

## PG COURSE OUTCOMES-BIOCHEMISTRY

### I YEAR

#### SEMESTER-I

<u>Code</u>	<u>Course Title</u>	<u>HPW</u>	<u>Credits</u>
<b>BI 101T</b>	<b>Chemistry and Metabolism of Proteins and Lipids and Porphyrins (core)</b>	<b>4</b>	<b>4</b>

**After studying this paper, Biochemistry Postgraduate students will be able to:**

- ✓ Understand biochemistry at the atomic level, draw molecules and reaction mechanisms perfectly.
- ✓ Understand in detail about amino acid structures, types of amino acids, classifications, structure of proteins and types of proteins.
- ✓ Learn the molecular structures of 20 amino acids, differentiating essential and non-essential amino acids, biologically important modified amino acids and their functions.
- ✓ Recognize the structural levels of organization of proteins, 3D structure of proteins, its functions, denaturation (hemoglobin, myoglobin etc.).
- ✓ Learn how amino acids and proteins are metabolized, emphasizing the role of few intermediates of their metabolism, monitoring the deficiency and abundance disorders of amino acid metabolisms and the role of enzymes in the regulation of the pathways
- ✓ Describe/recognize lipid and porphyrin structures, lipoproteins and functions of porphyrins (heme, chlorophyll etc.).

- ✓ Describe what happens: - when lipids are metabolized, cholesterol, prostaglandins etc. are synthesized, emphasizing the genetic defects of lipid metabolism.
- ✓ Understand the relationship between the properties of macromolecules and cellular activities, cell metabolism and chemical composition.

<b>Code</b>	<b>Course Title</b>	<b>HPW</b>	<b>Credits</b>
<b>BI 102T</b>	<b>Chemistry and Metabolism of Carbohydrates, Vitamins and NucleicAcids ( Core)</b>	<b>4</b>	<b>4</b>

### **COURSE OUTCOMES**

#### **At the end of the Course the student would be able to**

- ✓ Understand in detail the structure and physico chemical properties of carbohydrates from monosaccharide to polysaccharides.
- ✓ Learn the significance of structural and storage polysaccharides in nature
- ✓ To study the structures of PG, GAG and other complex Polysaccharides.
- ✓ Describe the physiology of the carbohydrate Digestion in mammals.
- ✓ Illustrate the metabolism of carbohydrates through various anabolic and catabolic pathways like glycolysis, Kreb's cycle, Glycogen metabolism, glucuronic acid cycle etc.
- ✓ Relate the structure of DNA with its function in Replication and gene expression that include both transcription and translation.

- ✓ Understand the difference between the water soluble and fat soluble vitamins and their key role in the metabolism as coenzymes.
- ✓ Acquire the knowledge on the clinical consequences of nutritional deficiency.
- ✓ Present a case study on the nutrition deficiency disorder.

Code	Course Title	HPW	Credits
BI 103T	Bio-Analytical Techniques (core)	4	4

### COURSE OUTCOMES

**After studying this paper, biochemistry postgraduate students will be able to:**

- ✓ Understand the difference between UV visible and fluorescence spectroscopy and colorimetry.
- ✓ To identify different organic compounds using ESR ,NMR ,ORD and CD the various principles and instrumentation behind them
- ✓ To differentiate between paper, ion exchange and affinity chromatography, calculate Rf value from a chromatogram
- ✓ Exhibit a knowledge base in handling different chromatographic techniques and knowing the sequences of different proteins.
- ✓ Explain the dangers and safety precautions associated with xrays and identify the various isotopes used in radiography.
- ✓ Learn fundamental principles behind centrifugation and electrophoresis and apply them practically.
- ✓ Capable to choose and apply suitable separation techniques to identify different biomolecules.
- ✓ Understand the intersection of life and information sciences, using different sequencing and mapping like zymography, SDS-PAGE, DNAfoot printing, southern and northern blots and applying them at genome level.

Code	Course Title	HPW	Credits
BI 104T	Bioenergetics And CellBiology (core)	4	4

### COURSE OUTCOMES

**After studying this paper, biochemistry postgraduate students will be able to:**

- ✓ Describing structure, functions and the mechanism of action of enzymes. Learning kinetics of enzyme catalysed reactions and enzyme inhibitions and regulatory process. Ability to perform immobilization of enzymes. Exposure of wide applications of enzymes and future potential.
- ✓ Understand the fundamental energetics of biochemical processes, chemical logic of metabolic pathways. Knowing in detail about concepts to illustrate how enzymes and redox carriers and the oxidative phosphorylation machinery occur.
- ✓ Understanding the utilization of proton gradient to drive the formation of high energy bonds and high energy compounds.
- ✓ Learning the detailed structures of eukaryotic and prokaryotic cells and methods used to examine them. Acquiring knowledge on cell-cell interactions, Cell cycle cell division and apoptosis.`
- ✓ 5. To understand a basic and comprehensive knowledge of eukaryotic and prokaryotic cells. A detail description of composition, structure and function of organelles and cell organelles and other cellular components.
- ✓ To provide a deeper insight in to the fundamentals of enzyme structure and function and kinetics of soluble and immobilized enzymes. Discussion on current applications and future potential of enzymes.
- ✓ Relating entropy to law of thermodynamics and Free energy and its relation to chemical equilibria. Detail description of Coupled reactions and their role in metabolism and Chemiosmotic hypothesis of ATP synthesis.

## SEMESTER-II

<b>Code</b>	<b>Course Title</b>	<b>HPW</b>	<b>Credits</b>
<b>BI 201T</b>	<b>Enzymology (core)</b>	<b>4</b>	<b>4</b>

## COURSE OUTCOMES

After studying this paper, biochemistry postgraduate students will be able to:

- ✓ Describe structure, functions and the mechanism of action of enzymes. Learning kinetics of enzyme catalysed reactions and enzyme inhibitions and regulatory process, Enzyme activity, Enzyme Units, Specific activity
- ✓ Have a deeper insight in to the fundamentals of enzyme structure and function and kinetics of soluble and immobilized enzymes. Discussion on current applications and future potential of enzymes.
- ✓ To perform immobilization of enzymes and understand the wide applications of enzymes and future potential.
- ✓ Have a complete understanding of rate of reactions and order of reactions, and inhibitions and their kinetics. To gain knowledge on enzyme catalysis and isoenzymes and on multienzyme and multienzyme complexes.
- ✓ Relate the entropy to law of thermodynamics and Free energy and its relation to chemical equilibria.

Code	Course Title	HPW	Credits
BI 202 T	MolecularBiology (core)	4	4

### COURSE OUTCOMES

After studying this paper, biochemistry postgraduate students will be able to:

- Understand different steps in the central dogma of molecular biology, enzymes involved in synthesis of DNA, RNA and protein.
  - Learn the basic steps involved in DNA replication in prokaryotes and eukaryotes, emphasizing the enzymes involved in different types of replication .
  - Describe the in vitro replication of DNA by PCR, most applicable technique of all the molecular works.
  - Understand and explain the different damages caused to DNA, the mechanisms involved in repairing DNA (direct and indirect methods) and DNA repair defects diseases.
  - Understand the purpose of the cells performing transcription and translation, learning steps involved in gene expression highlighting the enzymes and inhibitors of transcription and translation .Role of Transcription and Translation further
  - Explain the nature of signals, sorting, SRP Receptor in the targeting of proteins to the endoplasmic reticulum and to know that chaperones prevent faulty folding of other proteins.
  - Comprehend that ubiquitin is a key molecule in protein degradation and recognize the important role of transport vesicles in intracellular transport.
  - Learn that many diseases result from mutations in genes encoding proteins involved in intracellular transport and be familiar with the terms conformational diseases and diseases of proteostatic deficiency.
- ✓ Present hypothesis and select, adapt and conduct molecular and cell-based experiments to either confirm or reject the hypothesis.

Code	Course Title	HPW	Credits
BI 203 T	Biochemical Genetics And Model Organisms (core)	4	4

### COURSE OUTCOMES

**At the end of the Course the student would be able to**

- ✓ Learn and appreciate the history of the genetics through the study on various experimental approaches.
- ✓ Understand the Mendelian inheritance and the deviations from the pattern.
- ✓ Have a complete knowledge of the causes and consequences of types of mutations and methods of isolation.
- ✓ Construct the linkage maps for genes and make their own family pedigree and report which pattern of the inheritance it follows.
- ✓ Study the population genetics based on Hardy Weinberg law.
- ✓ To study about Horizontal gene transfer Mechanisms
- ✓ Construct a genome map of the micro-organisms through the methods of gene transfer such as Transformation, Transduction and conjugation.
- ✓ Understand the role of the model organisms are used to decipher a specific biological function.\ with typical examples
- ✓ Present a paper on the novel approaches in Gene targeting using a model organism

<b>Code</b>	<b>Course Title</b>	<b>HPW</b>	<b>Credits</b>
<b>BI 204 T</b>	<b>Endocrinology and Metabolic Disorders</b>	<b>4</b>	<b>4</b>

### COURSE OUTCOMES

- At the end of the course the student would be able to :
- Study the historical experiments that lead to the discovery of various hormones.
- Deeply understand the communication between the nervous system and the endocrine system.
- Learn the structure, functions and the disorders associated with the various hormones starting from the pituitary hormones to the gonadal hormones.
- Appreciate and analyze the endocrine regulation of the various metabolisms such as carbohydrate metabolism, Protein metabolism, calcium homeostasis, menstrual cycle, pregnancy and menopause.
- Apply the knowledge of hormones in assay of hormones such as T3, T4 and TSH and understand the strategy behind contraception.
- Learn the etiology of the disorders associated with the carbohydrate, amino acid, lipid and nucleic acid metabolism.
- Present a case study on a hormonal and a metabolic disorder.

## M.SC II YEAR

### SEMESTER-III

#### **SEMESTER-III**

<b>Code</b>	<b>Course Title</b>	<b>HPW</b>	<b>Credits</b>
<b>BI 301 T</b>	<b>Gene Regulation &amp; Genetic Engineering</b>	<b>4</b>	<b>4</b>

#### COURSE OUTCOMES

**At the end of the Course the student would be able to:**

- ✓ Understand “ Gene Regulation mechanism in Prokaryotes, Viruses and Eukaryotes”
- ✓ Differentiating between the different mechanisms involved, depending on the organism and the process involved in regulation.
- ✓ Gain knowledge about Recombinant DNA technology by studying about various Vectors and Restriction Enzymes involved.
- ✓ Study of Various Expression Systems and Molecular Markers
- ✓ Clear & Lucid understanding of the Various Regulatory mechanisms and their Applications
- ✓ Isolation of Genomes
- ✓ Application of R-DNA technology and use of Restriction enzymes in construction of various vectors and libraries such as c-DNA & Genomic libraries
- ✓ Screening of the libraries with the help of “ Reporter Genes” and Molecular Markers such as RFLP, RAPD, AFLP.

Code	Course Title	HPW	Credits
BI 302 T	Immunology and Immunotechnology	4	4

### COURSE OUTCOMES

**At the end of the Course the student would be able to:**

- ✓ Learn about the landmarks in the field of immunology and appreciate the efforts of the various scientists who contributed to the development of the field.
- ✓ Describe the components of the immune system and how cells and organs play an important role in the immune responses.
- ✓ Explain the specific interactions of Antigens and antibodies and the diversity of antibodies developed at the germ line DNA.
- ✓ Complete knowledge of the molecular mechanisms and kinetics of the immune responses , both humoral and cell mediated immunity.
- ✓ Understand the role of the HLA antigens in the transplantation of the various organs and graft rejection.
- ✓ Critically understand the abnormal manifestations of the immune response in the form of Hypersensitive reactions and autoimmune diseases.
- ✓ Study the principle and applications of various immuno techniques ranging from precipitation and agglutination reactions to ELISA, Radio immunoassay and flow cytometry.
- ✓ To study about the role of Vaccines and types or mode of their action
- ✓ Present research articles pertaining to novel vaccines and immuno techniques.

Code	Course Title	HPW	Credits
BI 303 T	Nutrition and Clinical Biochemistry	4	4

### COURSE OUTCOMES

**After studying this paper, Biochemistry Postgraduate students will be able to:**

- Understand different proximate analysis of foods, their nutrient contents, spoilage and their prevention.
  - Learn the RDA for infants, children, adults and expecting mothers, the various nutritional policies and nutritional interventional programmes.
  - Describe the various disorders like anorexia, bulimia, kwashiorkor.
  - Understand and explain the acid-base and water-electrolyte balance in the body.
  - Understand the difference between plasma, serum, normal and abnormal constituents in various body fluids. Blood clotting mechanism and anticoagulants.
  - Explain the nature and function of various enzymes, normal levels and elevated levels in various diseases.
  - Comprehend that blood is a universal fluid for carrying different minerals, nutrients, proteins etc to and from various tissues.
  - Learn that many diseases result from imbalance in certain enzymes and helps in diagnosis of liver, cardiac, gastrointestinal, kidney diseases.
  - To create awareness on various National, International Agencies to promote Nutrition.
- ✓ Present hypothesis and select treatments related to various deficiencies and diseases.

Code	Course Title	HPW	Credits
BI 304 T	Human Physiology & Xenobiotics	4	4

### COURSE OUTCOMES

**At the end of the Course the student would be able to:**

- ✓ Understand Anatomy & Physiology of various systems in Human which gives a clear picture about various systems and their respective disorders.
- ✓ Acquire good knowledge on Nervous & Muscular systems helps in add on courses such Acupuncture, Physiotherapy.
- ✓ Metabolism of Xenobiotics in Liver can form the basis for courses such as Drug Discovery, Bioinformatics, Cheminformatics.
- ✓ Alterations in Functions of Liver help in understanding various disorders associated with liver and their clinical significance.
- ✓ 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.
- ✓ Understand “Anatomy & Physiology of various Systems such as Nervous system, Muscular system, Reproductive system, Liver & metabolism of Xenobiotics in Humans.”
- ✓ Understand the importance of enzymes such as SGOT, SGPT, ALP act as marker enzymes and are used in assessing the functioning of liver

## SEMESTER-IV

Code	Course Title	HPW	Credits
BI 401 T	Biostatistics and Bioinformatics	4	4

### At the end of the Course the student would be able to:

- ✓ Understand the Sampling techniques and interpret the data based on the measures of the central tendency.
- ✓ Learn the discrepancies and deviations of the variable based on measures of dispersion
- ✓ Study the relationship between variables based on correlation and regression analysis
- ✓ Deduce the probable outcomes of an experiment based on observations following laws of probability and also assess the significance of the interpretation through tests of significance such as t-test.
- ✓ To study the principles of Genomics, Proteomics
- ✓ Design the Experiments and also study the Quality control mechanism in Biochemistry.
- ✓ To understand the importance and applications of computational methods in Biology
- ✓ Acquire knowledge and awareness on basic informatics tools and to extract or retrieve information from Biological databases
- ✓ Learning the High-throughput technologies and using them to solve problems related to databases.
- ✓ To understand the significance of in silico lab trials and probable outcomes
- ✓ Using Bioinformatics tools in conducting research.

Code	Course Title	HPW	Credits
BI 402 T	Cell-Cell signaling and signal transduction	4	4

### COURSE OUTCOMES

**At the end of the Course the student would be able to:**

- ✓ Acquire knowledge on basic concepts of Biology like cell, and the molecules in the extracellular matrix , their function in signaling.
- ✓ Understanding ligand receptor interaction and their role in signal transductions
- ✓ Understand importance of signal cascades and their response specificity in signaling events.
- ✓ Learn how receptors carry different extracellular signals by different mechanisms in prokaryotes like bacteria, and eukaryotes like yeast, plants and animals.
- ✓ Understand the regulation of cell cycle and how it leads to cancer
- ✓ Describe the oncogene and proto-oncogene and their relation to cell proliferation
- ✓ Describe the role of tumor suppressor genes in protecting the normal cell from becoming cancer cell and apply the knowledge to devise new methodologies in cancer treatment.

<b>Code</b>	<b>Course Title</b>	<b>HPW</b>	<b>Credits</b>
<b>BI 403 T</b>	<b>Bacteriology and Virology</b>	<b>4</b>	<b>4</b>

### COURSE OUTCOMES

After studying this paper, students will be able to:

- ✓ Understand the morphological differences of different microorganisms, identifying industrially and economically useful microorganisms and applying them in different fields
- ✓ Master aseptic techniques and be able to perform routine culture handling tasks aseptically.
- ✓ Know the various physical and chemical growth requirements of bacteria and to know various industrially important microorganisms.
- ✓ Exhibit knowledge of viruses, their classification based on various factors.
- ✓ Understand the architecture of viruses.
- ✓ Understand interactions between viruses and the host immune systems.
- ✓ Comprehend the various methods of isolation, propagation, and cultivation of viruses.
- ✓ Analyze the bacteria present in air, water, and soil and applying the knowledge in day to day life.
- ✓ These are diseases that have recently appeared within a population to those whose incidence or geographic range is rapidly increasing/threaten to increase in the near future.

<b>Code</b>	<b>Course Title</b>	<b>HPW</b>	<b>Credits</b>
<b>BI 404 T</b>	<b>Biotechnology</b>	<b>4</b>	<b>4</b>

### COURSE OUTCOMES

After studying this paper, biochemistry postgraduate students will be able to:

- ✓ The ability to develop novel biotechnology ideas and products.
- ✓ Master skills associated with screening of industrially important important strains.
- ✓ Know the various vaccines and their production.
- ✓ Exhibit a knowledge of various case studies in plant genomes and genetically modified foods.
- ✓ Understand the architecture of protein designing, fusion proteins, methods of drug design and delivery.
- ✓ Understand production of high value therapeutics, antibody engineering, gene knock out experiments, human gene therapy.
- ✓ Comprehend the various methods of microbial mining ,bioremediation and production of microbial polysaccharides.
- ✓ Analyse the genetically modified foods and applying the knowledge in maintaining health and lifestyle.
- ✓ Importance of GM foods which are prepared for using recombinant DNA technology .its pros and cons.

**ST.PIOUS X DEGREE & PG COLLEGE FOR WOMEN**

**( Accredited with NAAC 'A' Grade)**

**Snehapuri Colony, Nacharam, Hyd-500076.**

**DEPARTMENT OF BIOCHEMISTRY**

(Details of Programme Outcomes, Programme Specific Outcomes, Course Outcomes of UG And PG Course)

**Submitted to :**

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**Signature of Chairman, Board of Studies.**

**Signature of the Head of The Department.**

