PEO's

(Programme Educational Objectives)

- To provide in-depth knowledge about core areas of biochemistry.
- To make students competent in the field of biochemistry and allied areas by providing them hands on experience in basic tools and techniques.
- To instill the ability for research and entrepreneurship in the students along with strong ethics and communication skills.
- To inculcate, facilitate, motivate and promote knowledge and technical skills in core areas of biological sciences including advanced tools and techniques like genomics, proteomics and transcriptomics to young aspirants.
- To equip and motivate the students to pursue higher education and research in reputed institutes at national and international level in the field of science.
- To develop trained human resource in the field of advanced translational research.
- To provide students with an understanding of the role of science in societal development.
- To develop graduates with a strong professional ethics and moral duties that will positively affect their profession, community, society and Nation at large.

PO's

(Programme Outcomes)

- The degree programs offered at the Department of Biosciences empowers research-based in-depth study of biochemistry.
- It equips the students to work independently in laboratory, analyze and apprehend the scientific articles, present scientific topics and research results in spoken and written forms, both.
- It allows having a thorough perceivence and competency in specific areas of biology in addition to a broad-based integrative standing of basic biological concepts.
- It endows the understanding of research-based knowledge including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions.
- Apply ethical principles and commit to professional ethics, responsibilities, and norms of the biological sciences practice.
- Empower the students to acquire technological cross-examination by connecting disciplinary and interdisciplinary aspects.
- Develop ability to work independently as well as part of a team.
- It also inculcates the importance of Bioethics, entrepreneurship, communication and management skills to usher next generation of Indian industrialists and researchers.

PSOs

(Programme Specific Outcomes)

Intended Learning Outcomes of the Programme are listed under four headings:

1. Knowledge and Understanding,

2. Cognitive Skills

3. Practical Skills and

4. Capability / Transferable Skills.

After taking the course student will be able to:

Knowledge and Understanding

PSO1: Knowledge of structure, function and behavior of biological systems (plant /animal /human)

PSO 2: Knowledge of bimolecular structures and interactions in various biological systems

PSO3: Knowledge of industrial and environmental impact of biotechnology.

PSO 4: Recognize tools, techniques, ethics and processes followed in biotechnology

PSO5: Designing, research and analysis skills

Cognitive Skills

PSO6. Compare and Contrast various biological systems from biotechnology perspective

PSO7: Model biological systems and their interactions from biotechnology perspective

PSO8: Analyze bimolecular interactions and factors affecting such interactions to design effective biotechnology products

PSO9: Process Bioinformatics data to draw meaningful conclusions

Practical Skills

PSO 10. Choose appropriate instrumentation system for observation and evaluation of biological systems

PSO11: Conduct experiments on biological systems as per the standards and protocols

PSO12: Use commercially available software tools for modeling, simulation and analysis of defined biological systems

PSO13: Operate systems that are used in biotechnology industries

Capability/Transferable Skill

PSO 14: Manage information, develop scientific reports and make presentations

PSO15: Build, Manage and Lead a team to successfully complete a project and Communicate across teams and organizations to achieve professional objectives and work under various constraints to meet project targets

PSO16: Adopt to the chosen profession by continuously upgrading his/her knowledge and understanding through Life-long Learning philosophy

COURSE: ESSENTIAL PROFESSIONAL COMMUNICATION
COURSE CODE: LN104

COURSE OBJECTIVES:
Develop the basic knowledge, vocabulary, grammar and communication skills in the students-- listening, speaking, reading and writing.

COURSE OUTCOME (CO)	DESCRIPTION
CO1	To enhance all the four communication skills in the students-- listening, speaking, reading and writing.
CO2	To familiarize the students with the nature and importance of effective communication skills in their professional life.
CO3	To make the students capable of actively participating in various individual/group communications such as group discussion, debate, meeting, presentation etc.
CO4	To enrich the vocabulary of the students to make them efficient communicators.
CO5	To strengthen the Grammar of the students.

COURSE: MATHEMATICS
COURSE CODE: MT106

Available from Maths Department

COURSE: CONCEPTS OF COMPUTERS
COURSE CODE: CS109

COURSE OBJECTIVES:

- Study of computer history and structure of computer system.
- Understanding of computer peripheral devices, operating environment and software.
- Basic knowledge of computer networking and internet working devices.
- Fundamental concepts of Internet and web technologies.
- Study of biological databases, algorithms and flowchart design.

COURSE OUTCOMES (CO):

After completion of the course, a student will be able to

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Have a strong foundation of knowledge about the structure of computer system.
CO2	Utilize and configure computer peripheral devices, install and operate system and application software.
CO3	Establish a small computer network and utilize resource sharing.
CO4	Design and develop a website with limited features.
CO5	Design flowcharts, apply algorithms to solve problems and make use of biological databases.

COURSE: FUNDAMENTAL OF INORGANIC CHEMISTRY
COURSE CODE: CH112
Available from Chemistry department

COURSE: FUNDAMENTALS OF BIOCHEMISTRY

COURSE CODE: BS112
COURSE OBJECTIVES:

Develop the understanding of

- Basics of biomolecules
- Basics of carbohydrate, its classification and
- Basics of Amino acid & protein
- Basics of lipids
- Basics of Nucleic Acid
- Basics of Vitamin

COURSE OUTCOMES (CO):

After completion of the course, a student will be able to

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Study of Basics of carbohydrate, its classification
CO2	Basics of Amino acid & protein
CO3	Basics of lipids
CO4	Basics of Nucleic Acid
CO5	Basics of Vitamins

COURSE: CHEMISTRY LAB-I

COURSE CODE: CH113

Available from Chemistry department

COURSE: BIOCHEMISTRY LAB

COURSE CODE: BS141

COURSE OBJECTIVES:

Develop the understanding of

- To estimate the basic knowledge of biomolecules testing.

COURSE OUTCOMES (CO):

After completion of the course, a student will be able to

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Spot test for carbohydrates
CO2	Estimation of reducing sugars by Benedict method
CO3	Spot test for amino acids
CO4	Estimation of cholesterol
CO5	DNA and RNA estimation

COURSE: FUNDAMENTALS OF ENVIRONMENTAL STUDIES
COURSE CODE: ES115
Available from EVS department

COURSE: FUNDAMENTAL OF ORGANIC CHEMISTRY
COURSE CODE: CH114
Available from Chemistry department

COURSE: PLANT PHYSIOLOGY

COURSE CODE: BS232

On completion of this course, students will be able to understand:

- The concept of origin of life and evolution.
- The understanding of diversity in plants.
- The structure and functioning of Plant Cells and tissue.
- Morphology and physiology of plants and plant growth.

COURSE OBJECTIVES:

Develop the understanding of

- The concept of origin of life and evolution.
- The structure and functioning of Plant Cells and tissue.
- Morphology and physiology of plants.

COURSE OUTCOMES (CO):

After completion of the course, a student will be able to

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Have a strong foundation of basics of botany.
CO2	Develop the the concept of origin of life and evolution
CO3	Study of the structure and functioning of Plant Cells and tissue.
CO4	Study of morphology of plants
CO5	Study of physiology of plants.

COURSE: ANIMAL PHYSIOLOGY

COURSE CODE: BS233

COURSE OBJECTIVES:

Develop the understanding of

- To understand the inter relationships within and between anatomical and physiological systems of the human body.
- To understand the importance of economic zoology.

COURSE OUTCOMES (CO):

After completion of the course, a student will be able to

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Understand Formation of urine and gain perception on the various renal function tests and renal disorders.
CO2	Understand the pathophysiological processes responsible for common biochemical disorders such as jaundice, Pancreatitis, Fatty liver etc.

	Describe the general function of each organ system. Have in-depth understanding of anatomy and physiology of
CO3	Understanding the enzyme patterns in diseases of various organs such as pancreas, liver, bones, heart and muscle. Understand about various animal cultures. Understand host-parasite relationship.
CO4	Examine and identify acid-base balance and the regulatory mechanisms within the body to include the analyte, physiology involved, and clinical significance
CO5	Describe and explain the role of liver function in bilirubin metabolism and identify the tests used for bilirubin analysis, and relate laboratory results to clinical diagnosis.

COURSE: FUNDAMENTAL OF MICROBIOLOGY
COURSE CODE: BS113
COURSE OBJECTIVES:

Develop the understanding of

- Basics of microbiology
- General Classification of microbes
- Control of Microorganisms
- Microbes in extreme environments and microbial interactions
- Basics of Recombination in Prokaryotes

COURSE OUTCOMES (CO):

After completion of the course, a student will be able to

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Study of Basics of microbiology
CO2	General Classification of microbes
CO3	Basics of control of Microorganisms
CO4	Study of bacteriophages and microbes in extreme environments and microbial interactions.

CO5	Basics of Recombination in Prokaryotes

COURSE: CHEMISTRY LAB-II
COURSE CODE: CH115
Available from Chemistry department

COURSE: MICROBIOLOGY LAB
COURSE CODE: BS205
COURSE OBJECTIVES:

Develop the understanding of

- Basics of microbiology
- General Classification of microbes
- Control of Microorganisms
- Microbes in extreme environments and microbial interactions
- Basics of Recombination in Prokaryotes

COURSE OUTCOMES (CO):

After completion of the course, a student will be able to

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Study of Basics of microbiology
CO2	General Classification of microbes
CO3	Basics of control of Microorganisms
CO4	Study of bacteriophages and microbes in extreme environments and microbial interactions
CO5	Basics of Recombination in Prokaryotes

COURSE: Fundamentals of Physical Chemistry
COURSE CODE: CH215
Available from Chemistry department

COURSE: BIOPHYSICAL CHEMISTRY
COURSE CODE: BS202

COURSE OBJECTIVES:

Develop the understanding of

- Concept of electromagnetic radiation, absorption spectrum, Beer's law and Lamberts law
- Principle, working and applications of spectrophotometer and AAS
- Concepts of chromatography and concept of partition coefficient
- Principle, methodology and application of various chromatographic techniques
- Centrifugation and Electrophoresis-Principles and applications
- Importance of radioactivity in biological studies, GM counters and Scintillation counting.

COURSE OUTCOMES (CO):

After completion of the course, a student will be able to

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Concept of electromagnetic radiation, absorption spectrum, Beer's law and Lamberts law, Principle, working and applications of spectrophotometer and AAS
CO2	Concepts of chromatography and concept of partition coefficient
CO3	Principle, methodology and application of various chromatographic techniques
CO4	Centrifugation and Electrophoresis-Principles and applications
CO5	Importance of radioactivity in biological studies, GM counters and Scintillation counting.

COURSE: FUNDAMENTALS OF GENETICS
COURSE CODE: BS241
COURSE OBJECTIVES:

Develop the understanding of

- The objective of this course is to have a firm foundation in the fundamentals of genetics and *Drosophila* development.
- Discuss model organisms

- Discuss chromosomes structures and function.
- Discuss mutation, variation and DNA damage and repair mechanisms.

COURSE OUTCOMES (CO):

After completion of the course, a student will be able to

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Discuss interaction of genes through various Mendelian crosses.
CO2	Understand structure of chromosomes and its function.
CO3	Develop an understanding of the genetics of bacteria and virus.
CO4	Discuss the genetic control of development and how sex is determined in various orgnaism.
CO5	Understand mutation and variation along with different genetic disorders.

COURSE: INTRODUCTION OF CELL BIOLOGY
COURSE CODE: BS242
COURSE OBJECTIVES:

Develop the understanding of

- Develop an understanding of the Cytoskeleton and Cell Membrane.
- Discuss the structure of Microtubules, microfilaments.
- Distinguish between the cellular organization of prokaryotic and eukaryotic cells
- Would have deeper understanding of cell at structural and functional level.
- Would have broad knowledge on the molecular interaction between cells.
- Would demonstrate a clear understanding of the signal transduction, secondary messengers.

COURSE OUTCOMES (CO):

After completion of the course, a student will be able to

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Develop an understanding of the Cytoskeleton, Microtubules, microfilaments and

	Cell Membrane.
CO2	Distinguish between the cellular organization of prokaryotic and eukaryotic cells
CO3	Would have deeper understanding of cell at structural and functional level.
CO4	Would have broad knowledge on the molecular interaction between cells.
CO5	Would demonstrate a clear understanding of the signal transduction, secondary messengers.

COURSE: FUNDAMENTALS OF BIOINFORMATICS
COURSE CODE: BS243
COURSE OBJECTIVES:

Develop the understanding of :

- The basic objective is to give students an introduction to the basic practical techniques of bioinformatics.
- The students will become familiar with the use of a wide variety of internet applications, biological database and will be able to apply these methods to research problems.

COURSE OUTCOMES (CO):

After completion of the course, a student will be able to

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Formulate and justify appropriate choices in technology, strategy, and analysis for a range of projects involving DNA, RNA, or protein sequence data.
CO2	Develop pipelines of analysis tools to analyse real-world biological data sets, and show familiarity with the syntax and options required to generate meaningful interpretations.
CO3	Analyse an analytical approach for efficiency, robustness and correctness and explain the importance of these to non-specialist colleagues.
CO4	Explain common methods and applications for analysis of gene or protein expression.
CO5	Use data visualisation software to effectively communicate results.

COURSE: PHYSIOLOGY LAB
COURSE CODE: BS244
COURSE OBJECTIVES:

Develop the understanding of :

- Paper helps the students to understand the physiological functions of the biological systems

COURSE OUTCOMES (CO):

After completion of the course, a student will be able to

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Determination of osmotic potential of plant cell sap by plasmolytic method.
CO2	To study the effect of two environmental factors (light and wind) on transpiration by excised twig.
CO3	To study the effect of light intensity and bicarbonate concentration on O2 evolution in photosynthesis.
CO4	Estimation of haemoglobin.
CO5	Measurement of blood pressure

COURSE: CELL BIOLOGY AND GENETICS LAB
COURSE CODE: BS206
COURSE OBJECTIVES:
Develop the understanding of

- Develop an understanding of the Cytoskeleton and Cell Membrane.
- Discuss the structure of Microtubules, microfilaments.
- Distinguish between the cellular organization of prokaryotic and eukaryotic cells
- Would have deeper understanding of cell at structural and functional level.
- Would have broad knowledge on the molecular interaction between cells.
- Would demonstrate a clear understanding of the signal transduction, secondary messengers.

COURSE OUTCOMES (CO):

After completion of the course, a student will be able to

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Develop an understanding of the Cytoskeleton, Microtubules, microfilaments and Cell Membrane.
CO2	Distinguish between the cellular organization of prokaryotic and eukaryotic cells
CO3	Would have deeper understanding of cell at structural and functional level.
CO4	Would have broad knowledge on the molecular interaction between cells.
CO5	Would demonstrate a clear understanding of the signal transduction, secondary messengers.

COURSE: ENZYMES AND HORMONES
COURSE CODE: BS251
COURSE OBJECTIVES:

Develop the understanding of :

- To understand the concepts of enzyme and hormones.
- To understand the concepts of enzyme kinetics.

COURSE OUTCOMES (CO):

After completion of the course, a student will be able to

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Hormones: classification, structural features & functions in Plants: auxin, gibberellin, cytokinin, ethylene, and abscisic acid
CO2	Hormones and their functions secreted by endocrine glands
CO3	General properties and modes of actions of enzymes.
CO4	Activation energy and thermodynamics of enzyme action.
CO5	Classification of proteases with their mechanism of action.

COURSE: MOLECULAR BIOLOGY
COURSE CODE: BS212
COURSE OBJECTIVES:

Develop the understanding of

- Concept of gene, pseudogene, cryptic gene and split gene
- DNA replication and regulation in prokaryotes and eukaryotes
- Transcription in prokaryotes and eukaryotes
- Translation in prokaryotes and eukaryotes
- Post translation and transcriptional mechanism
- Gene expression in prokaryotes using Lap operon and in Eukaryotes by Trp operon.

COURSE OUTCOMES (CO):

After completion of the course, a student will be able to

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Concept of gene, pseudogene, cryptic gene and split gene
CO2	DNA replication and regulation in prokaryotes and eukaryotes
CO3	Transcription in prokaryotes and eukaryotes, Translation in prokaryotes and eukaryotes
CO4	Post translation and transcriptional mechanism.
CO5	Gene expression in prokaryotes using Lap operon and in Eukaryotes by Trp operon.

COURSE: CLINICAL BIOCHEMISTRY
COURSE CODE: BS252
COURSE OBJECTIVES:

Develop the understanding of :

- The understanding of basic concepts of clinical biochemistry.
- To understand disorder related with biomolecules metabolism.

COURSE OUTCOMES (CO):

After completion of the course, a student will be able to

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Anticoagulant preservatives for blood and urine. Transport of specimens.
CO2	Composition and their functions, Anemia:- classifications, erythrocyte indices. Blood coagulation system, Clotting time, Bleeding time, Prothrombin time, RBC count, WBC count,
CO3	Oral glucose tolerance test in normal and diabetic condition.
CO4	Cholesterol: Factors affecting blood cholesterol level. Dyslipoproteinemias, atheroscelorosis, risk factor and fatty liver.
CO5	Metabolism of bilirubin, jaundice - types, differential diagnosis. Liver function test - Icteric index, Vandenberg test, plasma protein changes.

COURSE: FUNDAMENTALS OF PLANT BIOCHEMISTRY
COURSE CODE: BS253
COURSE OBJECTIVES:

Develop the understanding of

- To understand the concepts of carbon assimilation.
- To understand the concepts of respiration and nitrogen metabolism.
- To understand Classification of terpenoids and representative examples from each class, biological functions of terpenoids. Concept of phytoalexins.

COURSE OUTCOMES (CO):

After completion of the course, a student will be able to

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Overview of glycolysis, Alternative reactions of glycolysis, Fate of pyruvate, Regulation of plant glycolysis, TCA cycle, oxidative phosphorylation and electron transport system.
CO2	Plant growth regulators – salicylic acid, polyamines, brassinosteroids.
CO3	Classification of terpenoids and representative examples from each class, biological functions of terpenoids.

CO4	Concept of phytoalexins.
CO5	Plant hormones and their effect on plant growth and development

COURSE: METABOLISM
COURSE CODE: BS201
COURSE OBJECTIVES:

Develop the understanding of

- Carbohydrate metabolism, significance of glycolysis and ETC, untreated diabetes
- Lipid metabolism and production of ketone bodies
- Protein metabolism, role of urea cycle and errors of protein metabolism
- Biosynthesis and degradation of purine and pyrimidine
- Characteristic of Enzymes, enzyme inhibition and kinetics

COURSE OUTCOMES (CO):

After completion of the course, a student will be able to

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Characteristic of Enzymes, enzyme inhibition and kinetics
CO2	Carbohydrate metabolism, significance of glycolysis and ETC, untreated diabetes
CO3	Lipid metabolism and production of ketone bodies
CO4	Protein metabolism, role of urea cycle and errors of protein metabolism
CO5	Biosynthesis and degradation of purine and pyrimidine

COURSE: ENZYMOLOGY LAB
COURSE CODE: BS255

COURSE OBJECTIVES:

Develop the understanding of :

- To understand the concepts of enzyme dynamics.

COURSE OUTCOMES (CO):

After completion of the course, a student will be able to

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Isolation of enzyme and determination of enzyme activity.
CO2	Study of the effect of pH on the enzyme activity.
CO3	Study of the effect of varying substrate concentration on the enzyme activity and determination of Km and Vmax.
CO4	Amino acid detections (Paper chromatography/ TLC).
CO5	Study of the effect of temperature on the enzyme activity.

COURSE: GENETIC ENGINEERING LAB
COURSE CODE: BS308
COURSE OBJECTIVES:

Develop the understanding of

- To understand the concepts of genetic engineering.

COURSE OUTCOMES (CO):

After completion of the course, a student will be able to

COURSE OUTCOME (CO)	DESCRIPTION
CO1	Isolation of genomic DNA from bacteria, plant and animal tissue
CO2	Isolation of plasmid DNA (E. coli)
CO3	Restriction digestion of DNA
CO4	Agarose Gel Electrophoresis
CO5	Demonstration of PCR