**LESSON PLAN SESSION 2025-26 ODD SEMESTERS**

**Dr. Prachi Gupta**

**Classes:** B. Sc Biotechnology **(1st sem)**

**Subjects:** **Basic of Biomolecules** **Credits:** 3L +1P = 4

**240/BIOT/CC103 BASICS OF BIOMOLECULES**

**July 2025**

Week-4: Introduction and History of Biochemistry. Importance of Biochemistry in life, Major

 Breakthroughs

Week-5: Introduction of Amino Acids, important features, structure insights

**August 2025**

Week-1: Properties of Amino acids

Week-2: Types of proteins and their classification, Forces stabilizing protein structure and

 shapes

Week-3:Different Level of structural organization of proteins;

Week-4: Hemoglobin, Fibrous and Globular Proteins, Denaturation, and renaturation of

 proteins.

**September 2025**

Week-1: Introduction of carbohydrates; Classification: Monosaccharides, Oligosaccharides

 and Polysaccharides, General Properties of carbohydrates

Week-2: Monosaccharides: Isomerism; Mutarotation; Structure-Linear form and Ring form,

 pyranose and furanose structure; anomer; epimers

Week-3: Revision & Mid-term Assessment.

Week-4: Oligosaccharides: reducing and non-reducing sugar; artificial sweeteners;

 Polysaccharides Homopolysaccharides.

**October 2025**

Week-1: Polysaccharides: Heteropolysaccharides (Hyaluronic acid & Chondroitin)

Week-2: Importance and definition of lipids; basic structural components; Fatty Acid-saturated

 and unsaturated fatty acids (nomenclature& structure); Biological roles of lipids

Week-3: Simple lipids (Fats & Oils); Compound (Phospholipids & Glycolipids)

Week-4: Diwali Break

Week-5: Derived Lipids (Steroids: cholesterol – its structure and biological properties;

 Terpenes; Carotenoids). Introduction & Types of nucleic acids

**November 2025**

Week-1: Structural components of nucleic acids; Nitrogenous bases: Structure of Pyrimidine

 & Purine derivatives; modified nitrogenous bases; tautomerism in nitrogenous bases;

Week-2: Nucleosides: nomenclature & structure; Nucleotides:nomenclature & structure

 (ribonucleotide &deoxyribonucleotides), functions of nucleotides

Week-3: Double helical model of DNA structure, Chargaff’s Rule, Variants of double helical

 DNA (A, B, C and Z-DNA), denaturation and annealing of DNA. Revision

Week-4: Examination

**LESSON PLAN SESSION 2025-26 ODD SEMESTERS**

**Dr. Prachi Gupta**

**Classes:** B. Sc Biotechnology **(3rd sem)**

**Subjects:** **Basic Enzymology** **Credits:** 2L +1P = 3

**240/BIOT/CC303 BASIC ENZYMOLOGY**

**July 2025**

Week-3: Introduction and History of Enzymology. I.U.B classification system

Week-4: Knowledge of various terms such as holoenzyme, apoenzyme, co-enzyme, prosthetic

 group, co-factors, ribozymes, abzymes, metalloenzymes, monomeric & oligomeric

 enzymes,

Week-5: Isoenzymes, or Isozymes; Biological Roles of Enzymes (Endo- and exo-enzyme)

**August 2025**

Week-1: Chemical Nature of Enzymes; Characteristics of Enzymes (colloidal nature, catalytic

 nature, turn over number, Specificity of enzyme action, thermolability- denaturation

 and renaturation)

Week-2: Understanding of Energy Mechanics of Enzymatic Reactions: standard free energy,

 ground & transition state

Week-3:Activation energy, energy diagram of reaction, rate limiting step, feed-back inhibition,

 zymogen

Week-4: Michaelis Menten Hypothesis; Derivation Michaelis-Menten equation

**September 2025**

Week-1: Michaelis constant, Significance of Km and Vm values

Week-2: Active Site & its detailed features; Fischer’s lock and key model; Koshland’s induced

 fit model

Week-3: Revision & Mid-term Assessment.

Week-4: Reversible enzyme inhibition (Competitive inhibition, Non-competitive inhibition,

 and Uncompetitive inhibition)

**October 2025**

Week-1: Reversible enzyme inhibition (Non-competitive inhibition and Uncompetitive

 inhibition)

Week-2: Co-enzymes: Mechanism of action of important coenzymes NAD, FAD, FMN

Week-3: Co-enzymes: Mechanism of action of important coenzymes TPP, Pyridoxal sulphate, lipoic acid, CoASH, Vit B12

Week-4: Diwali Break

Week-5: Methods of enzyme immobilization and applications of immobilized enzymes

**November 2025**

Week-1: Applications of enzymes in food, sugar, dairy, detergent

Week-2: Applications of enzymes in leather industry, medicine & diagnostics

Week-3: Revision

Week-4: Examination

**Lesson Plan: Session Odd Semester 2025-26**

**Mrs. Sangeeta**

**Classes:** B.Sc. Biotechnology 1st Semester

**Subjects:** Fundamentals of Genetics , Basic Cell Biology, Dairy Processing

**240/BIOT/CC101- Fundamentals of Genetics**

**July 2025**

Week-3 Genetics - Definition history, and terminology

Week-4 Mendel’s work on transmission of traits

**August 2025**

Week-1 Principles of Inheritance, Monohybrid, di-hybrid, and trihybrid crosses, test cross, backcross

Week-2 Chromosome theory of inheritance (Sutton-Boveri) Allelic interactions

Week-3 Penetrance, and expressivity, Non-allelic interactions

Week-4 Polygenic traits & problem solving

**September 2025**

Week-1 Linkage & types

Week-2 Crossing Over & mechanism

Week-3 Mid Term Assessment Week-4 Chromosomal Mapping, Interference and coincidence.

**October 2025**

Week-1 Mechanisms of sex determination & sex linkage

Week-2 Chromosome and genomic organization

Week-3 Diwali vacations Week-4 Chromosomal aberrations

**November 2025**

Week-1 Extra chromosomal Inheritance

Week-2 Population Genetics

Week-3 Problem solving & Revision

**240/BIOT/CC102- Basic Cell Biology**

**July 2025**

Week-4 Historical perspectives. Discovery of cell, cell theory

**August 2025**

Week-1 Ultra structure of a prokaryotic cell & eukaryotic cell,

Week-2 Structure and function of cell wall, Ultra structure of plasma membrane

Week-3 Transport across membranes

Week-4 Differentiation of cell surface

**September 2025**

Week-1 Endoplasmic Reticulum (SER & RER), Golgi apparatus, Lysosomes

Week-2 Micro bodies, Ribosomes and its types, Structure, functions & biogenesis of mitochondria, chloroplast.

Week-3 Mid-term Examination Week-4 Cytoskeletal structures, centrioles, basal bodies

**October 2025**

Week-1 Structure and organization of nucleus

Week-2 Cell division: Cell cycle, mitosis and meiosis

Week-3 Diwali Vacations Week-4 Regulations of cell cycle and check points and proteins involved in cell cycle check points.

**November 2025**

Week-1 Extracellular Matrix

Week-2 Programmed cell death

Week-3 Cancer & Revision

**240/BIOT/SEC101- Dairy Processing**

**July-2025**

Week-4 Operation Flood

**August-2025**

Week-1 Definition of Milk and Nutritive value of milk Week-2 ICMR recommendation of nutrients –Per Capita Milk production Week-3 Need for processing milk. , Different types of Milks & its Products Week-4 List the various units within a dairy processing plant

**September-2025**

Week-1 List the machineries used in a dairy processing Week-2 Composition, Standards, Manufacturing of Curd/Dahi, Yoghurt Week-3 Mid-term Examination

Week-4 Composition, Standards, Manufacturing of Cheese and its types

**October-2025**

Week-1 Composition, Standards, Manufacturing of Khoa

Week-2 Composition, Standards, Manufacturing of Paneer

Week-3 Diwali Vacations

Week-4 Composition, Standards, Manufacturing of Ghee

**November-2025**

Week-1 Composition, Standards, Manufacturing of Ice Cream

Week-2 Revision

**LESSON PLAN: SESSION (2025-26)**

**Dr. Mansi Arora**

**Classes:** B.Sc. Biotechnology (5th Semester); B.Sc. Life Sciences (3rd Semester)

**Subjects:** Bioinformatics (13700), Genomic and Proteomics (13703), Applications of biotechnology in agriculture & environment (240/BIOT/MI301)

**ODD SEMESTER**

**BIOINFORMATICS (13700)**

**July-2025**

Week-3: History, aim and scope of Bioinformatics

Week-4: Biological Databases, NCBI

**August-2025**

Week-1: Sequence Information Sources

Week-2: Sequence Information Sources contd.

Week-3: Protein Information Sources

Week-4: Data Generation techniques

**September-2025**

Week-1: Data Generation techniques contd.,

Week-2: Homology, Pairwise Alignments, Substitution Matrices

Week-3: Mid Semester Examination

Week-4: BLAST, Multiple Sequence Alignment

**October-2025**

Week-1: Phylogenetic Analysis

Week-2: Detecting ORFs, Sequence Assembly

Week-3: Searching Databases, Data Submission

Week-4: Diwali Break

Week-5: SequenceSimilarity Searches-BLAST, FASTA

**November-2025**

Week-1: Genome Annotation: Pattern and repeat finding

Week-2: Gene identification tools

Week-3: Revision and Problem solving

Week-4: Examinations start

**GENOMICS AND PROTEOMICS (13703)**

**July-2025**

Week-3: Introduction to Genomics and Proteomics

Week-4: Protein structure, Physical interactions

**August-2025**

Week-1: Physical and Chemical properties of proteins

Week-2: Determination of covalent structure

Week-3: Determination of protein size

Week-4: 2D-PAGE

**September-2025**

Week-1: Mass spectrometry

Week-2: Mass spectrometry contd.

Week-3: Mid Semester Examination

Week-4: DNA sequencing methods: manual

**October-2025**

Week-1: DNA sequencing methods: Automatic, Pyrosequencing

Week-2: Genome Sequencing

Week-3: Genome Assembly

Week-4: Diwali Break

Week-5: Managing and Distributing Genome Data (UCSC, NCBI Genome)

**November-2025**

Week-1: ENSEMBL, VISTA

Week-2: Selected Model Organismal Genomes and Databases

Week-3: Revision and Problem solving

Week-4: Examinations start

**APPLICATIONS OF BIOTECHNOLOGY IN AGRICULTURE & ENVIRONMENT**

**(240/BIOT/MI301)**

**July-2025**

Week-3: Scope and applications of the subject

Week-4: Market for environmental and agricultural biotechnology

**August-2025**

Week-1: Biotechnological tools and techniques for crop improvement

Week-2: Overview of the concept of green technology

Week-3: Sustainable consumption of resources

Week-4: Waste to energy approaches

**September-2025**

Week-1: Alternate energy resources

Week-2: Bioremediation definition and principle, types

Week-3: Mid Semester Examination

Week-4: Bioremediation definition and principle, types contd.

**October-2025**

Week-1: Biotechnological interventions for solid waste treatment

Week-2: Applications of microbes in soil fertility and crop production

Week-3: Applications of microbes in soil fertility and crop production contd.

Week-4: Diwali Break

Week-5: Genetic modifications in Agriculture

**November-2025**

Week-1: Genetic modifications in Agriculture contd.

Week-2: National and international guidelines for GMOs

Week-3: Revision and Problem solving

Week-4: Examinations start

**LESSON PLAN SESSION 2025-26 (ODD SEMESTER)**

**Name: Dr. Sheetal Yadav**

 **Class: BSC Biotechnology (Interdisciplinary) 3rd Semester**

**Lesson Plan: 240/BIOT/CC301 Bioanalytical tools**

**July-2025**

Week 4: Introduction to Electrophoresis. Starch-gel, polyacrylamide gel (native)

**August-2025**

Week 1: Polyacrylamide gel (native and SDS-PAGE),

Week2: Agrose-gel electrophoresis, Colony hybridization, Dot Blot Techniques and Microarray

Week3: Immuno-electrophoresis, isoelectric focusing, Southern Blotting. Northern and western blotting.

Week 4: Introduction to Biosensor and its,Nanotechnology and their applications

**September-2025**

Week 1: Introduction to the principle of chromatography.

Week2: Paper chromatography, Thin layer chromatography, Column chromatography

Week 3: **Si**lica and gel filtration, Affinity and Ion exchange chromatography **,**Gas chromatography, HPLC

Week 4: Terms, Simple microscopy, Compound microscoppe, phase contrast microscopy, florescences spectroscopy

**October-2025**

Week 1: Electron microscopy (TEM and SEM)

Week2: absorption and emission spectroscopy,Principle and law of absorption,

Week3: Diwali Break

Week4: Fluorimetry, Colorimetery, Spectrophotometry (visible, UV, infra-red)

**November-2025**

Week 1; Cell Fractionation Techniques, Centrifugation

Week 2: Isolation of sub-cellular organelles and particles

Week 3: Differential Centrifugation, Density gradient Centrifugation

Week 4: Revision and Examination

**LESSON PLAN SESSION 2025-26 (ODD SEMESTER)**

**Name: Dr. Sheetal Yadav**

 **Class: BSC Biotechnology- Multidisciplinary Course- 3rd Semester**

**Lesson Plan: Power of Immune System 240/BIOT/MD301**

**July-2025**

Week 3: Overview of immune system Week 4 : Various components of Immune system and functions

**August-2025**

Week 1:Immune cells:white blood cells Lymphoid organs - Primary vs Secondary Week2:Lymphoid organs and role - Primary and Secondary Week3:Types of Immune responses : innate, adaptive immunity, passive and active immunity Week 4: Antigen: Definition , types and examples

**September-2025**

Week 1: Antibody: definition and structure

Week2: Types of antibodies and function

Week 3: Specificity and function of antibodies

Week 4: Antigen-antibody interaction and importance

**October-2025**

Week 1:Basic knowledge of blood group

Week2: Blood antigens and Blood transfusion

Week3: Diwali Break

Week4: Immunodefeciency disorders AIDS

**November-2025**

Week 1: Indian Immunization Schedule with brief description of all the vaccines Week 2: Principle and working of pregnancy test Week 3: Revision Week 4: Revision and Examination

**LESSON PLAN SESSION 2025-26 (ODD SEMESTER)**

**Name: Dr. Sheetal yadav**

 **Class: BSC Life Sciences -Minor Course-Ist Semester**

**Lesson Plan: Fundamentals of Biotechnology- 240/BIOT/MI C101**

**July-2025**

Week 4 :Biotechnology Definition, Types and colors (white,red, green,blue)

**August-2025**

Week 1: scope and future of biotechnology

Week2: Introduction of genetic engineering

Week3: Basic concept of genetically modified organisms

Week 4: History of genetic manipulations

**September-2025**

Week 1:Application of biotechnology in agriculture, food industry, pharmaceutical industry, forensic analysis, environment protection.

Week2: Role of biotechnology in Bio-informatics

Week 3:Role of biotechnology in Nanotechnology and Biosensor.

Week 4: Role of biotechnology: Biosensor.

**October-2025**

Week 1: Brief account of Intellectual Property Rights

Week2: Ethical issues related to Biotechnology

Week3: Diwali Break

Week4: Future of Biotechnology

**November-2025**

Week 1: Biotechnology research in. Biotechnology in context of developing world

 Week 2: Revision

 Week 3: Revision and Examination