KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)

Re-accredited by NAAC with 'A+' Grade (4th Cycle)

College of Excellence (UGC)

Coimbatore – 641 029

DEPARTMENT OF BIOCHEMISTRY (UG)

COURSE OUTCOMES (CO)

B. SC. BIOCHEMISTRY

For the students
admittedin the
Academic Year 2020-2021

Programme Code: 07		B.ScBiochemistry		
Course Code: 20UBC101		Core Paper 1 – CHEMISTRY OF BIOMOLECULES		
Batch	Semester	Hours / Week	Total Hours	Credits
2020-2021	I	7	105	6

Course Objectives

1. To learn the chemistry and structure of differentbiomolecules
2. To understand the biological significance of differentbiomolecules

Course Outcomes (CO)

K1 to K4	CO1	Define the functions and properties of carbohydrates, lipids, amino acids, proteins and nucleic acids
	CO2	Classify the biomolecules according to their structures
	CO3	Sketch the basic structure of biomolecules and reactions involving them
	CO4	Distinguish different types of sugars, fats, amino acids and proteins based on the physical, chemical and biological aspects

Programme Code: 07		B.ScBiochemistry		
Course Code: 20UBC2CL		C.Pr.1. BIOCHEMISTRY (Lab)		
Batch	Semester	Hours / Week	Total Hours	Credits
2020-2021	I & II	2	60	2

Course Objectives

1. To acquire skill of analyzing carbohydrates and aminoacids.
2. To provide practical knowledge about the characterization oflipids.
3. To learn the methodology of separation of amino acids by paperchromatography.

Course Outcomes (CO)

K3 to K5	CO1	Practice the qualitative analysis of different carbohydrates and amino acids through individual experiments
	CO2	Calculate iodine number of lipids, thereby characterizing them
	CO3	Assess the separation technique of amino acids through paper chromatography

Programme Code: 07		B.ScBiochemistry		
Course Code: 20UBC202		Core Paper 2- BIOANALYTICAL TECHNIQUES		
Batch 2020-2021	Semester II	Hours / Week 7	Total Hours 105	Credits 6

Course Objectives

1. To know the various types of buffer systems in blood and plasma and its significance inthe maintenance of bloodpH.
2. To understand the principle, materials, methods and applications ofchromatography, electrophoresis andcolorimetry.
3. To detect and measure the radioactivity and explore its role in biological and clinicalfields.

Course Outcomes (CO)

K1 to K4	CO1	Recall the definition of acids, bases and buffers.
	CO2	Describe the various buffer systems present in blood and plasma, and their role in maintaining the blood pH and various bioanalytical techniques.
	CO3	Demonstrate the types and techniques of chromatography, electrophoresis andcolorimetry.
	CO4	Analyze the separated/purified components from the samples by chromatography, electrophoresis and colorimetry.

Programme Code:07		B.ScBiochemistry		
Course Code: 20UBC303		Core Paper III – ENZYMES AND ENZYME TECHNOLOGY		
Batch 2020-2021	Semester III	Hours / Week 4	Total Hours 60	Credits 5

Course Objectives

1. To perceive knowledge about enzymes and theirkinetics.
2. To study about the coenzymes and their roles in the biologicalsystem.
3. To know about the recent enzyme technologies and their applications for diagnosticpurpose.

Course Outcomes (CO)

K1 to K4	CO1	Remember the role of enzymes in biological system
	CO2	Acquire thorough knowledge on the enzyme kinetics and inhibition.
	CO3	Deploy the properties and functions of coenzymes and cofactors.
	CO4	Analyze the biological importance of immobilized enzymes and biosensors.

Programme Code: 07		B.Sc Biochemistry		
Course Code: 20UBC4CM		**Title:** C.Pr.2 BIOCHEMISTRY		
Batch 2020-2021	Semester III & IV	Hours / Week 3	Total Hours 90	Credits 2

Course Objectives

1. To perceive knowledge about λmax of thesubstances.
2. To learn about the methods to quantify the componentscolorimetrically.
3. To learn about the factors influencing the enzyme activity.

Course Outcomes (CO)

K1 to K4	CO1	Recalling the preparation of reagents.
	CO2	Understanding the principles of techniques.
	CO3	Carrying out the experiments using various techniques.
	CO4	Techniques are used to analyse the components both qualitatively and quantitatively.

Programme Code: 07		B.ScBiochemistry		
Course Code: 20UBC404		Core Paper 4 – INTERMEDIARY METABOLISM		
Batch 2020-2021	Semester IV	Hours / Week 4	Total Hours 60	Credits 4

Course Objectives

1. To learn the fate of dietary carbohydrates, proteins andlipids.
2. To study the various catabolic and biosynthetic pathways of biomolecules and theirsignificance.
3. To understand the interrelationship between carbohydrate, protein and fatmetabolism.

Course Outcomes (CO)

K1 to K4	CO1	Understand the various metabolic pathways of carbohydrate, proteins, fat and nucleic acid metabolism
	CO2	Remember the glycolysis, TCA cycle, Glycogenesis, glycogenolysis, β-oxidation, phospholipid biosynthesis, Urea cycle, Nucelic acid biosynthetic pathway and degradation of purine and pyrimidine
	CO3	Assessment of Bioenergetics of various metaboliC pathways, role of inhibitors and uncouplers in electron transport chain
	CO4	Analysis of regulation of various metabolic pathways and their significance

Programme Code: 07		B.Sc Biochemistry		
Course Code: 20UBC4S2		Skill Based Subject II - COMMON HUMAN DISEASES		
Batch 2020-2021	Semester III	Hours / Week 2	Total Hours 30	Credits 3

Course Objectives

1. To provide a broad overview of the most common and important humandiseases
2. To provide sufficient knowledge about the pathogenesis of common humandiseases
3. To address the aspects of diseases, diagnosis and treatment essential to maintain humanhealth

Course Outcomes (CO)

K1 to K4	CO1	Recollect the structure and functions of various biological systems.
	CO2	Understand the diseases of circulatory, endocrine and hepatic system.
	CO3	Describe and understand the pathophysiology of diseases.
	CO4	Acquire knowledge about the diseases, diagnosis and treatment essential to maintain human health.

Programme Code: 07		B.Sc Biochemistry		
Course Code: 20UBC505		Core Paper 5 – HUMAN PHYSIOLOGY		
Batch 2020-2021	Semester V	Hours / Week 4	Total Hours 60	Credits 4

Course Objectives

1. To understand the basic principles and mechanisms involved during the functioning of variousorgans of the physiologicalsystem.

2. To learn the mechanism of action of hormones, and their role under normal and abnormal conditions of the physiologicalsystem.

Course Outcomes (CO)

K1 to K4	CO1	Recall of the structure of skeletal muscle, GI tract, lungs, nephrons, neurons and reproductive system
	CO2	Understanding the mechanism of muscle contraction, mechanism of buffer action , transport of gases between tissues and blood, formation of urine, propagation of nerve application ,mechanism of action of hormones.
	CO3	Explanation of sources of energy for muscle contraction, functions of hormones, spermatogenesis, ovarian cycle, chemical changes during muscle contraction.
	CO4	Synaptic transmission of neuro-muscular transmission, pathophysiology of hormones of pituitary, thyroid, parathyroid and adrenal glands.

Programme Code: 07	B.ScBiochemistry		
Course Code: 20UBC506	Core Paper 6 – Basics of Microbiology and Biotechnology		
Batch 2020-2021	Hours / Week 4	Total Hours 60	Credits 5

Course Objectives

1. To provide students with a conceptual background inmicrobiology
2. To make the students to be familiar with the relationship between microbes and humanbeings
3. To provide knowledge about plant tissue culture and animal tissueculture.
4. To know about the different fermentationtechnologies.

Course Outcomes (CO)

K1 to K4	CO1	Recall the characteristics of bacteria, algae, fungi and viruses
	CO2	Understand the role of microbes as normal flora and as disease causing agents
	CO3	Evaluate the plant and animal tissue culture techniques and role of biotechnology in managing the environmental wastes.
	CO4	Analyze the techniques on fermentation, bioreactors, downstream processing and methods on food processing and industrial biotechnology. in food and industrialbiotechnology

Programme Code: 07		B.Sc Biochemistry		
Course Code: 20UBC507		Core Paper 7- CLINICAL BIOCHEMISTRY		
Batch 2020-2021	Semester V	Hours / Week 4	Total Hours 60	Credits 4

Course Objectives

1. To provide students with a conceptual background in ClinicalBiochemistry

2. To provide students with an understanding of various types of diseases and their causes, symptoms, prevention, management andtreatment

Course Outcomes (CO)

K1 to K4	CO1	Recall the metabolism of carbohydrates, lipids and proteins
	CO2	Describe the disorders of carbohydrate, lipids, protein and amino acids metabolism & assess the gastric, intestinal, liver and kidney functions
	CO3	Demonstrate the types, clinical pathology and diagnosis of disorders of carbohydrate, lipids, protein and amino acids
	CO4	Analyze the blood and serum samples for the diagnosis and prognosis of diseases

Programme Code: 07		B.Sc Biochemistry		
Course Code: 20UBC508		Core Paper 8 – MOLECULAR BIOLOGY		
Batch 2020-2021	Semester V	Hours / Week 4	Total Hours 60	Credits 4

Course Objectives

1. To understand the scientific process in the content of learning the fundamental biologicaland chemical factors of molecularbiology.
2. To gain knowledge about DNA replication, DNA repair mechanism andmutation.
3. To understand the mechanism of transcription and reversetranscription.
4. To acquire the knowledge about generegulation.

Course Outcomes (CO)

K1 to K4	CO1	Understand the dynamics of protein synthesis with respect to ribosome structure, function and accuracy of translation
	CO2	Remember the Genetic Code and the amino acid which it codes. the role of various enzymes and proteins in DNA replications, transcription and translation
	CO3	Advanced and integrated knowledge of the process that occur in DNA recombination and repair process
	CO4	Exploit spontaneous and chemically induced mutations

Programme Code: 07		B.Sc Biochemistry		
Course Code: 20UBC6CN		C.Pr.3. BIOCHEMISTRY (Lab)		
Batch 2020-2021	Semester V & VI	Hours / Week 4	Total Hours 120	Credits 3

Course Objectives

1. To make students learn the methods of collection of blood and urine samples and separation ofserum

2. To analyze the biochemical parameters in urine and blood samples and indicate theirclinical significance

3. To demonstrate the kit methods for the assay of biochemicalparameters

Course Outcomes (CO)

K3 to K5	CO1	Apply various techniques for the assay of important biochemical parameters and interpret their values
	CO2	Calculate the values from the graph obtained in the experiment
	CO3	Estimate the level of bilirubin, SGOT, SGPT, LDH, CKMB in the given sample using kit method

Programme Code: 07		B.ScBiochemistry		
Course Code: 20UBC6CO		**Title:** C.Pr.4. BIOCHEMISTRY (Lab)		
Batch 2020-2021	Semester V & VI	Hours / Week 2	Total Hours 60	Credits 2

Course Objectives

1. To isolate plasmid DNA and genomic DNA, isolation and restriction digestion of DNAthrough demonstrationexperiments
2. To perform simple staining, gram staining and negative staining, isolation of microbesand biochemical tests for identifyingbacteria
3. To demonstrate media preparation, callus initiation in plant tissue and mitosis in onion roottips

Course Outcomes (CO)

K3 to K5	CO1	Employ molecular methods in isolation, restriction digestion and separation of DNA
	CO2	Analyze microbiological methods of staining, plating and biochemical tests for identifying them
	CO3	Familiarize the techniques of plant tissue culture and cell biology through demonstrations

Programme Code: 07		B.ScBiochemistry		
Course Code: 20UBC6CP		C.Pr.5. BIOCHEMISTRY (Lab)		
Batch 2020-2021	Semester V & VI	Hours / Week 2	Total Hours 60	Credits 2

Course Objectives

1. To estimate chlorophyll, starch, total phenols and qualitatively analyze varioussecondary metabolites in plant sample
2. To determine RA and pregnancy tests using kitmethod
3. To demonstrate RBC count, total and differential count of WBCs and identifying bloodgroups

Course Outcomes (CO)

K3 to K5	CO1	Practice techniques of different plant component isolation, antigen-antibody interactions in immunological kit methods and identifying blood groups
	CO2	Calculate the number of RBC and WBCs
	CO3	Estimate chlorophyll, starch and total phenols present in plant sample

Programme Code: 07		For B.Sc Botany, Zoology & Biotechnology		
Course Code: 20UBC5X1		Extra Departmental Course - I - DIAGNOSTIC BIOCHEMISTRY		
Batch 2020-2021	Semester V	Hours / Week 2	Total Hours 30	Credits 3

Course Objectives

1. To make the students to know the principles for routinely conducted tests indiagnostic laboratories.
2. To select the appropriate biochemical tests to the diagnosis of thediseases.
3. To enable the students to interpret the laboratory dataproperly.

Course Outcomes (CO)

K1 to K4	CO1	Remember the basic concepts of collection of samples
	CO2	Understand the idea about the tests performed using blood, serum and enzymes
	CO3	Familiarize with the clinical importance of hormones
	CO4	Analyze and execute the clinical laboratory techniques

Programme Code: 07		B.ScBiochemistry		
Course Code: 20UBC609		Core Paper 9 – PLANT BIOCHEMISTRY		
Batch 2020-2021	Semester VI	Hours / Week 4	Total Hours 60	Credits 4

Course Objectives

1. To understand the metabolic processes in plants and role of various biosyntheticpathways.

2. To acquire knowledge about photosynthetic apparatus, role of nitrogen in plants and plantgrowth regulators

3. To explore about the photo morphogenesis and secondary metabolites inplants.

Course Outcomes (CO)

K1 to K4	CO1	Recollect the structure and function of plant cell.
	CO2	Understand the mechanism of photosynthesis in plants.
	CO3	Execute the concept of role of minerals and growth hormones in plants.
	CO4	Analyze the nature and functions of secondary metabolites.

Programme Code: 07		B.Sc Biochemistry		
Course Code: 20UBC610		Core Paper 10 – IMMUNOLOGY AND IMMUNOTECHNIQUES		
Batch 2020-2021	Semester VI	Hours / Week 4	Total Hours 60	Credits 4

Course Objectives

1. To learn about the basic principles of immunology, functioning of immune system,immunological techniques of clinical and researchlaboratories.

2. To know about the different types of immune mechanisms involving in various abnormal anddiseased conditions.

Course Outcomes (CO)

K1 to K4	CO1	Learning the basics of immunity and immune system, formation of cytokinins, different features of antigens and antibodies.
	CO2	Understanding of the mechanism of antibody and cell mediated immunity,action of complement system.
	CO3	Learning the development of various clinical conditions during the various abnormal conditions.
	CO4	Application of antigen – antibody reactions in the diagnosis of various infectious diseases using different techniques.

Programme Code: 07		B.Sc Biochemistry		
Course Code: 20UBC611		Core Paper 11 – GENETIC TECHNOLOGY		
Batch 2020-2021	Semester VI	Hours / Week 4	Total Hours 60	Credits 4

Course Objectives

1. To provide students with a broad conceptual background in the field of geneticengineering

2. To describe the methods used to create recombinant DNA molecules and introduce theminto prokaryoticcells

3. To expose the students to the application of genetic engineering in medicine andagriculture

Course Outcomes (CO)

K1 to K4	CO1	Recognize the concept of recombinant DNA technology or genetic engineering
	CO2	Describe a range of techniques in gene manipulation, the cloning vectors available and the containment procedures
	CO3	Demonstrate the application of transgenic plants with herbicide resistance, virus resistance, pest resistance and male infertility and the production of recombinant insulin
	CO4	Examine the difficulties during the expression of eukaryotic DNA in prokaryotes and how to overcome these difficulties

Programme Code: 07		B.Sc Biochemistry		
Course Code: 20UBC6S3		Skill based subject 3– TECHNIQUES IN GENOMICS AND PROTEOMICS		
Batch 2020-2021	Semester VI	Hours / Week 2	Total Hours 30	Credits 3

Course Objectives

1. To perceive knowledge about structure of animal cell membrane and itsfunction.

2. To study about the mechanism of protein sorting and transport in the biologicalsystem.

3. To know about the cell cycle and about cancer development.

Course Outcomes (CO)

K1 to K4	CO1	Recollect the organization of the nuclear DNA and mapping
	CO2	Get thorough knowledge about human genome project and sequencing
	CO3	Update the knowledge about transcriptomics
	CO4	Analyze the applications of proteomics in various diseases

Programme Code: 07	B.ScBiochemistry		
Major elective- BASICS OF BIOINFORMATICS			
Batch 2020-2021	Hours / Week 4	Total Hours 60	Credits 5

Course Objectives

1. To know about various tools for databasesearch.
2. To acquire knowledge about different biologicaldatabases.
3. To provide knowledge about Gene prediction and drugdesigning.

Course Outcomes (CO)

K1 to K4	CO1	Recognize the available bioinformatics resources on web like DNA and protein databases
	CO2	Understand concepts of similarity searching databases and algorithms
	CO3	Construct genome annotations and algorithms
	CO4	Outline the concepts of structure based drug design, protein structure levels and databases

Programme Code: 07	B.Sc Biochemistry		
Major Elective – Biopharmaceuticals			
Batch 2020-2021	Hours / Week 4	Total Hours 60	Credits 5

Course Objectives

1. To demonstrate the basics of biopharmaceutical to the undergraduatestudents.
2. To motivate the undergraduate students in analyzing the drug metabolism and mode ofaction.
3. To elaborate basic of formulations of drugs and to apply them in clinical trials.

Course Outcomes (CO)

K1 to K4	CO1	Acquire knowledge on drug development, principles, mechanism of actions ofdrugs
	CO2	Outline on preparation of biotechnology oriented pharmaceutical products.
	CO3	Help them to analyze the pharmaceutical products available in the market and Evaluate the recent advances in drug manufacturing
	CO4	Relate the regulations in clinical trial and management.

Programme Code: 07	B.Sc Biochemistry		
Major elective -ADVANCED CLINICAL BIOCHEMISTRY			
Batch 2020-2021	Hours / Week 4	Total Hours 60	Credits 5

Course Objectives

1. To make the students learn more about the latest techniques in clinical laboratoriesfor diagnosis of different types ofdiseases.
2. To understanding the abnormal levels of various biochemical parameters indiseased conditions.

Course Outcomes (CO)

K1 to K4	CO1	Practice the collection of blood using apparatus
	CO2	Understand the clinical significance of abnormal constituents of urine
	CO3	Analyze the clinical causes of haemoglobin related diseases

	CO4	Evaluate the liver tests using automated instruments

Programme Code: 07	B.ScBiochemistry		
Major elective- DAIRY BIOCHEMISTRY			
Batch 2020-2021	Hours / Week 4	Total Hours 60	Credits 5

Course Objectives

1. To understand the basic concepts of dairytechnology.
2. To provide knowledge about the milk processingtechniques.

Course Outcomes (CO)

K1 to K4	CO1	Recognize the properties of milk.
	CO2	Recall the methods of testing density, fat content and acidity of milk.
	CO3	Analyze the carbohydrates, lipids, proteins and enzymes present in milk.
	CO4	Acquire knowledge about the various milk products available and milk processing techniques practiced.

Programme Code: 08	B.ScBiochemistry		
Major elective- BIOSTATISITICS			
Batch 2020-2021	Hours / Week 4	Total Hours 60	Credits 5

Course Objectives

1. To learn the different methods of collecting data andprocessing
2. Toknowaboutthedifferentstatisticalmethodstointerpretthecollectedstatisticaldata
3. Toknowtheconceptofarticlewriting,reportwritingandthesismakingsoon

Course Outcomes (CO)

K1 to K4	CO1	The students get an idea on choosing the appropriate method of collecting data
	CO2	The students learn how to select the statistical method and process thecollected data
	CO3	The students can device and standardize the statistical methods

	CO4	The students will be well versed in preparing a report, publishing an article and writing a projectthesis

Programme Code: 09	B.ScBiochemistry		
Major elective- NUTRITIONAL BIOCHEMISTRY			
Batch 2020-2021	Hours / Week 4	Total Hours 60	Credits 5

Course Objectives

1. To impart the knowledge on historical overview of nutrition, essential nutrients formetabolism
2. To provide an overview of the major macro and micronutrients relevant to humanhealth
3. To discuss the scientific rationale for defining nutritional requirements in healthy individuals and populations, with reference to specific conditions such as pregnancy, lactation, and olderage

Course Outcomes (CO)

K1 to K3	CO1	Assess the nutritional status of community in order to determine the type magnitudeand distribution of malnutrition
	CO2	Describe the biochemical and physiological functions of the nutrients and their integrated role.
	CO3	Evaluate the therapeutic role of key nutrients in maintaining health.

Programme Code: 07		For B.Sc Zoology		
Course Code: 20UBC3A3		ALLIED BIOCHEMISTRY I		
Batch 2020-2021	Semester III	Hours / Week 5	Total Hours 75	Credits 4

Course Objectives

1. To make the students to understand the basic principles ofbiochemistry.
2. To learn about the mechanism of action of enzymes in the biologicalsystem.

Course Outcomes (CO)

K1 to K4	CO1	Understands the properties, types and functions of carbohydrates, proteins, lipids, enzymes, nucleic acids and their and functions.
	CO2	Remembers the structures of monosaccharides, dissaccharides and polysaccharides and aminoacids
	CO3	Applies the concept of enzymatic activity in biological system.
	CO4	Acquire knowledge about the nuclear organization of prokaryotes in eukaryotes.

Programme Code: 07		For B.Sc Zoology		
Course Code: 20UBC4A4		**Title:** ALLIED BIOCHEMISTRY II		
Batch 2020-2021	Semester IV	Hours / Week 5	Total Hours 75	Credits 4

Course Objectives

1. To learn about the various biochemical techniques applicable in both research andclinical laboratories.

2. To provide knowledge on metabolic reactions involved in biologicalreactions.

Course Outcomes (CO)

K1 to K4	CO1	Remember the concept of pH and buffer system.
	CO2	Understand the idea about the working principle of various analytical techniques.
	CO3	Deploy the activity of radioisotopes and their applications in biological system.
	CO4	Interpret the metabolic pathways of various molecules.

Programme Code: 07		For B.Sc Zoology		
Course Code: 20UBC4AL		A.Pr.2. BIOCHEMISTRY		
Batch 2020-2021	Semester III & IV	Hours / Week 2	Total Hours 60	Credits 2

Course Objectives

1. To acquire the skill of analyzing carbohydrates and aminoacids.
2. To provide practical knowledge about the quantitative analysis of carbohydrate andprotein.
3. To learn the methodology of separation of amino acid by paperchromatography.

Course Outcomes (CO)

K3 to K5	CO1	Practice the qualitative analysis of different carbohydrates and amino acids through individual experiments
	CO2	Calculate acid and iodine number of lipids, thereby characterizing them
	CO3	Assess the separation technique of amino acids through paper chromatography