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
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Knowledge is Power

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Namakkal-Dt.

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	**UNIT II:** Working Principle and applications of Paper, Thin layer, column, Ion exchange, Affinity chromatography, GC – MS, HPLC, LC – MS **UNIT III:** Types of electrophoresis –Paper electrophoresis, Agarose gel electrophoresis, Sodium Dodecyl Sulphate - Poly Acrylamide Gel Electrophoresis, Two Dimensional and Immuno electrophoresis, Capillary electrophoresis. **UNIT V:** Radioactivity – Measurement - GM Counter, Autoradiography and Liquid Scintillation Counter. FTIR.
			Employability	
5	18PMBMP101	Core Practical I	Skill development	**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.
6	18PMBM201	Core VI: Soil and Agricultural Microbiology	Entrepreneurship	**UNIT III:** Biofertilizers: Mass multiplication, field application and crop response to Rhizobium, Azotobacter, Azospirullum, Phosphobacteria, Cyanobacteria, Azolla and Mycorrhizae. **UNIT V:** Biopesticide and biocontrol agents: Mode of action, formulation and application methods of Bacteria - Bacillus thuringenesis; Fungal- Breuvaria bassiana and viral- Nuclear polyhedrosis and Baculovirus. Trichoderma viridae and Pseudomonas fluorescens.
			Employability	

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7	18PMBM202	Core VII: Medical Microbiology	Entrepreneurship	**UNIT I:** Laboratory diagnosis and control of gram positive bacteria. **UNIT II:** Laboratory diagnosis and control of gram negative bacteria. **UNIT III:** Laboratory diagnosis and control of fungal disease. **UNIT IV:** Laboratory diagnosis and control of viral disease. **UNIT V:** Clinical manifestation and diagnosis of parasites.
			Employability	
8	18PMBEL201	Elective I: Environmental Microbiology	Entrepreneurship	**UNIT II:** Aquatic Microbiology – Potability of water quality – Indicator organisms – MPN index – eutrophication - waterborne diseases and their control measures. **UNIT III:** Sewage treatment – Physical, chemical and biological (trickling filter, activated sludge and oxidation pond) treatment – waste disposal. **UNIT IV:** Bioremediationbioremediation-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. **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.
			Employability	

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9	18PMBMP201	Core Practical II	Entrepreneurship Employability	**Experiment (1 to 07):** Collection and transportation of clinical specimens, Rhizobium from root nodules. **Experiment (09 to 11): BOD, COD AND MPN**
10	18PMBBCI201/ 18PMBBTI201	IDC I : Clinical Microbiology	Employability Entrepreneurship	**UNIT II:** Collection and transport of clinical specimens: urine, pus, faeces, sputum and blood. **UNIT III:** Microbiological examination of samples: sputum, pus, faeces and urine. Diagnosis of anaerobic infections. **UNIT IV:** ntigen testsAgglutination test for pregnancy, Elek's gel precipitation test, ELISA. Antibody tests - WIDAL, ASO. Monoclonal antibodies in clinical microbiology. **UNIT V:** Molecular diagnosis of infectious diseases: tuberculosis, malaria, AIDS. RFLP as a molecular marker in disease diagnosis.
11	18PMBBCIP201/ 18PMBBTIP201	IDC Practical I: Clinical Microbiology	Skill development	**Experiment (1 to 6):** Bacteria on selective media, differential staining, preliminary test, biochemical test and special test. a) *Staphylococcus aureus* b) *Pseudomonas aeruginosa*, Media usage–PDA, SDA, Corn meal agar, Lactophenol cotton blue stain and *Candida albicans* - Gram's stain, Germ tube test
12	18PMBM301	Core VIII: Genetic Engineering	Employability	**UNIT V:** 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.

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13	18PMBM302	Core IX: Biostatistics and Research Methodology	Employability	**UNIT IV:** Thesis Writing: Planning and Classification, Components of research report, Essential steps in research. Problem Identification & Formulation, Research Question, Hypothesis: Qualities of a good Hypothesis, Null Hypothesis & Alternative Hypothesis. Experimental design. Literature collection – and its importance. **UNIT V:** 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.
14	18PMBMEL302	Elective II: Pharmaceutical Microbiology	Skill development	**UNIT II:** Industrial production of microbial products: Antibiotics – Penicillin and Streptomycin, vaccines – influenza, BCG. UNIT IV: Biosensors and applications in Pharmaceuticals; Methods of preservation of pharmaceutical products. UNIT V: 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.
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15	18PMBMP301	Core Practical III	Skill development	**Experiment (1 to 15):** 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 Aspergillus niger AND Submerged fermetation
16	18PMBBCI301/ 18PMBBTI301	IDC II: Industrial Microbiology	Skill development	**UNIT I:** Component parts of a fermentation process – Screening of industrial microorganisms- primary screening, Secondary screening, Preservation of microorganisms **UNIT II:** Strain improvement and Media formulation. **UNIT III:** Components and parts of fermentor – Body construction. **UNIT IV & V:** Microbial production of fermented products and recovery.
17	18PMBBCIP301/ 18PMBBTIP301	IDC Practical II: Industrial Microbiology	Employability	**Experiment (1 to 7):** 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.

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18	18PMBM401	Core X: Industrial Microbiology	Skill development	**UNIT I:** Screening of industrial microorganisms- primary screening - Crowded plate method, auxanography, indicator dye and enrichment. Secondary screening. Preservation of microorganisms- refridgerated storage, lyophilization, cryogenic storage. **UNIT II:** 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. **UNIT IV:** Microbial production: Antibiotics- Penicillin and Streptomycin. Organic acids- Citric acid and Acetic acid. Enzymes- Amylase and Protease. Yeast- Brewer's and Baker's
			Employability	
19	18PMBM402	Core XI: Food and Dairy Microbiology	Skill development	**UNIT I to IV:** 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 **UNIT V:** Fermented food products: Bread, Sauerkraut, cheese, Yoghurt, Buttermilk and Tempeh. Food sanitation and its control.
			Employability	

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HEAD
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Principal
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K. S. Rangasamy College of Arts & Science
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