

K.S.Rangasamy College of Arts and Science (Autonomous)

Tiruchengode-637215

Department of Microbiology (PG)

1.2.2 Percentage of programs in which Choice Based Credit System (CBCS)/elective course system has been implemented

1. Elective I: Environmental Microbiology
2. Elective I: Cell Biology
3. Elective II: Bioinformatics, Bioethics and IPR
4. Elective II: Pharmaceutical Microbiology

Enclosures:

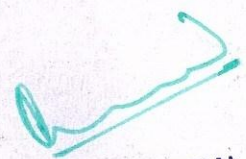
1. Copy of scheme of examination.
2. Syllabus copy of the elective courses


Head of the Department


Controller of Examination

Mr. M. PRASAD, M.Sc., M.B.A., M.Phil.
Controller of Examinations
K.S. Rangasamy College of Arts & Science (Autonomous)
Tiruchengode - 637 215, Tamilnadu, India.

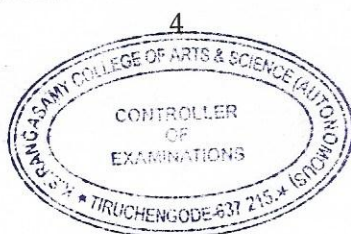



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SCHEME OF EXAMINATION

Subject Code	Subject	Hours of Instruction	Exam Duration	Maximum Marks			Credit Points
				CA	CE	Total	
FIRST SEMESTER							
Part A							
18PMBM101	Core I: Fundamentals of Microbiology and Taxonomy	5	3	25	75	100	5
18PMBM102	Core II: Microbial Biochemistry and Physiology	5	3	25	75	100	5
18PMBM103	Core III: Microbial Genetics	5	3	25	75	100	5
18PMBM104	Core IV: Immunology	5	3	25	75	100	5
18PMBM105	Core V: Bioinstrumentation	4	3	25	75	100	4
18PMBMP101	Core Practical I: Fundamentals of Microbiology & Taxonomy, Microbial Biochemistry & Physiology, Microbial Genetics, Immunology & Bioinstrumentation	5	9	40	60	100	4
Non Credit							
18PLS101	Career Competency Skills I	1	-	-	-	-	-
Total		30				600	28
SECOND SEMESTER							
Part A							
18PMBM201	Core VI: Soil and Agricultural Microbiology	5	3	25	75	100	5
18PMBM202	Core VII: Medical Microbiology	5	3	25	75	100	5
18PMBEL201	Elective I	5	3	25	75	100	4
18PMBMP201	Core Practical II: Soil and Agricultural Microbiology, Medical Microbiology, Environmental	6	9	40	60	100	4

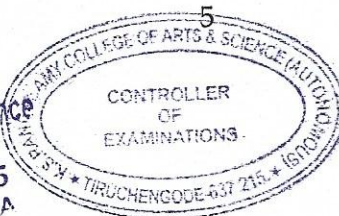
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Mr. M. PRASAD, M.Sc., M.B.A., M.L.
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K.S. Rangasamy College of Arts & Science (Autonomous)
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	Microbiology and Cell biology						
Optional Subjects							
18PBCMBI201	IDC I: Diagnostic Biochemistry	3	3	25	75	100	2
18PBCMBIP201	IDC Practical I: Diagnostic Biochemistry	3	3	40	60	100	2
18PBTMBI201	IDC I: Plant Tissue Culture Technology	3	3	25	75	100	2
18PBTMBIP201	IDC Practical I: Plant Tissue Culture Technology	3	3	40	60	100	2
Part B							
18PVE201	Value Education : Human Rights	2	3	25	75	100	2
Non Credit							
18PLS201	Career Competency Skills II	1	-	-	-	-	-
	Total	30				700	24
THIRD SEMESTER							
Part A							
18PMBM301	Core VIII: Genetic Engineering	6	3	25	75	100	5
18PMBM302	Core IX: Biostatistics and Research Methodology	5	3	25	75	100	4
18PMBEL301	Elective II	5	3	25	75	100	5
18PMBMP301	Core Practical III: Genetic Engineering, Industrial Microbiology, and Food and Dairy Microbiology	6	9	40	60	100	3
18PMBMP302	Core Practical IV: Statistical Software	2	3	40	60	100	2
Optional Subjects							
18PBCMBI301	IDC II: Pharmaceutical Biochemistry	3	3	25	75	100	2
18PBCMBIP301	IDC Practical II: Pharmaceutical	3	3	40	60	100	2

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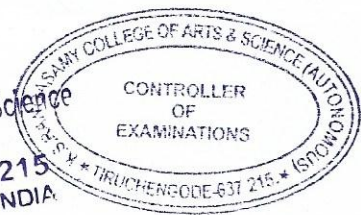



Mr. M. PRASAD, M.Sc., M.B.A., M.Phil.
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M.Sc., Applied Microbiology (Students admitted from 2018-2019 onwards)

	Biochemistry						
18PBTMBI301	IDC II: Animal Tissue Culture Technology	3	3	25	75	100	2
18PBTMBIP301	IDC Practical II: : Animal Tissue Culture Technology	3	3	40	60	100	2
Part B							
	Total	30				700	23
FOURTH SEMESTER							
Part A							
18PMBM401	Core X: Industrial Microbiology	5	3	25	75	100	4
18PMBM402	Core XI: Food and Dairy Microbiology	5	3	25	75	100	5
18PMBPR401	Project and Viva Voce	5	-	50	150	200	6
	Total	15				400	15
	Grand Total					2400	90


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ELECTIVE

The students shall choose any one of the following subjects as Elective I and II in the Second and Third semesters respectively.

Elective I

S.No.	SEMESTER	SUBJECT CODE	SUBJECT
1.	II	18PMBEL201	Elective I: Environmental Microbiology
		18PMBEL202	Elective I: Cell Biology

Elective II


S.No.	SEMESTER	SUBJECT CODE	SUBJECT
1.	III	18PMBEL301	Elective II: Bioinformatics, Bioethics and IPR
		18PMBEL302	Elective II: Pharmaceutical Microbiology

FOR COURSE COMPLETION

- Student shall complete:
- Value Education: Human Rights in II semester.
- IDC in II and III semester.
- Elective subjects in II and III semesters.
- Project & Viva-Voce in IV semester.
- Career Competency Skills in I and II semester.

TOTAL MARKS AND CREDIT DISTRIBUTION


S.No.	COMPONENT	MARK	CREDITS
1.	PART A: Core, Elective and IDC subjects	2300	88
2.	PART B: Value Education	100	02
TOTAL		2400	90

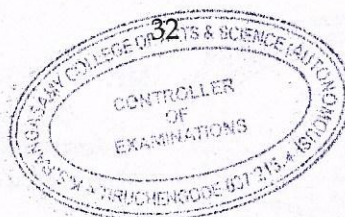

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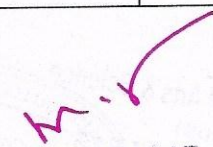



Mr. M. PRASAD, M.Sc., M.B.A., M.F.P.
Controller of Examinations
K.S. Rangasamy College of Arts & Science (Autonomous)
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18PMBMEL201	ELECTIVE I: ENVIRONMENTAL MICROBIOLOGY	SEMESTER II	
Course Objectives: The course aims <ul style="list-style-type: none"> To impart the significant processes involving in environmental microbiology. To understand bioremediation process and biofuel production. 			
Credits: 04		Total Hours: 50	
UNIT	CONTENTS	Hrs	CO
I	Ecological Principles- ecosystem-types of ecosystems-dynamics of ecosystem- culturable and non-culturable bacteria- conventional and molecular methods of studying microbial diversity.	10	CO1
II	Aero-microbiology - Aerosol- droplet nuclei - Enumeration of bacteria from air - Air sampling devices - Air sanitation- Air borne diseases and their control measures. Aquatic Microbiology - Potability of water quality - Indicator organisms - MPN index - eutrophication - waterborne diseases and their control measures.	10	CO2
III	Sewage Microbiology - chemical and biochemical characteristics of sewage - Biological oxygen demand- Chemical oxygen demand - Sewage treatment - Physical, chemical and biological (trickling filter, activated sludge and oxidation pond) treatment - waste disposal.	10	CO3
IV	Role of microbes in environment - Bioremediation- bioremediation-types and its applications- bioremediation of hazardous waste and metals--biodegradation of paper, oil	10	CO4


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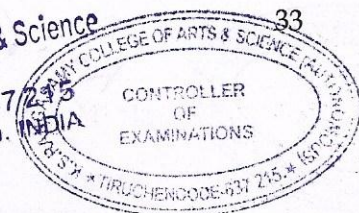
	and pesticide-bio-deterioration of leather and textiles - Bioleaching of ores- phytoremediation.		
V	Microbial conversion of solid waste to food- mushroom- SCP- Bio-fuel - biofuel production- bioethanol, biogas, hydrogen and algal fuel - concepts of sustainable energy development. Microbial composting.	10	CO5
Text Books:			
1.	<i>Atlas, R.M and Bartha R. 1980. Microbial Ecology: Fundamentals and applications. Fourth Edition, An imprint of Addison Wesley Longman Inc.</i>		
2.	<i>Vijaya Ramesh, K (2004). Environmental Microbiology. 1st Edition, MJP Publishers (A unit of Tamil Nadu Book house), Chennai.</i>		
Reference Books:			
1.	<i>Mithell R. 1974. Introduction to Environmental Microbiology. Prantice Hall. Inc., Englewood Cliffs, New Jersey.</i>		
2.	<i>Daniel J. C. 1999. Environment Aspects of Microbiology. 1st Edition, Bright sun Publications, Chennai.</i>		
3.	<i>Raina, M. M, Ian L. P and Charles P G. 2000. Environmental Microbiology. Academic Press, USA.</i>		

COURSE OUTCOMES (CO)

After completion of the course, the students' will be able to

CO1	Recall the existence of living organisms and communities
CO2	Evaluate air quality, air sanitation and control air borne diseases.
CO3	Create awareness about proper disposal and recycling of waste water.
CO4	Develop remediation for control environmental pollution using microorganisms.
CO5	Assess commercial application of microbial products.

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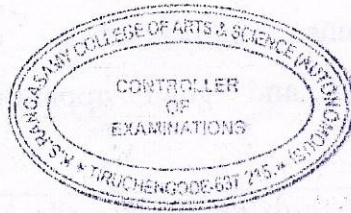
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Controller of Examinations
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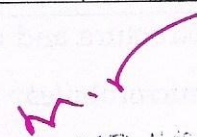
MAPPING

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	M	M	M
CO2	M	H	H	H	H
CO3	M	H	H	H	H
CO4	M	M	H	H	H
CO5	H	H	H	H	H

H-High; M-Medium; L-Low



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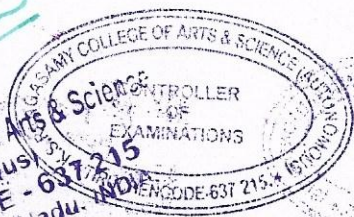

Mr. M. PRASAD, M.Sc., M.Phil.,
Controller of Examinations
K.S. Rangasamy College of Arts & Science (Autonomous)
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18PMBMEL202	ELECTIVE I: CELL BIOLOGY	SEMESTER II	
Course Objectives:			
The course aims			
<ul style="list-style-type: none"> To ascertain the cellular level organization and its functions To understand about the activation, regulation of cellular metabolism. 			
Credits: 04		Total Hours: 50	
UNIT	CONTENTS	Hrs	CO
I	Structure and organization of cytoskeleton - microfilaments, microtubules and intermediate filament. Structure and functions of nucleus, mitochondria, chloroplasts, endoplasmic reticulum and golgi apparatus- protein trafficking.	10	CO1
II	Cell cycle - Events and regulation in cell cycle. Microtubules and mitosis. Cell movements. Intracellular transport and the role of kinesin and dynein.	10	CO2
III	Ca ⁺⁺ dependent and independent cell-cell adhesion. Cell junctions and adhesion molecules, mitosis, meiosis, role of cyclins and cyclin dependent kinases, regulation of Cdk - cyclin activity.	10	CO3
IV	Signal transduction- G Protein couple receptors (GPCR), second messenger, role of cAMP and cGMP, steroid/peptide hormone regulation, tissue specific regulation - protein folding- molecular chaperones.	10	CO4
V	Cell division regulation and cancer. Role of protein kinases, Programmed cell death (PCD) - Autophagy and apoptosis. Geno toxicity assays.	10	CO5



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35

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 Controller of Examinations
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Text Book:

1.	Ajoy Paul. 2011. Text Book of Cell and Molecular Biology , Books and Allied Ltd., New Delhi.
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Reference Books:

1.	Lodish, H., Berk A., Kaiser C. A., Krieger M., Scott M.P., Bretscher A., Ploegh H., and Matsudaira P. 2008. Molecular Cell Biology , [Sixth Edition]. Freeman, W. H. and Co.
2.	Geoffrey, M. Cooper and Hausman, R.E. 2007. The cell - A Molecular Approach . [Fourth Edition]. ASM Press, Washington, D.C.
3.	Sadava, D.E. 2004. Cell Biology: Organelle Structure and Function . Reprint, [First Edition]. Panima Publishing Corp., India.

COURSE OUTCOMES (CO)

After completion of the course, the students' will be able to

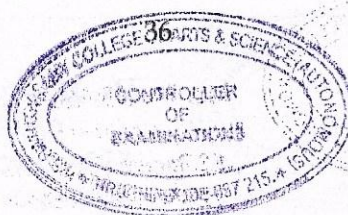
CO1	Recall about structural components and internal organelles.
CO2	Assess cell cycle and its regulations.
CO3	Analyze cell cycle mechanisms.
CO4	Apply cell signal transduction for design drugs.
CO5	Develop drugs for cancer therapy.

MAPPING

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	M	M	M	M	M
CO2	M	M	M	M	M
CO3	M	H	H	H	M
CO4	M	M	H	H	H
CO5	M	M	H	H	H

H-High; M-Medium; L-Low

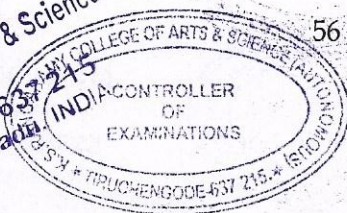
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18PMBMEL301	ELECTIVE II: BIOINFORMATICS, BIOETHICS AND IPR	SEMESTER III	
<p>Course Objectives:</p> <p>The course aims</p> <ul style="list-style-type: none"> To learn about the basics and scope of bioinformatics. To familiarize the prediction of various biological structures through bioinformatics tool. To know about the basics of intellectual property rights and bioethics. 			
Credits:05		Total Hours: 50	
UNIT	CONTENTS	Hrs	CO
I	<p>Bioinformatics: Definition and Scope. Biological Databases - uses. Sequence Databases-Nucleic acid (NCBI, EMBL, DDBJ), Proteins - (SWISSPROT, PIR), Structural databases-PDB, CATH, SCOP, Specialized databases - KEGG, Pub Med.</p>	10	CO1
II	<p>Sequence analysis: Local Alignment, Global alignment-BLAST, Multiple sequence alignment - ClustalW, Phylogenetic analysis- WPGMA, UPGMA methods. Human Genome Project.</p>	10	CO2
III	<p>Secondary structure prediction: GOR, Chau-Fasman method, ORF finder, restriction site analysis, molecular visualization tool - Rasmol. Molecular Docking.</p>	10	CO3
IV	<p>Biosafety and Bioethics: Definition - DBT - Guidelines on Biosafety in conducting research in Biology/Biotechnology. Bioethics - Definition - Animal ethics - Norms in India - Licensing of animal house. Human ethics, Ethics of Research. Biosafety levels.</p>	10	CO4


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56

Mr. M. PRASAD, M.Sc., M.B.A., M.Phil.
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V	<p>Intellectual Property Rights: WTO, GATT and TRIPS.</p> <p>Forms of IPR. Patents, copy rights, trade secrets. Patenting of biological materials. Patents of biotechnology in India.</p> <p>Plant breeders right. ICMR Guidelines.</p>	10	CO5
Text Books:			
1.	<i>Rastogi, S.C., N.Mendiratta and P.Rsatogi. Bioinformatics- Methods and applications. Third edition. PHI Learning Pvt Ltd, New Delhi.</i>		
2.	<i>Andreas, Baxevanis and Francis Ouellette. Bioinformatics- A practical guide to the analysis of genes & protein [Second edition].</i>		
3.	<i>Shaleesha A. Stanley. 2008. Bioethics. Wisdom educational service, Chennai.</i>		
Reference Books:			
1.	<i>David H Mount. Bioinformatics. 2005. Second Edn. CBS Publishers, New Delhi.</i>		
2.	<i>Baruch A Brody and Tristram Engelhardt H. 1987. Bioethics: Readings and Cases. Pearson education, UK.</i>		
3.	<i>Satheesh, M.K. 2008. Bioethics and Biosafety. IK International Pvt. Ltd., New Delhi.</i>		

COURSE OUTCOMES (CO)

After completion of the course, the students' will be able to

CO1	Recall the basics and applications of bioinformatics tools in molecular research.
CO2	Apply the sequence analysis for identification of microbes.
CO3	Develop the skill for protein characterization.
CO4	Demonstrate biosafety and ethics for the future sustainable development.
CO5	Apply intellectual property right for novel products.

Principal

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M. Prasad

M. PRASAD (P.O., M.A.S.S.)
 Controller of Examinations
 K.S. Ranganasamy College of Arts & Science (Autonomous)
 Tiruchengode - 637 215, Tamilnadu, India.

MAPPING

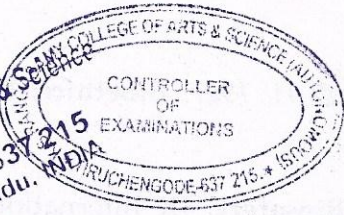
PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	H	M	M	M
CO2	M	H	H	H	H
CO3	H	H	H	H	H
CO4	M	M	H	H	H
CO5	M	H	H	H	H

H-High; M-Medium; L-Low

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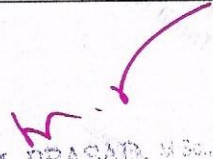


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18PMBMEL302	ELECTIVE II: PHARMACEUTICAL MICROBIOLOGY	SEMESTER III	
Course Objectives:			
The course aims			
<ul style="list-style-type: none"> To learn about the synthetic antimicrobial agents and its mechanism of action. To understand microbial contamination and spoilage of various pharmaceutical products. To study the quality assurance and validation of pharmaceutical Industry. 			
Credits: 05		Total Hours: 50	
UNIT	CONTENTS	Hrs	CO
I	Antibiotics: Definition - Classification of antibiotics - Mechanism of action of antibiotics - Inhibitors of cell wall synthesis, nucleic acid and protein synthesis- Antimicrobial resistance. Scope and recent developments of pharmaceutical microbiology.	12	CO1
II	Industrial production of microbial products: Antibiotics - Penicillin and Streptomycin, vaccines - influenza, BCG.	08	CO2
III	Microbial contamination and spoilage of pharmaceutical products: sterile injectables - Intravenous infusions and total parenteral nutrition (TPN), non injectables-non injectable water and haemodialysis solutions, ophthalmic preparations and implants.	10	CO3
IV	Pharmaceutical Drug Analysis: Biosensors and applications in Pharmaceuticals; Macromolecular, cellular and synthetic drug carriers. Assay of steroids. Methods of preservation of pharmaceutical products.	10	CO4


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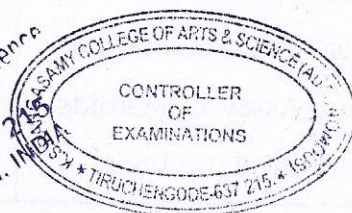
V	Quality Assurance and Validation: Good Manufacturing Practices (GMP) and Good Laboratory Practices (GLP) in Pharmaceutical Industry. Toxicology test of antimicrobial drugs - Acute toxic category and Fixed dose procedure. Laboratory evaluation and quality testing of antimicrobial drugs.	10	CO5
Text Book:			
1.	Hugo and Russell. 2004. Pharmaceutical Microbiology . [Seventh Edition]. Wiley- Blackwell Publishers, UK.		
Reference Books:			
1.	Purohit, S.S., Saluja, A.K. and Kakrani, H.N. 2003. Pharmaceutical Microbiology . Agrobios, New Delhi.		
2.	Lansing M Prescott, John P Harley and Donald A Klein. 2010. Microbiology . [Eighth Edition]. Mc Graw Hill, New York.		

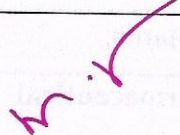
COURSE OUTCOMES (CO)

After completion of the course, the students' will be able to

CO1	Recall the basics and working mechanism of antibiotics against infectious diseases.
CO2	Optimize the production of pharmaceutical products.
CO3	Develop the pharmaceutical products without contamination and spoilage.
CO4	Apply the technology in drug delivery systems.
CO5	Follow the protocols and regulations to validate pharmaceutical products.


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MAPPING

PSO CO	PSO1	PSO2	PSO3	PSO4	PSO5
CO1	H	M	H	H	H
CO2	H	H	H	H	H
CO3	H	M	H	M	H
CO4	H	H	H	H	H
CO5	M	H	H	M	H

H-High; M-Medium; L-Low

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M. PRASAD, M.Sc., M.Phil., ...
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