

DEPARTMENT OF BIOCHEMISTRY

PROGRAMME OUTCOMES AND COURSE OUTCOMES OF UNDER GRADUATE & POST GRADUATE PROGRAMME (2022 ONWARDS)

NAME OF THE PROGRAMME: B.Sc BIOCHEMISTRY– PROGRAMME OUTCOME	
PO1	Ability to understand fundamental concepts of biology, chemistry and biochemistry.
PO2	Ability to apply basic principles of chemistry to biological systems and molecular biology
PO3	Ability to relate various interrelated physiological and metabolic events.
PO4	Develop as independent thinkers who are responsible for their own learning
PO5	Develop transferable quantitative skills
PO6	Be able to work with others demonstrating leadership and collaborative skills
NAME OF THE PROGRAMME: M.Sc BIOCHEMISTRY– PROGRAMME OUTCOME	
PO1	A strong understanding of fundamentals of biochemical process at an advanced level.
PO2	Better understanding of major thrust areas of the discipline
PO3	Know how on current developments in the biochemical research
PO4	Capacity to identify, analyse and design safe experimental process to provide efficient solutions by fair interpretation of data
PO5	Perfect gain insight into biochemical research ethics for production of quality researchand publication.
PO6	An ability to get engages them in lifelong learning to foster their growth as a successful research.

NAME OF THE PROGRAMME: B.Sc BIOCHEMISTRY – COURSE OUTCOMES	
SEMESTER I	
CELL BIOLOGY	1. Explain the structures and functions of basic components of prokaryotic and eukaryotic cells 2. Describe the structure, function and composition of cell membrane and communicate the types and mechanism of membrane transport 3. Discuss the structure and functions of cellular organelles 4. Understand the types of microfilaments and mitochondria 5. Describe nucleus and nucleolus ,Illustrate the phases of cell cycle; in particular mitosis and describe the significance of meiosis in genetic diversity Relate the structure and biological role of extra cellular matrix and cell –cell junction with physiological processes
CHEMISTRY I	1. Basic knowledge on Metallurgy, Cycloalkanes, Polarising Effects, Stereochemistry, Chemical Kinetics, Catalysis, Photochemistry, VSEPR Theory, Fuels, Osmosis, Nuclear Chemistry, Petroleum Chemistry, Chemistry of Naphthalene, Conductors and Applications
SEMESTER II	
BIOMOLECULES	1. To gain the knowledge about the classification, structure, properties and functions of carbohydrates. 2. Able to understand the classification, structure, properties and importance of amino acids. 3. To understand and gain knowledge about the classification of proteins, levels of structural organization of proteins and its properties. 4. To gain insights about the types, structure and properties of nucleic acids. 5. To acquire knowledge about the classification, structure and properties of different types of lipids.
CHEMISTRY II	1. Basic knowledge on Coordination Chemistry, Industrial Chemistry, Carbohydrates, Aminoacids, Proteins, Electrochemistry, Paints and Pigments, dyes, Vitamins,

	Medicinal Chemistry, Corrosion and Applications
SEMESTER- III	
ANALYTICAL BIOCHEMISTRY	1. A practical knowledge on the preparation of solutions. Separate biological sample by centrifugation. Separation of subcellular organelles by differential centrifugation 2. Obtaining analytical skills to separate samples (amino acids) using paper chromatography. 3. Advanced knowledge about the interactions of electromagnetic radiation and matter and their applications in spectroscopy. Assay of biomolecules using UV spectroscopy and spectrofluorimetry 4. Demonstrate the methodology involved in separation of proteins, Nucleic acid by various electrophoretic techniques. 5. Acquire knowledge on atomic structure. Radiation, types of radioactive decay. Detection and measurement of radioactivity using GM counter and Scintillation counter. Biological hazards of radiation and safety measures in handling radio isotopes.
MICROBIOLOGY I	1. To gain knowledge on history of microbiology and various types of microscopes. 2. To learn about cell structure and staining methods. 3. To understand Microbial Classification and genome organization. 4. To gain knowledge on culturing microorganisms and microbial growth. 5. To learn about antimicrobials and various groups of microorganisms.
FIRST AID	1. Summarize the importance of first aid 2. Analyze the symptoms and treatment for various medical emergencies 3. Illustrate the causes and effects of poisoning and its treatment 4. Identify the causes and treatment for various aches in the body 5. Identify the treatment for various wounds
FOOD AND NUTRITION	1. Realizing the fact that "Food as medicine", Classify carbohydrates and analyze their sources and functions in the body 2. Classify fats and analyze their sources and functions in the body 3. Identify and explain proteins in foods and the specific functions

	in maintaining health. - Identify the types of vitamins and their biomedical significance of vitamins present in food - Analyzing the biological importance of major and minor trace elements (Minerals) in the food
SEMESTER- IV	
PLANT BIOCHEMISTRY	- Summarize the events in Photosynthesis - Classify Plant Hormones And Explain Their Functions. Discuss Secondary Metabolites In Plants - Illustrate Nitrogen Fixation By Symbiosis Biochemistry Of Nitrogen Fixation - Distinguish Between Types of Stress Tolerance in plants - Evaluate The Anti Oxidant Defense In Plants
MICROBIOLOGY – II	- To gain knowledge about the importance of microorganisms in soil and agriculture - To understand the role of microorganisms in air and water - To learn about food borne microorganisms - To gain knowledge on microbial production of industrially important compounds - To learn about various microorganisms causing diseases in humans
BIOSTATISTICS	- Understand the definition of biostatistics and its scope. Ascertain the methods and importance of data collection and presentation - Examine the usage of statistical tools like measure of central tendency and measure of dispersion - Apply hypothesis testing via t, f, z and chi square statistical distribution& Basic Definition of Probability - Deduce the results of correlation and regression - Deduce ANOVA and make statistical decision
LIFESTYLE DISEASES & PREVENTION	- Understand the importance of vitamins and minerals - Identify Lifestyle Prone Disorders - Manage physiological and psychological disorders - Categorize Communicable And Non-Communicable Disease - Maintain good health
SEMESTER V	
ENZYMES AND INTERMEDIARY	Acquire Fundamental knowledge in relevant principles of enzyme, mechanism of enzyme kinetics, enzyme catalysis emphasizes

METABOLISM	on capability of the students to work in a group and gather the information. 2. Illustrate the reactions of carbohydrate metabolism. Summarize the steps involved in ATP formation 3. Identify the steps involved in oxidation of fatty acids 4. Obtain knowledge on the metabolism of amino acids and formation of urea 5. Summarize the steps involved in purine and pyrimidine synthesis
MOLECULAR BIOLOGY	1. Infer the central dogma of molecular biology, Show how DNA acts as vehicle of inheritance through experimental evidences, Outline the steps involved in replication and explain the events, enzymology, fidelity and inhibitors of replication in prokaryotes. 2. Summarize the process of prokaryotic transcription. 3. Define genetic code and show how it can be deciphered 4. Relate genetic code to translation process and explain protein biosynthesis. 5. Illustrate the regulation of gene expression in prokaryotes using <i>lac</i> and <i>trp</i> operon. 6. Gain knowledge on gene mutation and DNA Repair mechanisms.
PHYSIOLOGY AND NUTRITION	1. Gain knowledge about the various types of RBC and WBC cells, different types of blood groups and basic structure and functions of heart. 2. Illustrate the Mechanism of digestion and absorption of macromolecules. 3. To acquire the knowledge about the structure and functions of kidney, nephron and mechanism of urine formation. 4. Realizing the fact that “Food as medicine”, describe the significance of carbohydrates, lipids and proteins and analyze their sources and functions in the body 5. Identify the types of vitamins and their biomedical significance of vitamins present in food 6. Analyze the biological importance of major and minor trace elements (Minerals) in the food
MOLECULAR	1. Understand the structure of hormones and receptors. Classify hormones based on nature, mechanism of action.

ENDOCRINOLOGY	2. Explain the structure, biological action and regulation of hypothalamic and pituitary hormones. 3. Illustrate the structure, biological action and regulation of thyroid and pancreatic hormones. 4. Understand about the actions of adrenal hormones 5. Compare the structure and metabolic effects of adrenal hormones
MEDICAL LABORATORY TECHNOLOGY	1. Follow good laboratory practices, Prepare reagents for experiments 2. Examine urine and stool sample for normal and abnormal constituents 3. Estimate Hemoglobin and other hematological parameters 4. Perform blood grouping 5. Acquire knowledge on culturing microorganisms.
SEMESTER VI	
CLINICAL BIOCHEMISTRY	1. Understand the blood glucose regulation. Describe the pathophysiology and molecular basis of Diabetes mellitus. Acquire knowledge on the clinical features on Glycosuria, Ketosis, Fructosuria & Galactosemia. 2. Analyze the genetic diseases like phenyl ketonuria, cystinuria, albinism, hypo and hyperuricemias, obesity and fatty liver 3. Explain the physiopathological and biochemical markers of the liver function tests. 4. Assess the diagnostic performance of renal function tests. 5. Examine the gastric contents. Practical knowledge on FTM analysis 6. Categorize the use of enzymes and Isozymes in assessment of liver damage, bone disorders and myocardial infarction.
BIOTECHNOLOGY	1. To discuss the basic requirements and tools employed in genetic engineering process 2. Demonstrate the basic and recent techniques applied in the field of Recombinant DNA technology 3. Apply the basic rDNA technique to produce transgenic animal, discuss gene transfer methods, their application in pharmaceutical industry, cloning and its importance 4. To Design plants based on rDNA techniques 5. To Describe the methods employed for DNA amplification, gene therapy and antisense RNA therapy. To Discuss the basic requirements and tools employed in genetic engineering

	process
IMMUNOLOGY	1. A wide knowledge on the immunity, cells and organs of immune system 2. Illustrate the structure and classification of antibodies 3. Enlightenment of antigen and antibody interaction during infection 4. Exposure to mechanisms involved during allergic reactions. 5. Acquire knowledge on the principles, methodology involved in immunological techniques.
PHARMACEUTICAL BIOCHEMISTRY	1. Define a drug and identify the chemistry of drug molecules. 2. Illustrate the mechanism of drug absorption, distribution and metabolism 3. Explain the routes of drug administration. Appraise on the novel drug delivery systems compared to the conventional routes. 4. Justify the use of synthetic drugs for different disease systems. 5. Highlight the uses of Plants in traditional medicine 6. Highlight the importance of organic phytochemicals in pharmaceuticals
RESEARCH METHODOLOGY	1. Gain wide knowledge on the fundamentals of research 2. Identify the research problem and research design 3. Enlighten Importance of Hypothesis, Characteristics of a Good Hypothesis 4. Exposure to write thesis 5. Acquire knowledge on journals and paper writing 6. Acquire a knowledge on finding scientific articles using PubMed

NAME OF THE PROGRAMME: M.Sc BIOCHEMISTRY - COURSE OUTCOMES	
SEMESTER –I	
ADVANCES IN CELL BIOLOGY	1. To study the structure and function of cells 2. To understand about extracellular matrix and cell communication. 3. To Understanding the function of intracellular organelles 4. Understanding the function of cell cycle mechanism 5. Understanding the Division of cells and Cell Death 6. To study the concepts of cell signaling.

CHEMISTRY OF BIOMOLECULES	1. This course emphasizes on various Biomolecules and its significance. 2. To enable students the biological importance of lifeless chemical compounds. 3. To enable the students to learn the basic functions and structures of Biomolecules 4. On successful completion of the course the students should have understood the significance of the complex bio-molecules, polysaccharides, lipids and proteins. 5. To enable the students to learn the basic functions, structures and biological importance of nucleic acids and porphyrins.
HUMAN PHYSIOLOGY	1. This course provides a comprehensive, balanced introduction to this exciting, evolving and multi-disciplinary field. 2. To understand the circulatory cells, blood and its components. 3. To enable the students to learn or to know the biological, physiological activities of various organs. 4. To understand the functions, anatomy, histology of each organ systems. 5. To understand how the body works and explains the mechanisms. 6. To understand in depth knowledge of main structure composing human body
PLANT BIOCHEMISTRY	1. This course presents an Introduction and provides a comprehensive, balanced introduction to this exciting, evolving and multi-disciplinary field. 2. To enable the students to learn or to know the aspects of photosynthesis. 3. To understand the concept of Nitrogen fixation process and interaction between assimilation and metabolism. 4. To understand the plant metabolism, nutrient absorption and its deficiency. 5. To be aware of various plant hormones and its roles. 6. To identify the process of Dormancy- Germination, Reproduction and budding process.
BIOINSTRUMENTATION	1. It helps the students in understanding the basic science in a variety of applications 2. It includes the development of different tools and methods for identification, analysis and examination of physical properties of different biochemical compositions to provide better chemical information.

	3. To introduce an fundamentals of transducers as applicable to physiology 4. To explore the human body parameter measurements setups 5. To make the students understand the basic concepts of forensic techniques 6. To give basic ideas about how biomolecules are detected by instrumentation
SEMESTER- II	
ANALYTICAL BIOCHEMISTRY	1. To Understand the working principles of analytical instruments. 2. To Apply and analyze the biochemical samples using analytical instruments 3. To make the student familiar with the basic concepts of chromatography and spectroscopy utilized for food analysis 4. To acquired some technical knowledge of, and some practical experience with analysis in electrophoresis 5. To promote capacity building and research biodiversity use and conservation 6. worldwide through the application of molecular markers
MOLECULAR BIOLOGY	1. Understand the history and scope of molecular biology. 2. Acquire working knowledge of gene & to know how genes are expressed. 3. Appreciate how genetic engineering & biotechnology influence a health care in the next century. 4. Gain knowledge of biological and/or medicinal processes through the investigation of the underlying molecular mechanisms. 5. learn about DNA, RNA and their replication, mutations, DNA repair mechanism
METABOLIC REGULATION AND DISORDERS	1. Understand the rate of acceleration of the biochemical reactions in the presence of the biocatalyst (enzymes). 2. Enhance the knowledge about the key biochemical pathways in metabolism and their regulations. 3. Analyze the importance of biochemical metabolic pathways. 4. Acquire the concept of anabolism, catabolism and role of high energy compounds in the cell. 5. Ability to relate various interrelated physiological and metabolic events

MICROBIOLOGY	1. To gain knowledge on history of microbiology and various types of microscopes 2. To learn about cell structure and staining methods 3. To understand Microbial Classification and genome organization 4. To gain knowledge on culturing microorganisms and microbial growth 5. To learn about antimicrobials and various groups of microorganisms
SEMESTER III	
MOLECULAR ENDOCRINOLOGY	1. To impart knowledge on molecular mechanism and Endocrine system. 2. To provide knowledge on hormonal action and metabolic functions. 3. To create awareness on hormonal imbalance and regulations. 4. To impart basic knowledge on hormone cascade system. 5. To develop sound knowledge on steroids and its importance.
ENZYME TECHNOLOGY	1. To impart knowledge on classification and active sites of enzymes. 2. To provide knowledge on enzyme kinetics. 3. To create awareness on role of inhibitors and catalytic enzymes. 4. To impart basic knowledge on coenzymes and isoenzymes. 5. To develop sound knowledge on Industrial and clinical enzymology.
BIOTECHNOLOGY	1. To impart knowledge on basic tools in genetic engineering. 2. To provide knowledge on cloning vectors and DNA sequencing. 3. To create awareness on gene transfer and its applications. 4. To impart basic knowledge on Industrial biotechnology. 5. To develop sound knowledge on Bio safety and bio hazards.
GENETIC ENGINEERING	1. To impart knowledge on basics in genetics and intellectual property rights. 2. To provide knowledge on cloning vectors and DNA

	sequencing. 3. To create awareness on DNA enzymes and its applications. 4. To impart basic knowledge on DNA in biotechnology. 5. To develop sound knowledge on blotting techniques.
MUSHROOM CULTIVATION	1. To impart knowledge on types of mushrooms. 2. To provide knowledge on cultivation process. 3. To create awareness on edible mushrooms. 4. To impart basic knowledge on mushroom storage. 5. To develop sound knowledge on mushroom nutritive values and recepies.
HUMAN PHYSIOLOGY AND NUTRITION	1. To impart knowledge on basics human physiology and nutrition. 2. To provide knowledge on food digestion and absortion. 3. To create awareness on blood groups and anaemia. 4. To impart basic knowledge on BMR and trace elements.
SEMESTER IV	
RESEARCH METHODOLOGY	1. To impart knowledge on research problem and finding scientific articles with Internet. 2. To provide knowledge on collection and analysis of data using statistical tools. 3. To create awareness on bioinformatics and biological databases. 4. To develop sound knowledge on preparation of research reports. 5. To impart basic knowledge on animal experimentation and intellectual property rights.
ADVANCED CLINICAL BIOCHEMISTRY	1. To know the abnormal constituents in urine and CSF, Aminiotic fluid collections. 2. To impart knowledge on the disorders of carbohydrate metabolism, nucleic acid metabolism, lipid metabolism and amino acid metabolism. 3. To develop an understanding of organ function tests. 4. To develop knowledge on the concepts on diagnostic enzymology tests. 5. To understand the basic concepts of antioxidants and cancer.
STEM CELL	1. To provide the strong knowledge on stem cells and its types.

TECHNOLOGY	2. To impart basic knowledge on in vivo and invitro differentiation of stem cells. 3. To understand about limitations of cloning. 4.To develop sound knowledge on hematopoietic stem cells. 5.To understand about skeletal muscle stem cells.
LIFE STYLE - DISEASE AND PREVENTION	1. To provide the strong knowledge on obesity, cardiac disease and diabetes. 2. To impart basic knowledge on hypertension. 3. To understand about cancer. 4.To develop sound knowledge on age related diseases. 5.To understand about gallstone.