KONGUNADU ARTS AND SCIENCE COLLEGE (AUTONOMOUS)
Re-accredited by NAAC with A^+ Grade
4^{th} Cycle College of Excellence – UGC
Coimbatore – 641 029

DEPARTMENT OF BIOCHEMISTRY (Aided) COURSE

OUTCOMES (CO) OF

B.SC BIOCHEMISTRY

For the students admitted
In the Academic Year
2025-2026

Programme Code: 07		B.Sc. Biochemistry		
Course Code: 25UBC101		**Core Paper 1 – CHEMISTRY OF BIOMOLECULES**		
Batch	Semester	Hours / Week	Total Hours	Credits
2025-2026	I	7	105	6

Course Objectives

i) To learn the chemistry and structure of different biomolecules
ii) To understand the biological significance of different biomolecules
iii) To learn the Elementary treatment on structure of proteins.

Course Outcomes (CO)

K1 to K5	CO1	Define the functions and properties of carbohydrates, lipids, amino acids, proteins and nucleic acids
	CO2	Classify the biomolecules according to their structures
	CO3	Sketchthe 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
	CO5	Describe the various types of nucleic acids and their structures

Programme Code: 07		**B.Sc. Biochemistry**		
Course Code: 25UBC202		**Core Paper 2- BIOANALYTICAL TECHNIQUES**		
Batch 2025-2026	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 in the maintenance of blood pH
2. To understand the principle, materials, methods and applications of chromatography, electrophoresis and colorimetry.
3. To detect and measure the radioactivity and explore its role in biological and clinical fields.

Course Outcomes (CO)

K1 to K5	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 and colorimetry.
	CO4	Analyze the separated/purified components from the samples by chromatography, electrophoresis and colorimetry.
	CO5	Describe the radio activity types and their applications.

Programme Code:07		**B.Sc. Biochemistry**		
Course Code: 25UBC303		**Core Paper III – ENZYMES AND ENZYME TECHNOLOGY**		
Batch 2025-2026	Semester III	Hours / Week 4	Total Hours 60	Credits 5

Course Objectives

1. To perceive knowledge about enzymes and their kinetics.
2. To study about the coenzymes and their roles in the biological system.
3. To know about the recent enzyme technologies and their applications for diagnostic purpose.

Course Outcomes (CO)

K1 To K5	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 co enzymes and cofactors.
	CO4	Analyze the biological importance of immobilized enzymes and applications
	CO5	Understand the types of biosensors, and Artificial enzymes

Programme Code : 07				
Course Code: 25UGC3S1		**Skill Based Subject 1 – Cyber Security**		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credit**
2025-2026	**III**	**2**	**30**	**3**

Course Objectives

1. The course introduces the basic concepts of Cyber Security
2. To develop an ability to understand about various modes of Cyber Crimes and Preventive measures
3. To understand about the Cyber Legal laws and Punishments

Course Outcomes (CO)

K1	CO1	To Understand the Concepts of Cybercrime and Cyber Frauds
K2	CO2	To Know about Cyber Terrorism and its preventive measures
K3	CO3	To Analyze about the Internet, Mobile Phone and E-commerce security issues
K4	CO4	To Understand about E-mail and Social Media Issues
K5	CO5	To Describe about various legal responses to Cybercrime

Programme Code: 07		**B. Sc Biochemistry**		
Course Code: 25UBC404		**Core Paper 4–INTERMEDIARY METABOLISM**		
Batch 2025-2026	Semester IV	Hours/Week 4	Total Hours 60	Credits 4

Course Objectives

1. To learn the fate of dietary carbohydrates, proteins and lipids.
2. To study the various catabolic and bio synthetic pathways of bio molecules and their significance.
3. To understand the inter relationship between carbohydrate, protein and fat metabolism.

Course Outcomes (CO)

K1 to K5	CO1	Understand the various metabolic pathways of carbohydrates, proteins, fat and nucleic acid metabolism
	CO2	Remember the glycolysis, TCA cycle, Glycogenesis, glycogenolysis, β-oxidation, phospholipid biosynthesis, Urea cycle, Nucleic acid biosynthetic pathway and degradation of purine and pyrimidine
	CO3	Assessment of Bio 25nergetic of various metabolism pathways, role of inhibitors and uncouple electron transport chain
	CO4	Analysis of regulation of various metabolic pathways and their significance
	CO5	Acquire the knowledge of purine and pyrimidine metabolism and biological significance of uric acid and β-amino isobutyrate.

Programme Code: 07		**B. Sc Biochemistry**		
Course Code: 25UBC4S2		**Skill Based Subject 2- TECHNIQUES IN BIOTECHNOLOGY**		
Batch 2025-2026	Semester IV	Hours / Week 2	Total Hours 30	Credits 3

Course Objectives

1. To provide a broad overview of the common and important techniques in Biotechnology
2. To provide sufficient knowledge about the overall biotechnology skills
3. To address the aspects of developmental biology, plant and animal tissue culture, fermentation ,bioprocessing and bio nanotechnology

Course Outcomes (CO)

K1 to K5	CO1	Recollect the basics of developmental biology
	CO2	Understand the techniques of plant tissue culture
	CO3	Describe the process and introduce about bioprocess techniques
	CO4	Acquire knowledge fermentation and its role in biotechnology
	CO5	Remember Bio Nanotechnology and their materials applications

Programme Code: 07		**B. Sc Biochemistry**		
Course Code: 25UBC505		**Core Paper 5 – HUMAN PHYSIOLOGY & ENDOCRINOLOGY**		
Batch	Semester	Hours / Week	Total Hours	Credits
2025-2026	V	4	60	4

Course Objectives

1. To understand the basic principles and mechanisms involved during the functioning of various organs of the physiological system.

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

3. To learn the functions of organs and systems to the maintenance of Homeostasis.

Course Outcomes (CO)

K1 to K5	**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, Patho physiology of hormones of pituitary, thyroid, parathyroid and adrenal glands.
	CO5	Understand the structure and function of male and female reproductive system

Programme Code: 07		**B.Sc Biochemistry**		
Course Code: 25UBC404		**Core Paper 6 - CELL BIOLOGY**		
Batch	Semester	Hours / Week	Total Hours	Credits
2025-2026	V	4	60	4

Course Objectives

1. To perceive knowledge about structure of animal cell membrane and its function.
2. To study about the mechanism of protein sorting and transport in the biological system.
3. To know about the cell cycle and about cancer development.

Course Outcomes (CO)

K1 to K5	CO1	Appreciates and understands the dynamic nature of the cell, including how it occurs and response to the information from its environment.
	CO2	Remembers the different mechanism of receptor activation and regulation.
	CO3	Explores the role of growth hormones in the biological system
	CO4	Predict how alterations or given drugs or chemical treatment would impact cell behavior
	CO5	Describe the Cancer and their types, Tumor suppressor genes function and their products

Programme Code: 07		**B.Sc. Biochemistry**		
Course Code: 25UBC507		**Core Paper 7- CLINICAL BIOCHEMISTRY**		
Batch 2025-2026	Semester V	Hours / Week 4	Total Hours 60	Credits 4

Course Objectives

1. To provide students with a conceptual background in Clinical Biochemistry
2. To provide students with an understanding of various types of diseases and their causes, symptoms, prevention, management and treatment

Course Outcomes (CO)

K1 to K5	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
	CO5	Analyze the Liver and Kidney function tests

Programme Code: 07		**B.Sc Biochemistry**		
Course Code: 25UBC508		**Core Paper 8 – MOLECULAR BIOLOGY**		
Batch 2025-2026	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 biological and chemical factors of molecular biology.
2. To gain knowledge about DNA replication, DNA repair mechanism and mutation.
3. To understand the mechanism of transcription and reverse transcription.
4. To acquire the knowledge about gene regulation.

Course Outcomes (CO)

K1 to K5	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 on transcription and DNA recombination and repair process
	CO4	Explore the process of translation, genetic code and post translational modifications
	CO5	Describe the regulation of gene expression and types of operon and their regulation

Programme Code: 07		**B.Sc Biochemistry**		
Course Code: 25UBC609		**Core Paper 9 – PLANT BIOCHEMISTRY**		
Batch 2025-2026	Semester VI	Hours / Week 4	Total Hours 60	Credits 4

Course Objectives

1. To understand the metabolic processes in plants and role of various biosynthetic pathways.
2. To acquire knowledge about photosynthetic apparatus, role of nitrogen in plants and plant growth regulators

To explore about the photo morphogenesis and secondary metabolites in plants.

K1 to K5	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	Acquire the Photo morphogenesis function and development of plant
	CO5	Analyze the nature and functions of secondary metabolites

ProgrammeCode:07		**B.Sc Biochemistry**		
Course Code:25UBC611		**Core Paper11–GENETIC ENGINEERING**		
Batch 2025-2026	Semester VI	Hours/Week 4	Total Hours 60	Credits 4

Course Objectives

1. To provide students with abroad conceptual background in the field of genetic engineering
2. To describe the methods used to create recombinant DNA molecules and introduce them in to prokaryotic cells
3. To expose the students to the application of genetic engineering in medicine and agriculture

Course Outcomes (CO)

K1 to K5	CO1	Recognize the concept of recombinant DNA technology or genetic engineering
	CO2	Describe arrange of techniques in gene manipulation, the cloning vectors available and the containment procedures
	CO3	Understanding the techniques of DNA sequencing, Genetic fingerprinting, and PCR applications
	CO4	Examine the difficulties during the expression of eukaryotic DNA in prokaryotes and how to overcome these difficulties
	CO5	Demonstrate the application of transgenic plants with herbicide resistance, virusres is tance, pest resistance and male infertility and the production of recombinant insulin

Programme Code: 07		**B.Sc Biochemistry**		
Course Code: 25UBC6S3		**Skill Based Subject 3– TECHNIQUES IN GENOMICS AND PROTEOMICS**		
Batch	Semester	Hours / Week	Total Hours	Credits
2025-2026	VI	2	30	3

Course Objectives

1. To perceive knowledge about structure of animal cell membrane and its function.
2. To study about the mechanism of protein sorting and transport in the biological system.
3. To know about the cell cycle and about cancer development.

Course Outcomes (CO)

K1 to K5	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 comparative genomics
	CO4	Understanding the transcriptomics and Pharmacogenomics applications
	CO5	Analyze the applications of proteomics in various diseases

Programme Code: 07	B.Sc Biochemistry		
Major Elective – MICROBIOLOGY			
Batch 2025-2026	Hours/Week 4	Total Hours 60	Credits 5

Course Objectives

1. To provide students with a conceptual background in microbiology
2. To provide students with an understanding of various microbiological techniques
3. To make the students to be familiar with the relationship between microbes and human beings

Course Outcomes (CO)

K1 to K5	CO1	Recall the characteristics of bacteria, algae, fungi and viruses
	CO2	Describe the role of microbes as normal flora and as disease causing agents
	CO3	Demonstrate the microscopic techniques, staining and culturing methods
	CO4	Recollect the microbial diseases and their symptoms and prevention
	CO5	Analyze the bacteriological examination and purification of drinking water

Programme Code: 07	**B.Sc Biochemistry**		
Major elective- BASICS OF BIOINFORMATICS			
Batch 2025-2026	Hours / Week 4	Total Hours 60	Credits 5

Course Objectives

1. To know about various tools for data base search.
2. To acquire knowledge about different biological databases.
3. To provide knowledge about Gene prediction and drug designing.

Course Outcomes (CO)

K1 to K5	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
	CO5	Analyze the biological sequence databases and their tools

Programme Code: 07	**B.Sc Biochemistry**		
Major Elective – BIOPHARMACEUTICALS			
Batch 2025-2026	Hours / Week 4	Total Hours 60	Credits 5

Course Objectives

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

Course Outcomes (CO)

K1 to K5	CO1	Acquire knowledge on drug development, principles, mechanism ofactions of drugs
	CO2	Outline on preparation of biotechnologyoriented pharmaceutical products.
	CO3	Quality controltests and manufacturing, packaging of drugs
	CO4	Help them to analyze the pharmaceutical products available in the market and Evaluate the recent advances in drug manufacturing
	CO5	Relate the regulations in clinical trial and management.

Programme Code: 08	B.Sc Biochemistry		
Major elective- BIOSTATISITICS			
Batch 2025-2026	Hours / Week 4	Total Hours 60	Credits5

Course Objectives

1. To learn the different methods of collecting data and processing
2. Toknowaboutthedifferentstatisticalmethodstointerpretthecollectedstatisticaldata
3. To know the concept of article writing, report writing and thesis making soon

Course Outcomes (CO)

K 1 to K5	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 the collected data
	CO3	The students can device and standardize the statistical methods
	CO4	The students can understand the classification and tabulation data problems
	CO5	The students will be well versed in preparing a report, publishing an article and writing a project dissertation.

Programme Code: 09	**B.Sc Biochemistry**		
Major elective- NUTRITIONAL BIOCHEMISTRY			
Batch 2025-2026	Hours / Week 4	Total Hours 60	Credits 5

Course Objectives

1. To impart the knowledge on historical overview of nutrition, essential nutrients for metabolism
2. To provide an overview of the major macro and micro nutrients relevant to human health
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 older age

Course Outcomes (CO)

K1 to K5	CO1	Lean about the significance and role of nutrition in maintaining the health
	CO2	Describe the biochemical and physiological functions of the nutrients and their integrated role.
	CO3	Explore the nutritive value of carbohydrates, proteins and amino acids and their importance
	CO4	Learning about malnutrition and balanced diets
	CO5	Evaluate the therapeutic role of key nutrients in maintaining health.

Programme Code: 07		**For B.Sc Zoology**		
Course Code: 25UBC3A3		**ALLIED BIOCHEMISTRY I**		
Batch 2025-2026	Semester III	Hours / Week 5	Total Hours 75	Credits 4

Course Objectives

1. To make the students to understand the basic principles of biochemistry.
2. To learn about the mechanism of action of enzymes in the biological system.
3. To learn the Structure and chemistry of different biomolecules

Course Outcomes (CO)

K1 to K5	CO1	Understands the properties, types and functions of carbohydrates, proteins, lipids, enzymes, nucleic acids and their and functions.
	CO2	Remembers the structures of monosaccharides, disaccharides and polysaccharides and amino acids
	CO3	Applies the concept of enzymatic activity in biological system.
	CO4	Acquire knowledge about the nuclear organization of prokaryotes in eukaryotes.
	CO5	Describe the Nucleic acid structure and their types, Denaturation and Renaturation of DNA

Programme Code: 07		**For B.Sc Zoology**		
Course Code: 25UBC4A4		**Title: ALLIED BIOCHEMISTRY II**		
Batch 2025-2026	Semester IV	Hours / Week 5	Total Hours 75	Credits 4

Course Objectives

1. To learn about the various biochemical techniques applicable in both research and clinical laboratories.
2. To provide knowledge on metabolic reactions involved in biological reactions.
3. To study the Interrelationship between various biomolecules.

Course Outcomes (CO)

K1 to K5	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.
	CO5	General pathway of lipid and protein metabolism

Programme Code: 07		For all UG programmes		
Course Code: 25UBC5X1		EDC - HUMAN DISEASES AND HEALTH CARE		
Batch	**Semester**	**Hours / Week**	**Total Hours**	**Credits**
2025-2026	**V**	**2**	**30**	**3**

Course Objectives

1. To learn the importance of nutrients and functions of various organs.
2. To provide sufficient knowledge about the pathogenesis of common human diseases
3. To address the aspects of diseases, diagnosis and treatment essential to maintain human health

Course Outcomes (CO)

K1 to K5	CO1	Recollect the 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.
	CO5	Understand the diseases of brain and lungs

Programme Code: 07		**B.Sc Biochemistry**		
Course Code: 25UBC2CL		**C.Pr.1. BIOCHEMISTRY**		
Batch 2025-2026	Semester I & II	Hours / Week 2	Total Hours 60	Credits 2

Course Objectives

- To acquire skill of analyzing carbohydrates and amino acids.
- To provide practical knowledge about the characterization of lipids.
- To learn the methodology of separation of amino acids by paper chromatography.

Course Outcomes (CO)

K3 to K5	CO1	Learn the reagent preparation methods for qualitative analysis of biomolecules
	CO2	Practice the qualitative analysis of different carbohydrates and amino acids through individual experiments
	CO3	Practice the qualitative analysis of different amino acids through individual experiments
	CO4	Calculate iodine number of lipids, thereby characterizing them
	CO5	Assess the separation technique of amino acids through paper chromatography

Programme Code: 07		**B.Sc. Biochemistry**		
Course Code: 25UBC4CM		**Title: C.Pr.2 BIOCHEMISTRY**		
Batch 2025-2026	Semester III & IV	Hours / Week 3	Total Hours 90	Credits 2

Course Objectives

1. To perceive knowledge about λ max of the substances.
2. To learn about the methods to quantifyt he components calorimetrically.
3. To learn about the factors influencing the enzyme activity.

Course Outcomes (CO)

K1 to K5	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 analyze the components both qualitatively and quantitatively.
	CO5	Carrying out the experiments using various enzymes factors

Programme Code: 07		**B.Sc Biochemistry**		
Course Code: 25UBC6CN		**C.Pr.3. BIOCHEMISTRY**		
Batch 2025-2026	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 of serum

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

3. To demonstrate the kit methods for the assay of bio chemical parameters

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
	CO4	Understanding the quantitative estimation of Glucose and Calcium in urine
	CO5	Analyze the quantitative estimation of biochemical parameters in blood

Programme Code: 07		**B.Sc Biochemistry**		
Course Code: 25UBC6CO		**C.Pr.4. BIOCHEMISTRY**		
Batch 2025-2026	Semester V & VI	Hours / Week 2	Total Hours 60	Credits 2

Course Objectives

1. To isolate plasmid DNAand genomic DNA, isolation and restriction digestion of DNA through demonstration experiments
2. To perform simple staining, gram staining and negative staining, isolation of microbes and biochemical tests for identifying bacteria
3. To demonstrate media preparation, callus initiation in plant tissue and mitosis in onionroot tips

Course Outcomes (CO)

K3 to K5	CO1	Recallthe methods ofgenetic technologyand Employ molecular methods in isolation, restriction digestion and separation of DNA
	CO2	Recall the microbiological methods and performing of staining, plating techniques
	CO3	Analyze biochemical tests for identifying microorganisms
	CO4	Familiarize the techniques ofplant tissue culture and cell biologythrough demonstrations
	CO5	Introducing bioinformatics tools and learning basic tools on proteomics and genomics

Programme Code: 07		**B. Sc Biochemistry**		
Course Code: 25UBC6CP		**C.Pr.5. BIOCHEMISTRY**		
Batch 2025-2026	Semester V & VI	Hours / Week 2	Total Hours 60	Credits 2

Course Objectives

1. To estimate chlorophyll, starch, total phenols and qualitatively analyze various secondary metabolites in plant sample
2. To determine RA and pregnancy tests using kit method
3. To demonstrate RBC count, total and differential count of WBCs and identifying blood groups

Course Outcomes (CO)

K3 to K5	CO1	Practice techniques of different plant component isolation and qualitative analysis of secondary metabolites
	CO2	Performing quantification methods of chlorophyll, starch and total phenols present in plant sample
	CO3	Recollecting thetechniques antigen- antibodyinteractions in immunological kit methods
	CO4	Learning identification of blood groups
	CO5	Calculate the number of RBC and WBCs

Programme Code: 07		**For B.Sc Zoology**		
Course Code: 25UBC4AL		**A.Pr.2. BIOCHEMISTRY**		
Batch 2025-2026	Semester III & IV	Hours / Week 2	Total Hours 60	Credits 2

Course Objectives

1. To acquire the skill of analyzing carbohydrates and amino acids.
2. To provide practical knowledge about the quantitative analysis of carbohydrate and protein.
3. To learn the methodology of separation of amino acid by paper chromatography.

Course Outcomes (CO)

K3 to K5	CO1	Recall the classification of biomolecules and learn the preparation of reagents
	CO2	Practice the qualitative analysis of different carbohydrates through individual experiments
	CO3	Practice the qualitative analysis of various amino acids through individual experiments
	CO4	Calculate acid and iodine number of lipids, thereby characterizing them
	CO5	Assess the separation technique of amino acids through paper chromatography