



V.V.VANNIAPERUMAL COLLEGE FOR WOMEN

(Belonging to Virudhunagar Hindu Nadars)

An Autonomous Institution Affiliated to Madurai Kamaraj University, Madurai

Re-accredited with 'A' Grade (3rd Cycle) by NAAC

VIRUDHUNAGAR - 626 001

PEOs, POs, PSOs and COs

M.Sc. BIOCHEMISTRY

Programme Educational Objectives (PEOs)

PEOs are broad statements that describe the career and professional achievements that the Programme is preparing the graduates to achieve within the first few years after graduation. PEOs are framed for each Programme and should be consistent with the Mission of the Institution.

Programme Outcomes (POs)

POs shall be based on Graduate Attributes (GAs) of the Programme. The GAs are the attributes expected of a graduate from a Programme in terms of knowledge, skills, attitude and values. The Graduate Attributes include Disciplinary Knowledge, Communication Skills, Critical Thinking, Problem Solving, Analytical Reasoning, Research Related Skills, Co-operation/Team Work, Scientific Reasoning, Reflective Thinking, Information/Digital Literacy, Multicultural Competence, Moral and Ethical Awareness/Reasoning, Leadership Qualities and Lifelong Learning.

On successful completion of the Programme, the students will be able to

- 1 Apply their in depth domain knowledge and practical skills in interdisciplinary fields for research-based endeavours, employment and entrepreneurship development. (*Disciplinary Knowledge*)
- 2 Communicate proficiently and confidently with the ability to present complex ideas in a concise manner to assorted groups. (*Communication Skills*)
- 3 Identify, formulate and solve problems in a consistent and systematic way with updated skills using modern tools and techniques. (*Scientific Reasoning and Problem Solving*)

- 4 Analyze the data, synthesise the findings and provide valid conclusion by critical evaluation of theories, policies and practices for the betterment of society. (*Critical Thinking and Analytical Reasoning*)
- 5 Explore and evaluate globally competent research methodologies to apply appropriately in interdisciplinary research; Develop and sustain the research capabilities to meet the emerging needs for the welfare of the society. (*Research Related Skills*)
- 6 Use ICT to mould themselves for lifelong learning activities to face career challenges in the changing environment. (*Digital Literacy, Self - directed and Lifelong Learning*)
- 7 Self-manage and function efficiently as a member or a leader in diverse teams in a multicultural society for nation building. (*Co-operation/Team Work and Multicultural Competence*)
- 8 Uphold the imbibed ethical and moral values in personal, professional and social life for sustainable environment. (*Moral and Ethical Awareness*)

Programme Educational Objectives (PEOs)

The students will be able to

- provide in-depth knowledge in the core areas of life sciences for industries, clinical, research , pharmaceutical labs, and academia.
- instill the ability of entrepreneurship in research and diagnostics
- equip skillful attitude promoting lifelong learning to meet the ever evolving professional demands by developing ethical , interpersonal and team skills

Key Components of Mission Statement	PEO1	PEO2	PEO3
Employability in research, academia and pharmaceutical fields	✓	✓	✓
Motivation for research and entrepreneurship	✓	✓	✓
Committed to improving the scientific world today	✓	✓	✓

Programme Specific Outcomes (PSOs)

Based on the Programme Outcomes, Programme Specific Outcomes are framed for each PG Programme. Programme Specific Outcomes denote what the students would be able to do at the time of graduation. They are Programme-specific and it is mandatory that each PO should be mapped to the respective PSO.

On successful completion of M.Sc. Biochemistry Programme, the students will be able to

PO 1: *Disciplinary Knowledge*

PSO 1.a : Apply the knowledge of theoretical and experimental approaches in Biochemistry in research oriented Endeavour to unravel problems in health care with a scientific basis of life process and will have an ability to provide solution to new problems.

PSO 1.b : Recognize the importance of bioethics, entrepreneurship and career oriented skills, thus providing a strong foundation for both academic / industrial placements across the country and globe as well as setting up entrepreneurial ventures.

PO 2: *Communication Skills*

PSO 2 : Communicate the knowledge of Biochemistry to address environmental, intellectual, societal and ethical issues through case studies with effective communication.

PO3: *Scientific Reasoning and Problem Solving*

PSO 3.a: Enrich their analytical and problem solving skills with regard to biochemical principles of life processes and technologies for combating human diseases.

PSO 3.b: build up the capacity of decision making with regard to scientific progress, personal development and career choice.

PO 4: *Critical Thinking and Analytical Reasoning*

PSO 4: Apply the knowledge of experimental approaches on designing experiments, analysis, interpretation of data and synthesis of information to provide valid conclusions

PO 5: *Research Related Skills*

PSO 5: An ability to properly understand the technical aspects with research aptitude of existing technologies that help in addressing the biological and medical challenges faced by humankind by adhering the code of conduct of Biochemistry

PO 6: *Digital Literacy, Self - Directed and Lifelong Learning*

PSO 6 : Analyze and interpret the data using state-of the-art techniques with ICT and modern tools in planning and executing projects in Biochemistry.

PO 7: *Co-operation/Team Work and Multicultural Competence*

PSO 7: Develop leadership qualities, team spirit and good interpersonal skills to work effectively in diverse fields individually or as a team

PO 8: *Moral and Ethical Awareness*

PSO 8 : Follow the global standards of codes of conduct in Life science community and practice the imbibed moral values in their profession and society to maintain sustainable environment.



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VIRUDHUNAGAR - 626 001

Semester I	CHEMISTRY OF BIOPOLYMERS	Hours/Week: 6	
Core Course-1		Credits: 5	
Course Code 20PBCC11		Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the students will be able to

CO1: describe the composition, classification of biomolecules and its essential role in the biological system. [K2]

CO2: sketch the structure of biomolecules and its properties. [K3]

CO3: identify the mechanism of action of biomolecules along with their structural relationship. [K3]

CO4: evaluate the methods involved in the isolation and purification of macromolecules. [K4]

CO5: compile the structural difference in biomolecules and techniques involved in biomolecules structure identification. [K5]

Course Code 20PBCC11	PO1		PO2	PO3		PO4	PO5	PO6	PO7	PO8
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO 1	H	H	M	H	M	H	H	M	-	-
CO 2	H	H	M	M	L	H	M	H	-	-
CO 3	H	H	H	M	L	H	H	M	L	H
CO 4	H	H	M	H	M	H	M	M	H	L
CO 5	H	H	M	H	M	H	M	M	H	H



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Semester I	PRINCIPLES OF BIOCHEMICAL AND BIOPHYSICAL TECHNIQUES	Hours/Week: 6	
Core Course-2		Credits: 5	
Course Code 20PBCC12		Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the students will be able to

CO1: understand the Biophysical, Biochemical and Molecular Biology techniques. [K2]

CO2: apply the separation procedures such as Centrifugation, Chromatography and

Eletrophoretic techniques in biological investigations. [K3]

CO3: determine the Biochemical and Biophysical characterization of macromolecules and

their complexes for structural biology experiments. [K3]

CO4 : analyze the practical and data handling skills required to undertake the Bio Technical

research. [K4]

CO5: evaluate the principles and techniques of Biochemistry that motivates the students for

higher education, acquiring skills in separation techniques to identify different

biomolecules, undertaking research, and for becoming health professionals. [K5]

Course Code 20PBCC12	PO1		PO2	PO3		PO4	PO 5	PO6	PO7	PO8
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO 1	H	H	L	M	M	M	-	M	M	-
CO 2	H	H	H	H	H	H	-	M	M	-
CO 3	H	H	H	H	H	H	M	M	M	-
CO 4	H	H	M	H	H	H	M	M	M	M
CO 5	H	H	H	M	H	H	M	M	M	M



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Semester I	BIOCHEMICAL AND ENVIRONMENTAL TOXICOLOGY	Hours/Week: 6	
Core Course-3		Credits: 5	
Course Code 20PBCC13		Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the students will be able to

CO1: describe the terms and basic principles of toxicology, mechanism of toxic effects of toxicants and factors affecting disposition of toxicants. [K2]

CO2: identify health conditions linked to selected toxic exposures from food, lifestyle, environment, workplace and home. [K3]

CO3: apply pharmacokinetic and pharmacodynamic principles that impact administration, ADME, efficacy, potency, effectiveness and biological activity of drugs and toxins. [K3]

CO4: analyze the types of toxicology, toxicants, metals and its disposition, responses in target organ, non-organ directed toxicity. [K4]

CO5: assess the techniques and methods of toxicity and fate of toxicants in humans. [K5]

Course Code 20PBCC13	PO1		PO2	PO3		PO4	PO5	PO6	PO7	PO8
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO 1	H	M	H	M	M	H	M	L	-	-
CO 2	H	H	H	H	M	H	H	L	M	H
CO 3	H	H	M	H	M	H	H	M	M	H
CO 4	H	H	H	H	M	H	H	M	M	H
CO 5	H	H	H	H	M	H	H	m	H	H



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Semester: I	BIOCHEMICAL TECHNIQUES AND ANALYSIS LAB	Hours/Week: 6	
Core Practical-1		Credits: 3	
Course Code 20PBCC11P		Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the students will be able to

CO1: apply the principles and methodologies of partial enzyme purification, spectrophotometry and chromatographic techniques in biomolecules analysis. [K3]

CO2: sketch flowcharts for the partial enzyme purification, spectrophotometry and Chromatographic techniques of various bioanalytes. [K3]

CO3: observe and calculate the results for the spectrophotometry, chromatographic techniques of biological samples and complete the record work. [K3]

CO4: infer the normal and abnormal parameters of biological samples analyzed by spectrophotometry, chromatographic techniques. [K4]

CO5: evaluate the outcomes of the modifications in sample analysis using spectrophotometry, chromatographic Techniques. [K5]

Course Code 20PBCC11P	PO1		PO2	PO3		PO4	PO5	PO6	PO7	PO8
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	M	M	M	M	M	M	M	M	-	M
CO 2	M	M	M	M	M	M	M	M	-	M
CO 3	H	H	H	H	H	M	H	L	-	H
CO 4	H	H	H	H	H	H	H	M	-	H
CO 5	H	H	H	H	H	H	H	M	L	H



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Semester I	ENZYMES AND ENZYME TECHNOLOGY	Hours/Week: 6	
DSEC-1		Credits: 5	
Course Code 20PBCE12		Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the students will be able to

CO1: describe the structure, functions, mechanism of action of enzymes, kinetics of enzyme catalyzed reactions, enzyme inhibitions, regulatory process and their application in commercial production. [K2]

CO2: apply their knowledge in the commercial synthesis of novel products using the enzyme kinetics in living systems. [K3]

CO3: compare and contrast the uses of enzyme technology with current applications in a diverse range of industries. [K3]

CO4: evaluate the function of cofactors in enzyme catalyzed reactions, immobilization of enzymes, exposure of wide applications of enzymes and future potential. [K4]

CO5: detect the immobilization of enzymes, commercial enzyme production and the presence of aminoacids in the active sites. [K5]

Course Code 20PBCE12	PO1		PO2	PO3		PO4	PO5	PO6	PO7	PO8
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO 1	H	H	M	M	M	H	M	-	-	-
CO 2	H	H	M	M	M	M	M	-	-	M
CO 3	H	M	M	M	M	M	M	-	-	-
CO 4	H	H	M	M	M	H	H	-	-	M
CO 5	H	H	M	M	M	M	H	-	-	M



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Semester I	DAIRY BIOCHEMISTRY	Hours/Week: 6	
DSEC-1		Credits: 5	
Course Code 20PBCE13		Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the students will be able to

CO1: understand the composition and physicochemical characteristics of the main components of milk. [K2]

CO2: apply the knowledge of chemistry of dairy components and find the impacts of processing conditions on milk and dairy products. [K3]

CO3: identify the dairy products manufacturing and key functions of the processing steps involved. [K3]

CO4: analyze the food adulteration and contamination of food, food laws and standards. [K4]

CO5: design methods of dairy production, and refrigeration and storage techniques. [K5]

Course Code 20PBCE13	PO1		PO2	PO3		PO4	PO5	PO6	PO7	PO8
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4	PSO 5	PSO6	PSO7	PSO8
CO 1	H	H	M	M	M	M	M	M	M	M
CO 2	H	H	M	H	H	M	M	M	-	-
CO 3	H	M	H	M	M	H	M	-	-	M
CO 4	H	H	M	H	H	M	H	M	M	-
CO 5	H	H	H	H	H	H	H	-	-	-



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Semester II	ENDOCRINOLOGY & METABOLIC REGULATION	Hours/Week: 5	
Core Course-4		Credits: 4	
Course Code 20PBCC21N		Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the students will be able to

CO1: demonstrate various metabolic pathways of various biomolecules, hormones of endocrine glands and their mechanism of action [K2]

CO2: apply the crucial role of hormones with regard to the integration of metabolic Pathways [K3]

CO3: find the integrated approach of anabolic and catabolic pathways of various biomolecules mediated by hormones. [K3]

CO4: analyze the role of hormones and key enzymes that regulate various metabolic pathways [K4]

CO5: assess the involvement of hormones and organs in the metabolic pathways of the living system [K5]

Course Code (20PBCC21N)	PO1		PO2	PO3		PO4	PO5	PO6	PO7	PO8
	1a	1b	2	3a	3b	4	5	6	7	8
CO 1	H	M	M	M	M	M	H	M	M	M
CO 2	H	M	M	H	H	H	H	M	M	M
CO 3	M	M	H	H	M	H	H	M	M	M
CO 4	M	M	H	H	M	H	H	M	M	M
CO 5	M	M	H	H	M	H	H	M	M	M



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Semester II	MICROBIAL BIOCHEMISTRY AND FERMENTATION TECHNOLOGY	Hours/Week: 5	
Core Course-5		Credits: 4	
Course Code 20PBCC22		Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the students will be able to

CO1: understand how microbes are relevant in technological developments for industries related to food and fermentation and their various, metabolic energy yielding pathways. [K2]

CO2: develop knowledge about microbial metabolism, growth, energy generation, various fermentation pathways, energetic its role in science and industry today. [K3]

CO3: apply the knowledge of microbial biochemistry and fermentation technology Including areas such as energy metabolism, microbial biosynthesis and industrial production, purification of compounds and their application to research, development and societal needs. [K3]

CO4: analyze different fermentation techniques, bioreactor design, inoculum development for industrial fermentation, the use of microorganisms for the value-added products through fermentation processes, the production of secondary metabolites. [K4]

CO5: assess fermentation technology and requirements; production of commercially important microbial products and various metabolic activities in microorganisms. [K5]

Course Code 20PBCC22	PO1		PO2	PO3		PO4	PO5	PO6	PO7	PO8
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	H	H	M	M	H	H	M	M	-	-
CO2	H	H	M	M	H	H	M	H	-	-
CO3	H	H	H	H	H	H	H	H	M	H
CO4	H	H	H	H	H	H	M	H	M	H
CO5	H	H	M	H	H	H	M	H	M	H



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Semester II	MICROBIAL BIOCHEMISTRY AND FERMENTATION TECHNOLOGY	Hours/Week: 5	
Core Course-5		Credits: 4	
Course Code 20PBCC22N		Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the students will be able to

CO1: understand how microbes are relevant in technological developments for industries related to food and fermentation and their various, metabolic energy yielding pathways. [K2]

CO2: develop knowledge about microbial metabolism, growth, energy generation, various fermentation pathways, energetic its role in science and industry today.[K3]

CO3: apply the knowledge of microbial biochemistry and fermentation technology Including areas such as energy metabolism, microbial biosynthesis and industrial production, purification of compounds and their application to research, development and societal needs. [K3]

CO4:analyze different fermentation techniques, bioreactor design, inoculum development for industrial fermentation, the use of microorganisms for the value-added products through fermentation processes, the production of secondary metabolites. [K4]

CO5: assess fermentation technology and requirements; production of commercially important microbial products and various metabolic activities in microorganisms. [K5]

Course Code (20PBCC22N)	PO1		PO2	PO3		PO4	PO5	PO6	PO7	PO8
	1a	1b	2	3a	3b	4	5	6	7	8
CO 1	H	H	M	M	H	M	M	M	M	M
CO 2	H	H	M	M	H	M	M	H	M	M
CO 3	H	H	H	M	H	H	H	H	M	H
CO 4	H	H	M	M	H	M	M	H	M	H
CO 5	H	H	M	M	H	M	M	H	M	H



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Semester II	MOLECULAR BIOLOGY AND GENETIC ENGINEERING	Hours/Week: 5	
Core Course- 6		Credits: 4	
Course Code 20PBCC23		Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the studs will be able to

CO1: understand the principles and techniques leads to comprehensive analysis and practices in Molecular Biotechnology. [K2]

CO2: apply the synthetic information from a wide variety of sources to understand the key principles of molecular biology and Genetic Engineering. [K3]

CO3: identify the various issues both independently and cooperatively for current and future research problems in molecular and advanced biotechnology. [K3]

CO4: analyze the various applications of rDNA technology in evolving plants for resistance to pest and disease, tolerance to herbicides and abiotic factors. [K4]

CO5: evaluate the steps of the synthesis of novel bio products, development of research aptitude and technical skills. [K5]

Course Code 20PBCC23	PO1		PO2	PO3		PO4	PO5	PO6	PO7	PO8
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO 1	M	M	M	L	L	L	-	-	-	-
CO 2	M	M	L	M	M	M	M	-	-	-
CO 3	H	H	H	H	H	H	M	-	-	-
CO 4	H	H	H	H	M	M	M	M	M	-
CO 5	H	H	M	H	M	H	H	H	M	M



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Semester II	MOLECULAR BIOLOGY AND GENETIC ENGINEERING	Hours/Week: 5	
Core Course- 6		Credits: 4	
Course Code 20PBCC23N		Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the studs will be able to

CO1: understand the principles and techniques leads to comprehensive analysis and practices in Molecular Biotechnology. [K2]

CO2: apply the synthetic information from a wide variety of sources to understand the key principles of molecular biology and Genetic Engineering. [K3]

CO3: identify the various issues both independently and cooperatively for current and future research problems in molecular and advanced biotechnology. [K3]

CO4: analyze the various applications of rDNA technology in evolving plants for resistance to pest and disease, tolerance to herbicides and abiotic factors. [K4]

CO5: create and explain the steps involved in the synthesis of novel bio products, development of research aptitude and technical skills. [K5]

Course Code (20PBCC23N)	PO1		PO2	PO3		PO4	PO5	PO6	PO7	PO8
	1a	1b	2	3a	3b	4	5	6	7	8
CO 1	H	H	H	M	M	H	M	M	L	M
CO 2	H	M	M	H	M	H	M	H	M	M
CO 3	H	H	H	H	H	H	M	H	H	H
CO 4	H	H	H	H	M	M	M	H	H	M
CO 5	H	H	M	H	M	H	H	H	H	M



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Semester: II	MICROBIOLOGY AND MOLECULAR BIOLOGY TECHNIQUES LAB	Hours/Week: 6	
Core Practical-2		Credits: 3	
Course Code 20PBCC21P		Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the students will be able to

CO1 : apply the principles and methodologies of microbial cell culture, characterization of microbes ,electrophoresis , DNA isolation from various cells such as bacterial cells and animal tissues. [K3]

CO2: outline the flow charts for microbes characterization, electrophoresis, DNA isolation from various cells [K3]

CO3 : observe and interpret the results of microbiology and molecular biology experiments using the standard methods and techniques and complete the record work. [K3]

CO4: Comment on the microbial cell culture, characterization of microbes , electrophoresis and DNA isolation from various cells. [K4]

CO5 : assess the modifications in the use of reagents, in characterizing microbes , in electrophoresis and DNA isolation. [K5]

Course Code 20PBCC21P	PO1		PO2	PO3		PO4	PO5	PO6	PO7	PO8
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	M	M	M	M	M	M	M	-	M	M
CO 2	H	H	M	M	M	M	M	-	M	H
CO 3	H	H	H	H	H	H	H	L	M	H
CO 4	H	H	H	H	H	H	H	L	M	H
CO 5	H	H	H	H	H	H	H	M	M	H



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Semester II	BIOINFORMATICS LAB	Hours/Week: 4	
Core practical-3		Credits: 2	
Course Code 20PBCC22P		Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the students will be able to

CO1: write the protocols for sequence retrieval from different Biological databases. [K3]

CO2: construct the methodologies for accessing proteomic tools and DNA or protein sequence similarity search using BLAST and visualizing protein structure. [K3]

CO3: interpret the results of retrieved and aligned sequences from different primary databases, structural databases, multiple sequence alignment, proteomic tools and complete the record work notebook. [K3]

CO4: assess the basic informatics tools to extract or retrieve information from Biological databases, molecular visualization tools and its applications. [K4]

CO5: build homology model for unknown protein sequence and predict the structure. [K5]

Course Code 20PBCC22P	PO1		PO2	PO3		PO4	PO5	PO6	PO7	PO8
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO 1	H	M	M	M	M	M	M	-	-	L
CO 2	H	H	M	M	M	M	M	-	-	L
CO 3	H	H	M	H	H	H	H	H	H	H
CO 4	H	H	M	H	H	H	H	H	H	H
CO 5	H	H	M	H	H	H	H	H	H	H



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Semester II	PLANT BIOCHEMISTRY	Hours/Week: 5	
DSEC-2		Credits: 4	
Course Code 20PBCE21		Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the students will be able to

CO1: summarize plant tissue culture, organelles of plant cell and also biochemistry of photosynthetic process and its relation to man and its environment. [K2]

CO2: interpret the role of nutrients and secondary metabolites in plants. [K3]

CO3: sketch the effect of environmental factors, growth regulators and pathogens in plant physiology. [K3]

CO4: analyze the biochemical pathways involved in the synthesis, transport, growth, maturation and disease resistant mechanisms in plants. [K4]

CO5: evaluate the transport mechanism, tissue culture technique and industrial applications of secondary metabolites in plants. [K5]

Course Code 20PBCE21	PO1		PO2	PO3		PO4	PO5	PO6	PO7	PO8
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO 1	H	H	H	M	M	H	M	M	M	H
CO 2	H	M	M	M	M	H	M	M	-	-
CO 3	H	H	M	M	M	M	M	M	-	L
CO 4	H	H	M	H	M	M	M	M	-	-
CO 5	H	H	M	H	H	H	H	M	H	M



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VIRUDHUNAGAR - 626 001

Semester II	PLANT BIOCHEMISTRY	Hours/Week: 5	
DSEC-2		Credits: 4	
Course Code 20PBCE21N		Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the students will be able to

CO1: summarize plant tissue culture, organelles of plant cell and also biochemistry of

Photosynthetic process and its relation to man and its environment. [K2]

CO2: interpret the role of nutrients and secondary metabolites in plants. [K3]

CO3: sketch the effect of environmental factors, growth regulators and pathogens in plant physiology. [K3]

CO4: analyze the biochemical pathways involved in the synthesis, transport, growth, maturation and disease resistant mechanisms in plants. [K4]

CO5: evaluate the transport mechanism, tissue culture technique and industrial applications of secondary metabolites in plants. [K5]

Course Code (20PBCE21N)	PO1		PO2	PO3		PO4	PO5	PO6	PO7	PO8
	1a	1b	2	3a	3b	4	5	6	7	8
CO 1	H	H	M	M	M	H	M	M	M	L
CO 2	H	M	M	M	M	H	M	M	L	L
CO 3	H	H	M	M	M	M	M	M	L	L
CO 4	H	H	M	H	M	M	M	M	M	L
CO 5	H	H	M	H	H	H	H	M	H	M



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VIRUDHUNAGAR - 626 001

Semester II	BIOINFORMATICS AND NANOTECHNOLOGY	Hours/Week: 5	
DSEC- 2		Credits: 4	
Course Code 20PBCE22		Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the students will be able to

CO1: understand the basic bioinformatics techniques and synthesis, applications of nanomaterials used in biological research. [K2]

CO2: apply sequence alignment methods for sequence similarity search, visualization tools in biological data and different types of nanomaterials, applications of Nanotechnology in Biomedical and Pharmaceutical Industries. [K3]

CO3: analyze the different types of nano materials and application of Nanotechnology in Biomedical and Pharmaceutical Industries and different databases, tools used in biological analysis. [K3]

CO4: examine the development, ELSI of Genome projects, challenges, scope and Application of bioinformatics, importance of scoring matrix, gap penalty in sequence alignment, properties of nanomaterials, different types of nanoparticle synthesis methods and its advantage, disadvantage. [K4]

CO5: evaluate sequence analysis using tools in biological systems, important contributions in bioinformatics, goals, strategies of human genome project, role of nanotechnology in biological research and industries. [K5]

Course Code 20PBCE22	PO1		PO2	PO3		PO4	PO5	PO6	PO7	PO8
	PSO 1a	PSO1b	PSO2	PSO3a	PSO 3b	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO 1	H	H	M	L	L	L	M	M	-	-
CO 2	H	M	M	L	L	L	M	M	-	-
CO 3	H	H	M	H	M	M	M	M	-	M
CO 4	H	H	M	H	M	M	M	M	-	M
CO 5	H	H	M	H	M	M	M	M	-	M



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VIRUDHUNAGAR - 626 001

Semester II	MOLECULAR MECHANISM OF INFECTIOUS DISEASES	Hours/Week: 5	
DSEC- 2		Credits: 4	
Course Code 20PBCE23		Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the students will be able to

CO1: demonstrate the mechanism of disease cause, transmission, detection, treatment and prevention. [K2]

CO2: apply the mechanism behind various diseases in diagnosis and research for treatment Interventions. [K3]

CO3: identify the reason behind the disease cause, transmission and the response towards Treatment. [K3]

CO4: analyze the existing or emerging infection, drug resistance mechanisms in order to develop new tools for their management. [K4]

CO5: interpret the research findings pertaining to transmission, detection, treatment and prevention of diseases. [K5]

Course Code 20PBCE23	PO1		PO2	PO3		PO4	PO5	PO6	PO7	PO8
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO 1	M	M	H	M	M	M	H	-	-	-
CO 2	H	H	H	H	H	M	H	-	L	H
CO 3	H	H	H	H	H	M	H	M	L	H
CO 4	H	H	H	H	H	H	H	M	M	H
CO 5	H	H	H	H	H	H	H	M	M	H



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VIRUDHUNAGAR - 626 001

Semester III	IMMUNO CHEMISTRY	Hours/Week: 6	
Core Course-7		Credits: 5	
Course Code 20PBCC31		Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the students will be able to·

CO1: understand the structure and function of the major lymphoid systems, including the molecular, biochemical and cellular mechanisms for maintaining homeostasis and basic defense mechanism. [K2]

CO2: apply the immunoglobulin genes of the immune system, antigen antibody interaction and their applications in various immuno assays. [K3]

CO3: develop the knowledge of each lymphoid system 's contribution to the functioning of health and diseases. [K3]

CO4: analyze the mechanism of cellular and molecular basis of immune responsiveness and its therapeutic implications in human system. [K4]

CO5: evaluate the state-of-the-art experimental methods and Technologies in disease diagnosis and clinical research. [K5]

Course Code 20PBCC31	PO1		PO2	PO3		PO4	PO5	PO6	PO7	PO8
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	H	H	H	-	-	M	M	M	M	-
CO2	H	M	H	M	H	M	M	M	-	-
CO3	H	H	M	H	M	M	M	-	-	M
CO4	H	H	H	H	M	M	H	-	M	-
CO5	M	H	H	H	M	H	H	M	-	-



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VIRUDHUNAGAR - 626 001

Semester III	BIOSTATISTICS	Hours/Week: 6	
Core Course-8		Credits: 5	
Course Code 20PBCC32		Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the students will be able to

CO1: demonstrate the necessary skill sets to interpret statistical data. [K2]

CO2: utilize effective statistical methods for data analysis and interpretation. [K3]

CO3: discover the statistical methodology for the evaluation during health and disease conditions. [K3]

CO4: assess the general theory of data analysis and specific concepts as they apply to confidence intervals, effect sizes and hypothesis testing. [K4]

CO5: hypothesize study designs for analyzing data based on research problems. [K5]

Course Code 20PBCC32	PO1		PO2	PO3		PO4	PO5	PO6	PO7	PO8
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	H	H	M	H	L	H	M	-	-	-
CO2	H	H	H	H	M	H	M	L	-	M
CO3	H	H	H	H	M	H	M	M	M	M
CO4	H	H	H	H	M	H	H	M	M	H
CO5	H	H	H	M	H	H	H	H	M	H



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VIRUDHUNAGAR - 626 001

Semester III	BIOSTATISTICS	Hours/Week: 6	
Core Course-8		Credits: 5	
Course Code		Internal	External
20PBCC32N		40	60

COURSE OUTCOMES

On completion of the course, the students will be able to

CO1 : demonstrate the necessary skill sets to interpret statistical data. [K2]

CO2: utilize effective statistical methods for data analysis and interpretation. [K3]

CO3: discover the statistical methodology for the evaluation during health and disease conditions. [K3]

CO4: assess the general theory of data analysis and specific concepts as they apply to confidence intervals, effect sizes and hypothesis testing. [K4]

CO5: evaluate various statistical methods for data analysis . [K5]

Course Code 20PBCC32N	PO1		PO 2	PO3		PO4	PO5	PO 6	PO7	PO8
	1a	1b	2	3a	3b	4	5	6	7	8
CO1	H	H	H	H	H	M	M	H	M	M
CO 2	H	H	M	H	H	H	H	H	M	M
CO 3	M	M	M	M	H	H	H	H	H	H
CO 4	H	H	M	H	H	H	H	H	M	M
CO 5	H	H	M	H	H	H	H	H	H	H



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VIRUDHUNAGAR - 626 001

Semester III	EUKARYOTIC GENE EXPRESSION	Hours/Week: 6	
Core Course-9		Credits: 5	
Course Code		Internal	External
20PBCC33N		40	60

COURSE OUTCOMES

On completion of the course, the students will be able to

CO1: demonstrate the cell division process, stem cell types, genome organization and molecular mechanisms in gene expression and regulation in eukaryotes. [K2]

CO2: apply the properties of stem cells, gene function and their modulation in various aspects of normal and abnormal signaling pathways. [K3]

CO3: apply the perceived knowledge about gene and protein expression on various signaling mechanism and its deregulation in oncogenesis process. [K3]

CO4 : analyse and discuss research articles in the area of normal and abnormal gene regulation and protein expression, stem cells & cell cycle process. [K4]

CO5 : evaluate the information relating to eukaryotic gene expression, cell division, stem cells, cell signaling and cancer. [K5]

Course Code 20PBCC33N	PO1		PO2	PO3		PO4	PO5	PO6	PO7	PO 8
	1a	1b	2	3a	3b	4	5	6	7	8
CO1	M	M	H	H	H	H	M	H	M	M
CO 2	H	H	M	H	H	H	H	H	M	M
CO 3	H	M	H	M	H	H	H	H	M	M
CO 4	H	H	M	H	H	H	H	H	M	M
CO 5	H	H	M	H	H	H	H	H	M	M



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VIRUDHUNAGAR - 626 001

Semester III	IMMUNOLOGY AND ADVANCED BIOCHEMISTRY LAB	Hours/Week: 6	
Core Practical-4		Credits: 3	
Course Code 20PBCC31P		Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the students will be able to

CO1: apply the principles of western blot, immunochemical techniques, cloning and restriction digestion. [K3]

CO2: sketch the schema chart for the techniques involved in immunology and advanced biochemistry. [K3]

CO3: observe and interpret the results of molecular biology and immunological Techniques and complete the record work. [K3]

CO4: comment and compare the antigen-antibody interaction methods and gene cloning technique. [K4]

CO5: Assess gene cloning with and without restriction endonucleases, ligase, plasmid and judge the antigen-antibody interaction. [K5]

Course Code 20PBCC31P	PO1		PO2	PO3		PO4	PO5	PO6	PO7	PO8
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	H	H	M	H	H	H	H	M	H	M
CO2	H	H	M	H	H	H	H	M	H	M
CO3	H	H	M	H	H	H	H	M	H	M
CO4	H	H	M	H	H	H	H	M	H	M
CO5	H	H	M	H	H	H	M	M	H	M



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VIRUDHUNAGAR - 626 001

Semester III	CLINICAL BIOCHEMISTRY (BASICS)	Hours/Week: 5	
NMEC		Credits: 4	
Course Code		Internal	External
20PBCN31		40	60

COURSE OUTCOMES

On completion of the course, the students will be able to

CO1: recall about the normal constituents of urine, blood and their significance in maintaining good health. [K1]

CO2: understand the mechanisms causation of diseases of liver, kidney and of Cancer will be explained. [K2]

CO3: find normal and abnormal metabolic functions, the impact of disorders on metabolic processes, an overall picture about the molecular basis of diseases and novel strategies to prevent diseases. [K3]

CO4: apply the principles and techniques of biochemical instruments and analyze the biochemical constituent and diagnose the disease which helpful the students for further employment in basic research and the health professions. [K4]

CO5: evaluate the variations in the levels of biochemical constituents and their relationship with various diseases. [K5]

Course Code 20PBCN31	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H	M	H	H	M	M	-	-
CO2	H	M	H	H	M	M	-	-
CO3	H	M	H	H	M	M	-	-
CO4	H	M	H	H	M	M	-	M
CO5	H	M	H	H	M	M	-	M



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VIRUDHUNAGAR - 626 001

Semester III	PRACTICE FOR CSIR / NET – GENERAL PAPER	Hours/Week:1	
Course Code		Credits: 1	
20PGOL32		Internal 100	External -

COURSE OUTCOMES

On completion of the course, the students will be able to

- CO1 : explain various concepts related to numbers, quantitative comparison, monetary problems and logical reasoning. [K2]
- CO2 : apply the analytical skills and logical reasoning in solving problems related to competitive examinations. [K3]
- CO3 : solve typical problems, geometrical type problems, daily life problems in an effective manner. [K3]
- CO4 : analyze the techniques used in solving complicated real life problems. [K4]
- CO5 : interpret the data using logical reasoning and observational ability. [K5]

Course code 20PGOL32	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8
CO1	H	H	M	M	-	M	-	-
CO2	H	H	H	H	-	M	-	-
CO3	H	H	H	H	-	H	-	-
CO4	H	M	H	H	-	H	-	-
CO5	H	M	H	H	-	H	-	-



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VIRUDHUNAGAR - 626 001

Semester IV	ENVIRONMENTAL BIOCHEMISTRY	Hours/Week: 6	
Core Course-10		Credits: 5	
Course Code 20PBCC41		Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the students will be able to

CO1: understand the key concepts and complex relationship between biotic and abiotic components of ecosystem. [K2]

CO2: apply the ecological knowledge and its consequences in basis of regional and global environmental issues.[K3]

CO3: identify the current environmental problems (Air, water and soil pollution), chemical pollutants and its impacts on Biosphere. [K3]

CO4: analyze the strategies, technologies and methods for assessment of environmental system and discuss some mitigation strategies like Biodegradation and Bioremediation. [K4]

CO5: evaluate basic chemical concepts to analyze the Bio chemical processes involved in different environmental problem

Course Code 20PBCC41	PO1		PO2	PO3		PO4	PO5	PO6	PO7	PO8
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	M	H	M	M	-	M	M	-	-	M
CO2	H	H	M	H	H	M	M	-	M	-
CO3	H	H	H	H	M	H	M	-	M	M
CO4	H	H	H	H	H	M	H	-	-	-
CO5	H	H	M	H	M	H	H	-	M	M



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VIRUDHUNAGAR - 626 001

Semester IV	CLINICAL BIOCHEMISTRY	Hours/Week: 6	
Core Course-11		Credits: 5	
Course Code		Internal	External
20PBCC42		40	60

COURSE OUTCOMES

On completion of the course, the students will be able to

CO1: discuss the diagnostic importance of gastric, renal function, immunological, prenatal test and metabolic functions. [K2]

CO2: perform clinical investigation on blood, urine and other body fluids for diagnostic purpose. [K3]

CO3. determine the abnormalities of digestive, reproductive, kidney system and inborn errors of metabolism. [K3]

CO4: interpret the laboratory results with respect to the biological reference ranges and infer the results critically in light of the clinical picture. [K4]

CO5: assess the role of clinical biochemistry monitoring the biochemical basis of diseases and novel strategies to prevent the diseases [K5]

Course Code 20PBCC42	PO1		PO2	PO3		PO4	PO5	PO6	PO7	PO8
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	H	H	H	M	M	M	M	M	M	-
CO2	H	H	M	M	M	M	M	M	M	-
CO3	H	H	H	M	H	M	-	M	M	M
CO4	H	H	M	M	H	M	M	M	M	H
CO5	H	H	H	M	H	M	H	M	M	H



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Semester IV	CLINICAL BIOCHEMISTRY	Hours/Week: 6	
Core Course-11		Credits: 5	
Course Code 20PBCC42N		Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the students will be able to

CO1: discuss the diagnostic importance of gastric, renal function, immunological, prenatal test and metabolic functions. [K2]

CO2: perform clinical investigation on blood, urine and other body fluids for diagnostic purpose [K3]

CO3. determine the abnormalities of digestive, reproductive, kidney system and inborn errors of metabolism. [K3]

CO4: interpret the laboratory results with respect to the biological reference ranges and infer the results critically in light of the clinical picture. [K4]

CO5: assess the role of clinical biochemistry monitoring the biochemical basis of diseases and novel strategies to prevent the diseases [K5]

Course Code 20PBCC42N	PO1		PO2	PO3		PO4	PO5	PO6	PO7	PO8
	PSO 1a	PSO 1b	PSO 2	PSO 3a	PSO 3b	PSO 4	PSO 5	PSO 6	PSO 7	PSO 8
CO1	H	H	H	M	M	M	M	M	M	-
CO2	H	H	M	M	M	M	M	M	M	-
CO3	H	H	H	M	H	M	-	M	M	M
CO4	H	H	M	M	H	M	M	M	M	H
CO5	H	H	H	M	H	M	H	M	M	H



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VIRUDHUNAGAR - 626 001

Semester IV	DEVELOPMENTAL BIOLOGY AND GENETICS	Hours/Week: 6	
Core Course-12		Credits: 5	
Course Code 20PBCC43N		Internal 40	External 60

COURSE OUTCOMES

On completion of the course, the students will be able to

CO1: summarize the principles and experimental approaches of developmental biology and genetics. [K2]

CO2: apply the genetics principle, molecular events of embryogenesis in understanding human development and associated defects. [K3]

CO3 : apply molecular laboratory techniques used routinely in embryo development, forensic analysis including sex typing, DNA profiling, Single Nucleotide Polymorphism detection and in DNA sequencing. [K3]

CO4: examine the early development process, principles of genetics to produce a family pedigree from a family history, and to distinguish patterns of inheritance for genetic disorders linked to autosomes or sex chromosomes. [K4]

CO5 : evaluate the concept of genetics, human genome project, genetic counselling, fertilization process and embryo development, genetic markers . [K5]

Course Code 20PBCC43N	PO1		PO2	PO 3		PO 4	PO 5	PO 6	PO 7	PO 8
	1a	1b	2	3a	3b	4	5	6	7	8
CO1	M	M	H	H	H	H	M	H	M	M
CO 2	H	H	M	H	H	H	H	H	M	M
CO 3	M	M	M	M	H	H	H	H	M	H
CO 4	H	H	H	H	H	H	H	H	H	H
CO 5	H	H	M	H	H	H	H	H	H	H

