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UNIVERSITY
NAAC ACCREDITED
THANJAVUR- 613 403 - TAMIL NADU

2022- 2023

DEPARTMENT OF BIOCHEMISTRY

B.SC., BIOCHEMISTRY

POs and COs Mapping

Sem	Course Code	Title of the Course	COs	POS						
				PO1	PO2	PO3	PO4	PO5	PO6	PO7
SEM I	22110AEC11	Tamil I	COI Learn the changes occurred in literature since classical period.		3					
			CO2 Make use of vocabulary systematically		3					
			CO3 Understand how to lead one's life realizing the modernity and its environment/atmosphere.		3					
	22111AEC11	Advanced English-I	CO1 Develop vocabulary		3					
			CO2 Read and comprehend literature		3					
			CO3 Read and comprehend literature		3					
	22111AEC12	English-I	CO1 Appreciate poetry and prose		3					
			CO2 Familiarize students with fiction.		3					
			CO3 Read and comprehend literature		3					
	22115AEC13	Biomolecules	CO1 Recognize water as a universal solvent and elixir of life by knowing its importance					3		
			CO2 Identify the properties and classification of carbohydrates					3		
			CO3 Recall the role of various lipids in biomembrane including signal transduction					3		

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			CO4 Categories the amino acids and know their properties					3		
			CO5 List the functions and deficiency disease of fat and water soluble vitamins					3		
			CO6 Differentiate the structure, properties and functions of DNA and RNA					3		
	22115AEC14L	**Biomolecules Lab-I**	CO1 Trained on preparation of reagents and solution	3					3	
			CO2 Able to analyze biomolecules and vitamins qualitatively and quantitatively	3					3	
			CO3 To identify the structure of biomolecules	3					3	
			CO4 Handle the instruments associated with the practical	3					3	
			CO5 Gain knowledge on lab safety	3					3	
			CO5 Apply quantitative reasoning skills to matter and energy, and physical or chemical changes that occur.	3					3	
			CO6 Use accepted models to describe the reactions between acids and basis and basic equilibrium concepts. Demonstrate competence in collecting and interpreting data in the laboratory.	3					3	
	22114AEC15	Chemistry-I	CO1:Apply quantitative reasoning skills to matter and energy, and physical or chemical changes that occur.	3						3
			CO2: Use accepted models to describe the reactions between acids and basis and basic equilibrium concepts.	3						3
			CO3 Demonstrate competence in collecting and interpreting data in the laboratory.	3						3

	22114AEC16L	**Volumetric Analysis Lab**	CO1 To understand the apparatus used in volumetric analysis and correct volumetric analysis.	3					3	
			CO2 To know Good laboratory practice	3					3	
	221INDCONS	**Indian Constitution**	CO1 Democratic values and citizenship Training are gained.			3		3		
			CO2 Awareness on Fundamental Rights are established.			3		3		
			CO3 Learn the functions of union and State Governments			3		3		
			CO4Learn the power and functions of the Judiciary			3		3		
			CO5Appreciate of Democratic Parliamentary Rule			3		3		
SEM II	**22110AEC21**	**Tamil II**	CO1 Know what devotion really is.		3					
			CO2 Know the fruitfulness obtained through devotion.		3					
			CO3 Perceive the progress achieved in the society through devotion.		3					
	22111AEC21	**Advanced English-II**	CO1 Develop technological skill.		3					
			CO2 Able to write in a variety of formats		3					
			CO3 Read biographies and develop personality		3					
	22111AEC22	**English-II**	CO1 Appreciate different forms of literature		3					
			CO2 Acquire language skills through literature		3					

			CO3 Broadens the horizon of knowledge		3					
	22115AEC23	Biochemical Techniques	CO1 The units of this paper are crucial for implementation of research ideas at molecular level.	3			3		3	
			CO2 This skill based course will teach the students the various instrumentations that are used in the analytical laboratories.	3			3		3	
			CO3 This course covers both fundamental and applications of the instruments that are routinely used for the characterization of biomolecules	3			3		3	
			CO4 It trains the students in adopting various techniques in biological research.	3			3		3	
			CO5 To learn various techniques and acquire the skills to use appropriate methods	3			3		3	
			CO6 To acquire the good laboratory practices	3			3		3	
			CO7 This significantly enhances the employability of the candidates in Biotechnological, Pharmaceutical Industries and Analytical Laboratories and research institutes.	3			3		3	
	22115AEC24L	Biochemical Techniques Lab-I	CO1 Gain knowledge on lab safety				3		3	
			CO2 Trained on preparation of reagents and solution				3		3	
			CO3 Students will understand the concept of spectrophotometer				3		3	
			CO4 They will be able to assess the suitability of chromatographic techniques for solving specific bio- analytical problems and critically				3		3	

			apply the knowledge for biomolecules separation							
			CO5 Able to analyze biomolecules qualitatively and quantitatively				3		3	
			CO6 Handle the instruments associated with the practical				3		3	
	22114AEC25	**Chemistry II**	CO1 Apply quantitative reasoning skills to matter and energy, and physical or Chemical changes that occur.	3						3
			CO2 Use accepted models to describe the reactions between acids and basis and basic equilibrium concepts.	3						3
			CO3 Demonstrate competence in collecting and interpreting data in the laboratory	3						3
	22114AEC26L	**Organic Analysis Lab**	CO1 Apply significant figures rules in all calculations providing the correct number of significant figures and units	3					3	
			CO2 convert between different units using conversion factors and dimensional analysis	3					3	
			CO3 Name elements, provide their symbols and determine the number of protons, neutrons, electrons and nuclei in elements and compounds	3					3	
			CO4 Calculate percent composition given a molecular formula and molecular formula given the percent composition	3					3	
			CO5 Name salt, acids, bases and covalent compounds and provide formulas for these given a molecular formula.	3					3	
			CO6 Explain the difference between solubility and dissociation in water and apply this knowledge to acids, bases and salts.	3					3	

			CO7 Identify weak and strong acids and bases and insoluble compounds using dissociation and solubility rules.	3					3	
			CO8 Construct molecular, total and net ionic equations for double displacement reactions	3					3	
	22111RLC27	Research Led seminar	CO1 Exposure to various research domains	3			3		3	
			CO2 Acquaintance with languages of research	3			3		3	
			CO3 Development of research aptitude	3			3		3	
SEM III	22110AEC31	Tamil III	CO1 Achieve one's goal by following the ancestral path		3					
			CO2 Learn to lead life of perfection by realizing the uncertainty in the life		3					
			CO3 Attain happiness through honesty		3					
	22111AEC31	Advanced English-III	CO1 Understand phonetics.		3					
			CO2 Develop writing skill		3					
			CO3 Able to develop creative writing		3					
	22111AEC32	English-III	CO1 Enable to appreciate different types of prose		3					
			CO2 Develop the conversational skills through one-act plays		3					
			CO3 Enhance the skill of making grammatically correct sentences.		3					
	22115AEC33	Cell Biology and Genetics	CO1 Differentiate the prokaryotic and eukaryotic cell	3		3				
			CO2 Understand the principle behind studying the cell morphology using various microscope	3		3				
			CO3 Identify the structure and functions of each organelle in cell	3		3				
			CO4 Recognise the mechanism behind the protein sorting and transport to their	3		3				

			destinations like lysosome, mitochondria and chloroplast							
			CO5 Maintenance of cytoskeleton structure and function of micro, macro and intermediary filaments	3		3				
			CO6 Identify the proteins involved in cell interaction	3		3				
			CO7 Enumerate the phases of cell cycle, events in cell division and mechanism of cell death.	3		3				
	22115AEC34L	**Cell Biology and Genetics Lab**	CO1 By the end of the course, students can be able to demonstrate the importance of the chromatography and their wide applications	3		2	3	3	3	
			CO2 Understand and apply the principles and techniques of separation of pigments, amino acid and protein which prepares students for further education and/or employment in teaching, basic research, or the health professions.	3		2	3	3	3	
			CO3 would be able to separate the plant pigments, identify and distinguish different amino acid, protein, lipids	3		2	3	3	3	
			CO4 would be able to identify and outline the structure of an cell membrane at different magnification	3		2	3	3	3	
			CO5 It trains the students in adopting various techniques in biological research.	3		2	3	3	3	
	22120AEC35	**Programming in C**	CO1 Understanding a functional hierarchical code organization.	3						
			CO2 Ability to define and manage data structures based on problem subject domain.	3						

			CO3 Understanding a concept of object thinking within the framework of functional model.	3						
			CO4 Understanding a concept of functional hierarchical code organization.	3						
			CO5 Understand operators, expressions and preprocessors.	3						
			CO6 To learn the concept of programming	3						
	22120AEC36L	**Programming in C Lab**	CO1 : To know the proper lines of C++, Encapsulation, Inheritance and Polymorphism.	3						
			CO2 : To explain the various data types, operations and functions of C++.	3						
			CO3 : To know the concept of constructors and destructors.	3						
			CO4 : To explain the concept of inheritances, types of inheritance and polymorphism, virtual function Functions.	3						
			CO5 : To explain the types of streams, format and format of input and output operations:	3						
			C06:To Known the procedural and object oriented paradigmwith concepts of streams, classes, functions, data and objects.	3						
	22117RMC37	**Research Methodology**	CO1 Understanding research questions and tools				3	3	3	
			CO2 Experience in scientific writings				3	3	3	
			CO3 Practice in various aspects of scientific publications				3	3	3	
			CO4 Inculcation of research ethics				3	3	3	
	22120SEC01AL	**Package lab-III**	CO1 Indicate the names and functions of the **Excel** interface components.	3						

			CO2 Enter and edit data.	3						
			CO3 Format data and cells.	3						
			CO4 Construct formulas, including the use of built-in functions, and relative and absolute references.	3						
			CO5 Create and modify charts.	3						
			CO6 Preview and print worksheets.	3						
	22160SEC03B	**Soft skill – III**	Learn interpersonal relations and social responsibilities.		3					
	22111SEC03L	**Communicative english Lab-III**	CO1 Learn grammar.			3				
			CO2 Enhance their fluency in English			3				
			CO3 Develop speaking and writing skills			3				
			CO4 Develop individual perspectives that demonstrate critical thinking skills			3				
IV	**22110AEC41**	**Tamil-IV**	CO1 Realize how the ancient people changed their life style according to the ages			3				
			CO2 Learn how to change one's lifestyle according to the needs of the future			3				
			CO3 Accept the modern trend and its uses			3				
	22111AEC41	**Advanced english-IV**	CO1 Develop writing skill.			3				
			CO2 Comprehend and describe poems			3				
			CO3 Learn interviewing skills			3				
	22111AEC42	**English-IV**	CO1 Improve their ability to read and understand them			3				
			CO2 Know the genius of Shakespeare			3				
			CO3 Express in writing their views.			3				

	22115AEC43	Human Physiology	CO1 The purpose of this course is to promote knowledge in the integration of theories, methods and research in human physiology.	3		3		3	3	
			CO2 Understand Anatomy & Physiology of various systems in Human which gives a clear picture about various systems and their respective disorders.	3		3		3	3	
			CO3 Acquire good knowledge on Nervous & Muscular systems	3		3		3	3	
			CO4 A Fair knowledge on Human Reproductive Biology provides information with the system, hormones involved, disorders associated with them in, and treatments in both genders respectively.	3		3		3	3	
			CO5 Understand "Anatomy & Physiology of various Systems such as Nervous system, Muscular system, Reproductive system, Liver.	3		3		3	3	
			CO6 It gives and exposure about human anatomy and physiology.	3		3		3	3	
	22115AEC44L	Biochemical Techniques Lab-II	CO1 This skill based course will teach the students the various instrumentations that are used in the analytical laboratories.							
			CO2 This course covers both fundamental and applications of the instruments that are routinely used for the characterization of biomolecules				3		3	
			CO3 Perform skillful specimen collection, identification and processing				3		3	
			CO4 Utilize communication skills necessary for working in the health care setting				3		3	

			CO5 Exhibit professionalism, initiative, positive interpersonal skills, teamwork, respect and integrity.				3		3	
			CO6 By the end of the course, students can be able to demonstrate the importance of the blood, buffer and their wide applications				3		3	
	22120AEC45	Fundamentals of Computing	CO1 Bridge the fundamental concepts of computers with the present level of knowledge of the students.	3						
			CO2 Familiarise operating systems, programming languages, peripheral devices, networking, multimedia and internet	3						
			CO3 Understand binary, hexadecimal and octal number systems and their arithmetic.	3						
			CO4 Understand how logic circuits and Boolean algebra forms as the basics of digital computer.	3						
			CO5 Demonstrate the building up of Sequential and combinational logic from basic gates.	3						
	22120AEC46L	Web Design Lab	CO 1: Acquire knowledge about functionalities of World Wide Web and E-Mail.	3						
			CO 2 :Apply a structured approach to identifying needs, interests, and functionality of a website.	3						
			CO 3: Write well-structured, easily maintained, standards-compliant, accessible HTML code,	3						
			Write CSS code to present html pages in different ways.	3						

			CO 5:ExploreMarkup languages features and create interactive web pages using them	3						
			CO 6: Design dynamic websites that meet specified needs and interests.	3						
			CO 7: Learn and design Client side validation using scripting languages	3						
			CO 8 :Acquire knowledge about Scripting libraries	3						
	221ENVTSTU	**Environmental Studies**	CO1 to acquire awareness about immediate/wider surroundings through lived experiences on various themes related to daily life for example Family, Plants, Animals, Food, Water, Travel, and Shelter etc.	3				2		3
			CO2 To learn natural curiosity and creativity for the immediate surroundings.	3				2		3
			CO3 To develop various processes/skills e.g. observation, discussion, explanation, experimentation, logical reasoning, through interaction with immediate surroundings.	3				2		3
			CO4 To develop sensitivity for the natural, physical and human resources in the immediate environment.	3				2		3
			CO5 point out/ raise issues related to equality, justice and respect for human dignity and rights.	3				2		3
			CO6 To Learn about environmental pollution.	3				2		3
			CO7 Familiarize with the social issues and the environment	3				2		3
SEM V	**22115AEC51**	**Enzymes**	CO1. Understand the basic concepts on enzymes							

			CO2 Relate the initial velocity and substrate concentration of enzymes and be able to understand the kinetics of inhibition reactions	3		3		3	3	
			CO3. Able to understand the regulation pattern of various enzymes	3		3		3	3	
			CO4. Relate the regulation pattern of enzymes for its application in health and diseases	3		3		3	3	
			CO5. Understand the application of enzymes in Industrial and therapeutic.	3		3		3	3	
			CO 6 Exposure to the nature of non-protein enzymes such as ribozymes.	3		3		3	3	
	22115AEC52	**Bioenergetics and Metabolism**	CO1 To shed knowledge on generation and transformation of energy in metabolic pathways.	3		3		3	3	
			CO2 To know the various metabolic pathways associated with carbohydrate, lipid , protein and nucleic acid metabolism, their regulation and associated disorders.	3		3		3	3	
			CO3 To understand the inter relationship of carbohydrate, lipid , protein and nucleic acid metabolism and understand the importance of TCA cycle.	3		3		3	3	
			CO4 To aware about the Biological oxidation	3		3		3	3	
			CO5 Understanding the importance of high energy compounds, electron transport chain, synthesis of ATP under aerobic and anaerobic conditions.	3		3		3	3	
			CO6 Understand the anabolic and catabolic processes associated with amino acids and nucleic acids and their regukation.	3		3		3	3	

	22115AEC53	Immunology	CO1 The students may understand the immune system, its components and various techniques used in bio manipulation.	3		3		3	3	
			CO2 Describe surface membrane barriers and their protective functions.	3		3		3	3	
			CO3 Explain the importance of phagocytosis and natural killer cells in innate body defense.	3		3		3	3	
			CO4 Describe the roles of different types of T cells, B cells and APCs.	3		3		3	3	
			CO5 Compare and contrast the origin, maturation process, and general function of B and T lymphocytes.	3		3		3	3	
			CO6 Along with this the students will become aware about concept, synthesis and action mechanism of vaccines.	3		3		3	3	
	22115AEC54L	Food and enzyme Analysis Lab	CO1 To illustrate various aspects of food engineering.	3			3	3	3	
			CO2 To know the sources of enzymes and study the extraction and partial purification of enzyme.	3			3	3	3	
			CO3 To standardize the optimum pH, optimum substrate concentration required for the maximum activity of enzyme.	3			3	3	3	
			CO4 The students will be expertise in estimation of minerals in food.	3			3	3	3	
			CO5 To understand the optimum activity of enzyme.	3			3	3	3	
			CO6 Students will gain an understanding of buffers and their importance in the context of pH control.	3			3	3	3	

	22115AEC55L	Immunology Lab	CO1 This course has been designed to provide hands-on experience on the tools and techniques used in immunology.	3			3	3	3	
			CO2 The experiments have been designed in such a way that the student will have the opportunity to isolate a specific protein from a natural source, purify it and determine its activity	3			3	3	3	
			CO3 Besides, students will get an opportunity to learn diffusion and electrophoresis.	3			3	3	3	
			CO4 Basic understanding of Immunotechnology	3			3	3	3	
			CO5 Study the principle and applications of various immuno techniques ranging from precipitation and agglutination reactions.	3			3	3	3	
			CO6 To gain the experimental knowledge about ELISA, Radio immunoassay	3			3	3	3	
	22116DSC56A	Pharmaceutical Chemistry A	CO1 Students are able to explain biopharmaceutical, physiological, biochemical and cell biology-related aspects on the transport and metabolism of drugs in the gastrointestinal tract and in the liver.			3		3	3	3
			CO2 Students be able to explain mechanisms behind the transport of drug and metabolism and how drugs can interact with other drugs and food and methods to study these - having developed its ability to plan, compile, analyze and report experiment that has importance for biopharmaceutical issues -			3		3	3	3

			CO3 Students be able to account for regulatory requirements within the biopharmaceutical area			3		3	3	3
			CO4 Students be able to describe the role of bio pharmaceutics in drug development within the pharmaceutical industry			3		3	3	3
			CO5 To describe action of different drugs			3		3	3	3
			CO6 To analyze drugs to inhibit the particular enzymes and treatment of diseases			3		3	3	3
	22116DSC56B	**Basic Biotechnology**	CO1 To understand principles of animal culture, media preparation.	3				3	3	
			CO2 To explain basic principles of cloning.	3				3	3	
			CO3 To describe culture and clonal propagation of plants on a commercial scale.	3				3	3	
			CO4 To get insight in applications or recombinant DNA technology in agriculture, production of therapeutic proteins.	3				3	3	
			CO5 To describe commercial production of fuels, microbial enzymes.	3				3	3	
			CO6 To explain the microbial degradation of pesticides, Bioremediation& Biofertilizers	3				3	3	
	22117BRC57	**Participation in Bounded Research**	CO1 Hands on exposure to problem solving tools in contemporary research				3			
			CO2 Evolution of research intuitiveness and orientation				3			
			CO3 Familiarity with cutting edge research trends				3			
			CO2 Describe the various disorders			3	3		3	
			CO3 Understand and explain the acid-base and water-electrolyte balance in the body.			3	3		3	

			CO4 Understand the difference between plasma,serum,normal and abnormal constituents in various body fluids. Blood clotting mechanism and anticoagulants.			3	3		3	
			CO5 Explain the nature and function of various enzymes ,normal levels and elevated levels in various diseases.			3	3		3	
			CO6 Comprehend that blood is a universal fluid for carrying different minerals, nutrients, proteins etc to and from various tissues.			3	3		3	
			CO7 Learn that many diseases result from imbalance in certain enzymes and helps in diagnosis of liver, cardiac, gastrointestinal, kidney diseases.			3	3		3	
			CO8 describe the diagnostic significance of the main laboratory investigations know the problems related to the preparation of the patient, the collection and knowledge of the samples .			3	3		3	
	22115AEC62	**Molecular Biology**	CO1 Discuss the most significant discoveries and theories through the historical progress of biological scientific discoveries, and their impacts on the development of molecular biology.			3	3		3	
			CO2 Compare the structure of eukaryotic cells with the structure of simpler prokaryotic cells and with the structure of viruses			3	3		3	
			CO3 They will be familiarized with mechanism of action and resistance to antibiotics at molecular lev			3	3		3	

			CO4 They will be able to describe the mechanisms of protein transport to various sub cellular sites and process of protein degradation			3	3		3	
			CO5 Students will be able to describe how gene expression is regulated at the transcriptional and post-transcriptional level.			3	3		3	
			CO6 They will be able to read and understand scientific articles related to subject and gain a critical understanding of their contents. They will be able to give a spoken and written presentation of scientific topics and research results.			3	3		3	
			CO7 They will be familiarized with mechanism of action and resistance to antibiotics at molecular level			3	3		3	
			CO8 To understand molecular concept of DNA, RNA			3	3		3	
	22115AEC63L	**Hematology and clinical biochemistry Lab**	CO1 Explain the origin of blood cells and articulate the process of erythropoiesis and leukopoiesis as it relates to health and disease.	3			3		3	
			CO2 Discuss the coagulation process and its role in maintaining hemostasis.	3			3		3	
			CO3 Demonstrate current hematological procedures used to diagnose, monitor and evaluate disorders.	3			3		3	
			CO4 Demonstrate the basic principles of hematology and clinical biochemistry instrumentation	3			3		3	

			CO5 Describe and Identify inborn defects in metabolism and correlate them with deficiency of key metabolic markers in the clinical laboratory, their common methods of analysis, and their clinical significance.	3			3		3	
			CO6 Relate laboratory results to clinical diagnosis and relationship to heart, liver, kidney and pancreas function.	3			3		3	
	22115SEC64L	**Molecular Biology Lab**	CO1 Exhibit a knowledge base in genetics, cell and molecular biology.	3			3		3	
			CO2 Demonstrate the knowledge of common and advanced laboratory practices in cell and molecular biology.	3			3		3	
			CO3 It can explain the principles of separation of DNA.	3			3		3	
			CO4 To know the general safety routines for laboratory work in molecular biology.	3			3		3	
			CO5 To gain the knowledge about isolation of Plasmid DNA from E.coli	3			3		3	
			CO6 To understand purity determination by UV absorption	3			3		3	
	22115DSC65A	**Biochemistry of Plants and Microbes**	CO1 The students are able to perform plant phytochemical pigments	3			3		3	3
			CO2 to study about water microbiology.	3			3		3	3
			CO3 Prepare stained smears, culture micro-organisms, perform tests to identify bacteria and fungi, and to study food microbiology	3			3		3	3
	22115DSC65B	**Hospital Managements**	CO1 Understand the theories of management.	3				3	3	
			CO2 Understand the management process and integrated approach in management.	3				3	3	

			CO3 Manage service organizations by accepting the inbuilt challenges.	3				3	3	
			CO4 Manage hospitals by understanding the complexity, levels and role of hospital administrator.	3				3	3	
			CO5 Understand the current issues that have an implication in administration practice hospital administration	3				3	3	
	22117PRW67	**Project Work**	CO1 To outcome are the changes or result that the organization expects to be achieved the successful completion of the project	3			3		3	
			CO2 The outcomes could be qualitative and qualitative or both	3			3		3	
			CO3 The outcomes are the changes or results that the organization expects to be achieved the successful completion of the project	3			3		3	

M.SC., BIOCHEMISTRY

POs and COs Mapping

Sem	Course Code	Title of the Course	COs	POS					
				PO1	PO2	PO3	PO4	PO5	PO6
SEMESTER I	22215SEC11	Biomolecules	CO1- Recognize water as a universal solvent and elixir of life by knowing its importance	3	3			3	
			CO2- Identify the properties and classification of carbohydrates	3	3			3	
			CO3 -Recall the role of various lipids in biomembrane including signal transduction	3	3			3	
			CO4 -Categories the amino acids and know their properties	3	3			3	
			CO5 -Differentiate the structure, properties and functions of DNA and RNA	3	3			3	
			CO6 -List the functions and deficiency disease of fat and water soluble vitamins	3	3			3	
	22215SEC12	Biochemical and Instrumental analysis	CO 1 This skill based course will teach the students the various instrumentations that are used in the analytical laboratories.	3	3		3		
			CO2 Understanding the principles of Electrophoresis, Spectrophotometry and ELISA and their applications in biological investigations/experiments	3	3		3		
			CO3 This course covers both fundamental and applications of the instruments that are routinely used for the characterization of biomolecules	3	3		3		
			CO 4 Develop competence in handing various chromatographic techniques and apply them in isolating and characterizing different biological molecules.	3	3		3		
			CO 5 Purify proteins by affinity chromatography	3	3		3		
			CO 6 Understanding the principles of Electrophoresis, Spectrophotometry and ELISA and their applications in biological investigations/experiments	3	3		3		
			CO 7 To learn various techniques and acquire the skills to use appropriate methods	3	3		3		
			CO 8 To acquire the good laboratory practices	3	3		3		3

	22215SEC13	Enzymology	CO1 Upon successful completion of this course, the student will learn, the major classes of enzyme and their functions in the cell.	3	3			3	
			CO2 The course also provides information pertaining to role of co-enzyme cofactor in enzyme catalyzed reaction, properties of enzymes and regulation of biochemical pathways.	3	3			3	
			CO3 To acquire fundamental knowledge on enzymes and their importance in biological reactions.	3	3			3	
			CO4 Exposure to the concept of activation energy and its importance in biological reactions.	3	3			3	
			CO5 Understanding the role of enzymesin clinical diagnosis and industries.	3	3			3	
			CO 6 Exposure to the nature of non-protein enzymes such as ribozymes.	3	3			3	
			CO 7 Differentiate between equilibrium and steady state kinetics and analyzed simple kinetic data and estimate important parameter (Km. Vmax, Kcat etc)	3	3			3	
	22215SEC14L	Biochemical Techniques Lab - I	CO1 By the end of the course, students can be able to demonstrate the importance of the protein chemistry and their wide applications.						
			CO2 This skill based course will teach the students the various instrumentations that are used in the analytical laboratories.	3	3		3		3
			CO3 This course covers both fundamental and applications of the instruments that are routinely used for the characterization of biomolecules	3	3		3		3
			CO4 Perform skillful specimen collection, identification and processing	3	3		3		3
			CO5 Utilize communication skills necessary for working in the health care setting	3	3		3		3
			CO6 Exhibit professionalism, initiative, positive interpersonal skills, teamwork, respect and integrity.	3	3		3		3
	22215DSC15A	Biostatistics	CO1 To use basic analytical techniques to generate results	3				3	
			CO2 interpret results of commonly used statistical analyses in written summaries	3				3	

			CO3 demonstrate statistical reasoning skills correctly and contextually	3				3	
			CO4 They play an important role in interpretation of result of experiments and research work. This course will provide information how to utilize various tools of biostatics in interpretation of biological data.	3				3	
			CO5 The students will understand the principles of collection of data in biological experiments, proper statistical analysis of the data and its presentation.	3				3	
			CO6 Knowing statistical methods will help students in improving their analytical and interpretation skill.	3				3	
	22215DSC15B	Immunology	CO1 The students may understand the immune system, its components and various techniques used in bio manipulation.	3	3			3	3
			CO2 The course will provide technical knowledge as to how different diseases are caused and various responses mediated by living cells to combat pathogen attack.	3	3			3	3
			CO3 Compare and contrast the origin, maturation process, and general function of B and T lymphocytes.	3	3			3	3
			CO4 At The course will provide sound knowledge of how immune system deals with various pathogens, different processes and cell types involved in prevention of disease.	3	3			3	3
			CO5 To understand the principles of tolerance, autoimmunity and the role of immunity in protection against pathogens.	3	3			3	3
			CO6 Along with this the students will become aware about concept, synthesis and action mechanism of vaccines.	3	3			3	3
	22215RLC16	Research led seminar	CO1 Exposure to various research domains	3	3	3			
			CO2 Acquaintance with languages of research	3	3	3			
			CO3 Development of research aptitude	3	3	3			
SEMESTER II	22215SEC21	Cellular Biochemistry	CO1 Describe the general principles of gene organization and expression in both prokaryotic and eukaryotic organisms.	3	3			3	3

			CO2 Describe the structure and function of biological membranes including the roles of gradients in energy transduction.	3	3			3	3
			CO3 Explain the basic pathways and mechanisms in biological energy transduction from oxidation of metabolites to synthesis of ATP.	3	3			3	3
			CO4 Explain various levels of gene regulation and protein function including signal transduction and cell cycle control.	3	3			3	3
			CO5 To become aware with the variations in the levels of trigycerides and lipoproteins and their relationship with various diseases.	3	3			3	3
			CO6 Relate properties of cancerous cells to mutational changes in gene function.	3	3			3	3
	22215SEC22	Metabolism and Regulation	CO1 Gain knowledge on glucose anabolic and catabolic pathways that ultimately control the glucose homeostatis.	3	3			3	3
			CO2 Describe surface membrane barriers and their protective functions.	3	3			3	3
			CO3 Able to explain the role of lipids, their metabolism and their stringent control by hormones and other factors.	3	3			3	3
			CO4 To acquire knowledge related to the role of TCA cycle in central carbon metabolism, importance of anaplerotic reactions and redox balance.	3	3			3	3
			CO5 Understanding the importance of high energy compounds, electron transport chain, synthesis of ATP under aerobic and anaerobic conditions.	3	3			3	3
			CO6 Understand the anabolic and catabolic processes associated with amino acids and nucleic acids and their regukation.	3	3			3	3
			CO7 Able to understand the energy homeostatis during starvation and energy excess.	3	3			3	3
	22215SEC23	Neuro Biochemistry	CO1 To understand various neurological system	3	3			3	3
			CO2 Recognize the need for, and engage in life-long learning in neurological system	3	3			3	3
			CO3 To understand various Exocytosis of neurotransmitter	3	3			3	3

			CO4 To able to understand DNA microarrays, Methodology, types and applications	3	3			3	3
			CO5 To acquire knowledge related to LEARNING AND MEMORY	3	3			3	3
			CO6 Gain knowledge of contemporary issues	3	3			3	3
			CO7 to understand BIOCHEMISTRY OF VISION AND MUSCLE CONTRACTION	3	3			3	3
	22215SEC24L	Enzymology Lab- II	CO1 Students will gain an enhanced overall understanding of enzymology, enzyme assays, and in particular the influence of various physicochemical characteristics upon enzyme activity.	3	3		3		3
			CO2 Acquiring training to estimate activity of enzymes.	3	3		3		3
			CO3 To determine pH optimum, Km and Vmax of enzymes and to analyse enzyme kinetics	3	3		3		3
			CO4 To determine optimum temperature for the activity of an enzyme.	3	3		3		3
			CO5 Students will gain direct laboratory experience in spectrophotometry.	3	3		3		3
			CO6 Students will gain an understanding of buffers and their importance in the context of pH control.	3	3		3		3
			CO7 Students will gain an appreciation of working as part of an integrated research team.	3	3		3		3
	22215DSC25A	Endocrinology	Apply the knowledge from this course while working in medical laboratory to diagnose different hormone disorders	3	3		3		3
			Understand the scientific research that have been used to understand endocrine and hormone function	3	3		3		3
			Explain recent laboratory methods in diagnosis hormone disorders	3	3		3		3
			Knowledge and Understanding the synthesis of different endocrine gland hormones	3	3		3		3
			Ability to analyze and solve problems related to hormone tests	3	3		3		3

			Ø To know the pathophysiology significance of the system with special reference to humans	3	3		3		3
	22215DSC25B	Clinical nutrition and dietetics	CO1 To learn glycemic index, balanced diet, micronutrient deficiencies and the remedies, nutraceuticals and their importance, junk foods and their hazards	3	3		3		3
			CO2 Understanding merits and demerits of vegetarian and non-vegetarian foods	3	3		3		3
			CO3 To understand the need for specialized food for people with special needs - diabetes, pregnancy, inherited genetic disorders.	3	3		3		3
			CO4To know the use of alternate crops – cereals and pulses and their importance.	3	3		3		3
			CO5 Patients receive medical or surgical help with their conditions, but some have conditions that can also benefit from special diets. Eating more of certain foods, and/or avoiding certain things can help to control a patient's symptoms.	3	3		3		3
			CO6 In some cases, by carefully monitoring what a sick patient eats and drinks, the dietitian can reduce the chance that patient will have problems in the long-term, and can establish and/or help maintain the patient's quality of life.	3	3		3		3
	22215DSC25C	Bioinformatics	Ø The student will choose biological data, submission and retrieval from databases.	3	3		3		3
			Ø The students will be able to experiment pair wise and multiple sequence alignment and will analyze the secondary and tertiary structures of protein sequences.	3	3		3		3
			The students will acquire training in different areas of bioinformatics related to various biological databases such as protein databases, nucleic acid databases, metabolic pathway databases, etc.	3	3		3		3
			to understand the Role of computers in Biology	3	3		3		3
			To know the Software in Bioinformatics - C, C++, bioperl,Biopython and oracle	3	3		3		3

			Ø The student will understand the data structure (databases) used in bioinformatics and interpret the information (especially: find genes; determine their functions), understand and be aware of current research and problems relating to this area.	3	3		3		3
	22215RMC26	Research Methodology	CO1 Understanding research questions and tools	3	3		3		3
			CO2 Experience in scientific writings	3	3		3		3
			CO3 Practice in various aspects of scientific publications	3	3		3		3
			CO4 Inculcation of research ethics	3	3		3		3
	22215BRC27	Participation in Bounded Research	CO1 Hands on exposure to problem solving tools in contemporary research	3		3		3	
			CO2 Evolution of research intuitiveness and orientation	3		3		3	
			CO3 Familiarity with cutting edge research trends	3		3		3	
SEMESTER III	22215SEC31	Molecular Biology	CO1 Understand the structure of nucleic acids and the DNA replication process	3	3		3		3
			CO2 Learn about the process of transcription	3	3		3		3
			CO3 Understand the mechanism of translation	3	3		3		3
			CO4Learn about gene regulation in prokaryotes	3	3		3		3
			CO5 Study the discovery of DNA as genetic material, transcription, DNA repair and translation.	3	3		3		3
			CO6 Analyse coding and non-coding regions of eukaryotic genome and their importance.	3	3		3		3
			CO7 Exposure with the importance of E. coli lac operon	3	3		3		3
	22215SEC32	Clinical Biochemistry	CO1 To learn about the normal constituents of urine, blood and their significance in maintaining good health.	3	3		3		3
			CO2 Exposure to the mechanisms of causation of diseases of liver and kidney.	3	3		3		3
			CO3 Develop understanding of the current concepts related to mechanism of Cancer.	3	3		3		3

			CO4 To become aware with the variations in the levels of trigycerides and lipoproteins and their relationship with various diseases.	3	3		3		3
			CO5 able to describe the diagnostic laboratory, according to the main stages pre-analytical, analytical and post-analytical.	3	3		3		3
			CO6 describe the diagnostic significance of the main laboratory investigations know the problems related to the preparation of the patient, the collection and knowledge of the samples	3	3		3		3
	22215SEC33L	Clinical Biochemistry Lab	CO1 Identify the principal analytical procedures used to measure biochemical magnitudes.	3	3		3		3
			CO2Interpret and integrate the analytical data from the principal biochemical and molecular genetics tests for the screening, diagnosis, prognosis and monitoring of pathologies.	3	3		3		3
			CO3 Interpret experimental results and identify consistent and inconsistent elements.	3	3		3		3
			CO4 To introduce them to metabolic pathways of the major biomolecules and relevance to clinical conditions.	3	3		3		3
			CO5 Manage information and the organization and planning of work.	3	3		3		3
			CO6 To learn qualitative and quantitative analysis of constituents of biological fluids such as urine, blood and their estimation using standard methods.	3	3		3		3
	22215DSC34A	Genetics and Genetic Engineering	CO1 Comprehensive, detailed understanding of the chemical basis of heredity	3	3		3		3
			CO2 Comprehensive and detailed understanding of genetic methodology and how quantification of heritable traits in families and populations provides insight into cellular and molecular mechanisms.	3	3		3		3
			CO3 Comprehensive detailed understanding of cellular mechanisms of developmental stages.	3	3		3		3
			CO4 Exposure to the concepts of genomics, proteomics, metabolomics and their importance in human health	3	3		3		3

			CO5 Acquaintance with the merits and demerits of transgenic crops.	3	3		3		3
			CO6 To produce insulin using recombinant DNA technology.	3	3		3		3
	22215DSC34B	Pharmaceutical Biotechnology	CO1 Understanding the importance of Immobilized enzymes in Pharmaceutical Industries.	3	3		3		3
			CO2 Genetic engineering applications in relation to production of pharmaceuticals	3	3		3		3
			CO3 This course gives information on drug designing, novel techniques in drug discovery and the role of biotechnology in pharmaceutics.	3	3		3		3
			CO4 Importance of Monoclonal antibodies in Industries	3	3		3		3
			CO5 Appreciate the use of microorganisms in fermentation technology	3	3		3		3
			CO6 Exposure with the importance of expression vectors and their importance in Biotechnology.	3	3		3		3
	22215SRC35	Design/Socio technical research	CO1 Sensitization of social needs for innovation			3			
			CO2 Team work towards interdisciplinary synchronous research strategy			3			
			CO3 Development of critical thinking and synergistic research approach.			3			
SEMESTER IV	22215SEC41	Molecular Basis of diseases	CO1 Attain a thorough knowledge on the molecular mechanisms for Tuberculosis, Typhoid, Cholera						
			CO2 Understand the pathological changes during infectious diseases.						
			CO3 Provide an insight into the history of pathology covering all the basic definitions and common terms.						
			CO4 Detail on the survival mechanism in diseases, an insight into microscopic and cellular pathology.						
			CO5 Elaborate the overview of Dengue Hemorrhagic Fever, and Chlamydiae, opportunistic fungal pathogens						
			CO6 review the causes and mechanisms of Emerging and re-emerging infectious diseases and pathogens						
	22215SEC42	Environmental Biochemistry	CO1 students will be able to explain fundamentals of earth atmosphere and its interconnectivity between various components.	3	3		3		3

			CO2 students will be able to describe different elements of the environments and their impact on sustaining the environment.	3	3		3		3
			CO3 students will be able to interpret the fundamentals of ecology and its role in biological evolution	3	3		3		3
			CO4 Gain knowledege about pollution control	3	3		3		3
			CO5 understand the importance of Structure and functions of ecosystem	3	3		3		3
			CO6 exposure with the importance of Value of Biodiversity	3	3		3		3
	22215SEC43L	Molecular and Environmental biochemistry lab	CO1 After the completion of this course, the student will be able to Learn how to isolate genomic DNA.	3	3		3		3
			CO2 Track various techniques adopted for separation of DNA.	3	3		3		3
			CO3 Demonstrate separation of protein by Western blotting and Animal Tissue culture.	3	3		3		3
			CO4 Separate chromosomal and plasmid DNA using enzyme.	3	3		3		3
			CO5 Gain the knowledege about COD and BOD	3	3		3		3
			CO6 demonstrate basis of Animal tissue culture	3	3		3		3
	22215DSC44A	Medical Biotechnology	CO1 Explain insights about genetic diseases and also about the molecular aspects related to human disease	3	3		3		3
			CO2 Gain new insights into molecular mechanisms of nucleic acid and gene therapy	3	3		3		3
			CO3 Gain knowledge about therapeutic recombinant proteins and immunotherapy for the treatment of different diseases	3	3		3		3
			CO4 understant then Nucleic acid based Therapy	3	3		3		3
			CO5 exposure with Gene therapy	3	3		3		3
			CO6 able to interpret the molecular basis of diseases	3	3		3		3
	22215DSC44B	Applied Microbial Biochemistry	CO1 Will be acquainted with methods of measuring microbial growth, calculating growth kinetic parameters with understanding of steady state and continuous growth.	3	3		3		3
			CO2 Will have gained an in-depth knowledge of primary, secondary and group translocation transport systems existing in bacteria, simultaneously learning membrane transport proteins and kinetics of solute transport.	3	3		3		3

			CO3 Will have learnt central metabolic pathways for carbon metabolism in bacteria enlisting differences with eukaryotic systems and their regulation in diverse physiological conditions. This allows students to apply the acquired knowledge in engineering metabolic pathways for developing industrially useful strains.	3	3		3		3
			CO4 Will have gathered understanding of inorganic and organic nitrogen assimilation and its regulation. Also knows role of glutathione in cellular redox regulation and biochemistry of glutamate overproducing strains.	3	3		3		3
			CO5 will have learnt Microbial products in pharmaceutical and agriculture industry	3	3		3		3
			CO6 exposure with Medical microbiology and microbial metabolism	3	3		3		3
	22215PRW45	Project Work	CO1 exposure for safe laboratory practices by handling high end equipments and chemical reagents.	3	3			3	3
			CO2 Biochemistry can be better understood with parallel practical components. In this regard the committee strongly felt that there shall be a guideline to maintain the students' teacher ratio for both theory and practical classes.	3	3			3	3
			CO3 analyze current literature research for research topic of his/her area of expertise.	3	3			3	3
			CO4 rationalize the research gap for new innovation and design and execute independent experimental approach	3	3			3	3
			CO5 able analyze the data obtained from a particular experiment and make to plot graphs, power point presentations.	3	3			3	3
			CO6 comprehend expertise for writing the research reports.	3	3			3	3

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