b>UNIT III:</b> Microbiological examination of samples: sputum, pus, faeces and urine. Diagnosis of anaerobic infections.</p> <p><b>UNIT IV:</b> ntigen tests Agglutination test for pregnancy, Elek's gel precipitation test, ELISA. Antibody tests - WIDAL, ASO. Monoclonal antibodies in clinical microbiology.</p> <p><b>UNIT V:</b> Molecular diagnosis of infectious diseases: tuberculosis, malaria, AIDS. RFLP as a molecular marker in disease diagnosis.</p> <p><b>Experiment (1 to 6):</b> Bacteria on selective media, differential staining, preliminary test, biochemical test and special test. a) <i>Staphylococcus aureus</i> b) <i>Pseudomonas aeruginosa</i>, Media usage-PDA, SDA, Corn meal agar, Lactophenol cotton blue stain and <i>Candida albicans</i> - Gram's stain, Germ tube test</p> <p><b>UNIT V:</b> rDNA technology: Blotting techniques - Southern, Northern and Western blotting. PCR amplification and its application. DNA sequencing methods - dideoxy, chemical and Next Generation Sequencing (NGS), RFLP, RAPD, Microarray. Applications of Genetic Engineering in Medicine and Agriculture.</p>
10	18PMBBCI201/ 18PMBBTI201	IDC I : Clinical Microbiology	<p>Employability</p> <p>Entrepreneurship</p>	
11	18PMBBCIP201/ 18PMBBTIP201	IDC Practical I: Clinical Microbiology	<p>Skill development</p>	
12	18PMBM301	Core VIII: Genetic Engineering	<p>Employability</p>	

  
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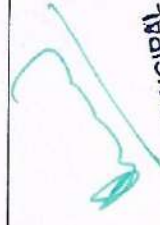
13	18PMBM302	Core IX: Biostatistics and Research Methodology	<p><b>UNIT IV:</b> Thesis Writing: Planning and Classification, Components of research report, Essential steps in research. Problem Identification &amp; Formulation, Research Question, Hypothesis: Qualities of a good Hypothesis, Null Hypothesis &amp; Alternative Hypothesis. Experimental design. Literature collection - and its importance.</p> <p><b>UNIT V:</b> Preparing proposal for a research project: Scientific Research report writing- writing Introduction, Review of literature, Materials and methods, Results, Table, Figures, Discussion, Citing and listing references. Format of a Thesis. Preparation of manuscript for publication. Scientific information-Introduction, Writing proposals, scientific papers and figures. Plagiarism.</p>	Employability
14	18PMBMEL302	Elective II: Pharmaceutical Microbiology	<p><b>UNIT II:</b> Industrial production of microbial products: Antibiotics - Penicillin and Streptomycin, vaccines - influenza, BCG.</p> <p><b>UNIT IV:</b> Biosensors and applications in Pharmaceuticals; Methods of preservation of pharmaceutical products.</p> <p><b>UNIT V:</b> Good Manufacturing Practices (GMP) and Good Laboratory Practices (GLP) in Pharmaceutical Industry. Toxicology test of antimicrobial drugs - Acute toxic category and Fixed dose procedure. Laboratory evaluation and quality testing of antimicrobial drugs.</p>	Skill development  Employability



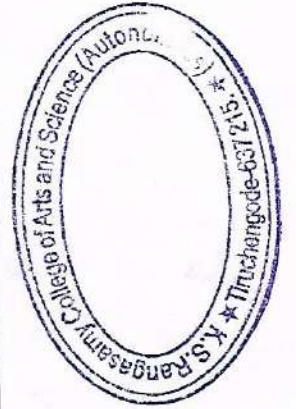
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15	18PMBMP301	Core Practical III	Skill development	<p><b>Experiment (1 to 15):</b> Genomic DNA., Plasmid DNA, SDS-PAGE, PCR, eplica plating and gradient plate technique, Bacterial conjugation, Western blotting, MBRT, Phosphatase test, Breeds count method, citric acid from <i>Aspergillus niger</i> AND Submerged fermentation</p> <p><b>UNIT I:</b> Component parts of a fermentation process - Screening of industrial microorganisms- primary screening, Secondary screening, Preservation of microorganisms</p> <p><b>UNIT II:</b> Strain improvement and Media formulation.</p> <p><b>UNIT III:</b> Components and parts of fermentor - Body construction.</p> <p><b>UNIT IV &amp; V:</b> Microbial production of fermented products and recovery.</p> <p><b>Experiment (1 to 7):</b> antibiotic and amylase enzyme producing organisms from soil, disc preparation, MIC determination by filter paper disc assay, Kirby Bauer method, Phenol Coefficient method and Wine production.</p>
16	18PMBBICI301/ 18PMBBITI301	IDC II: Industrial Microbiology	Skill development	
17	18PMBBICIP301/ 18PMBBITIP301	IDC Practical II: Industrial Microbiology	Employability	

  
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<p><b>UNIT I:</b> Screening of industrial microorganisms- primary screening - Crowded plate method, auxanography, indicator dye and enrichment. Secondary screening. Preservation of microorganisms- refrigerated storage, lyophilization, cryogenic storage.</p> <p><b>UNIT II:</b> Strain improvement and Media formulation: mutation- ionizing and non-ionizing radiation- rDNA technology. Strain development technique- bacteria, fungi and yeast. Medium formulation and sterilization- batch, continuous. Del factor. Types of fermentation- submerged-solid state fermentation.</p> <p><b>UNIT IV:</b> Microbial production: Antibiotics- Penicillin and Streptomycin. Organic acids- Citric acid and Acetic acid. Enzymes- Amylase and Protease. Yeast- Brewer's and Baker's</p>	<p>Skill development</p>	<p>Core X: Industrial Microbiology</p>	<p>18PMBM401</p>	<p>18</p>
<p>Employability</p>	<p>Employability</p>	<p>Core XI: Food and Dairy Microbiology</p>	<p>18PMBM402</p>	<p>19</p>
<p><b>UNIT I to IV:</b> Importance of food and dairy Microbiology, Types of microorganisms in food - Source of contamination, Spoilage and preservation of different kinds of foods, Food borne infections and intoxications, Food preservation</p> <p><b>UNIT V:</b> Fermented food products: Bread, Sauerkraut, cheese, Yoghurt, Buttermilk and Tempeh. Food sanitation and its control.</p>	<p>Skill development</p>	<p>Employability</p>		



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