Mahatma Gandhi University
MEGHALAYA
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SYLLABUS MANUAL

PARAMEDICAL PROGRAMME
PROGRAMME CODE --- 503

Post Graduate Diploma in Bio Technology (PGDBT)

SEMESTER I

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Detailed Syllabus

SEMESTER I

PGDBT11 - Introductory Biology

Unit 2: Kingdoms of life, or Biological Classification, species and population, Biotic community, Biosphere.
Unit 3: Cell as a unit of life : Prokaryotic and Eukaryotics cell, Plant and animal cell, cell structure, membrane organization and cell organelles. Cell function, cell division mitosis and meiosis, cell cycle .
Unit 4: Introduction to Bio Molecules:
   I. Structure and properties of mono, oliga and poly Saccharides
   II. Structure and properties of fatty acids, glycerolipids, phospholipids, glycolipids, steroids.
   III. Structures and Properties of amino acids peptides and protein.
   IV. Structure and properties of purines, Pyrimidines, nucleosides, nucleotides, polynucleotides, Ribonucleic acids and Deoxyribonucleic acids, nucleoprotein complexes.

Unit 5: Metabolism: Introduction of Respiration and Photosynthesis.

PGDBT12 - Molecular Biology – I

Unit 1: Cell: - Cell organelles: Structure function, structure of mitochondria and organization of respiratory chain, organization of cytoskeleton and nucleic.
Unit -2:- STRUCTURE & PROPERTIES OF DNA: Discovery of DNA as the genetic material, Structure of DNA (A,B&Z forms ), concept & definition of the genome, C-value paradox, denaturation & renaturation of DNA, repetitive & non-repetitive DNA, reassociation kinetics. Cot curve, Rot curve, chemical & kinetic complexitv of DNA, supercoiling in DNA.
Unit 2: PROKARYOTIC AND EUKARYOTIC GENOME ORGANIZATION:-Organization of viral genome, organization of bacterial genome, chromosome structure in eukaryotes, nucleosome model, chromatin structure, satellite DNA, polytene chromosomes, lambrush chromosomes, B chromosomes-Evolution of the gene concept, definition of gene, interrupted genes, multigene families & pseudogenes, overlapping genes, nested genes, open reading frames.
Unit 4: DNA REPLICATION:- General features of DNA replication in prokaryotes & eukaryotes, enzymology of DNA replication, regulation of DNA replication.


PGDBT13 - Bioenergetics & Metabolism

Unit 2: Lipid : Define Lipid, nomenclature, classification structure, chemistry and properties. Lipids with specific biological function. Lipoproteins and biological membrane, micelles and liposomes. Lipid metabolism : Biosynthesis and degradation of fatty acid. Prostaglandins, leukotrienes and thromboxanes.


Unit 5: First and second laws of thermodynamics & concept of free energy. High energy phospho Compounds, ATP cycle, structural basis of free energy during hydrolysis of ATP. Hormones : Hormones receptors and intracellular messengers, Adenylate cyclase, Protein kinase and phosphodiesterase. Porphyrins : Classification and Structure.

PGDBT14 – Microbiology

Unit 1: THE WORLD OF BACTERIA:- General characteristics & classification of bacteria according to Bergey's manual of systematic bacteriology. Nutritional requirements & physical conditions necessary for cultivation of bacteria, properties of bacteriological media.


Unit 3: MICROBIAL METABOLISM & STAINING TECHNIQUES- Classification of bacteria on the basis of their nutritional requirements, transport of substances across membranes. Procedure and principle involved in gram's staining, acid fast staining, flagella staining, endospore staining.

Unit 4: Microbial growth & nutrition :- Definition of growth, mathematical expression of growth, measurement of growth field; synchronous growth, continuous culture, effect of environmental factor on growth.

Unit 5: Microbial Ecology:- Rhizosphere, phylloplane & role of microorganism is productivity of ecosystem. Interaction between microorganism, and with plants and animals. Biogeochemical cycle. Microbes & bio-deterioration.

PGDBT15 – Practical

SEMESTER II

PGDBT21 - Biophysical Chemistry & Instrumentation


Unit 2: Centrifugation: Principle, types, analytical and prepared centrifugation, differential density, gradient centrifugation, sedimentation and coefficient centrifuge and its application. Electrophoresis : Principles, types
and application (paper, starch, gel polyacrylamide and agar electrophoresis. Chromatography: Principle type and application, (Paper, thin layer, gas ion exchange and molecular sieve). Affinity chromatography, HPLC, FPLC.


PGDBT22 - Enzymology & Enzyme Technology

Unit 1: Enzyme: Historical aspects, nomenclature and classification. General properties of enzymes and the factors that affect their activity and the associated changes. Extraction assay and purification of enzymes. Subcellular localization and organization of enzymes

Unit 2: Enzyme kinetics (steady state), determination of Km value and studying, kinetics using, Lineweaver-Burke plot, Eadie Hofstee plot "and: IHans-Woolf equations. Enzyme inhibitors-Presteady state kinetics-fast kinetics to elucidate the intermediate and rate limiting steps (flow and relaxation techniques)Complex kinetics and analysis. Allosteric enzyme. Rapid reaction techniques.


Unit 4: Coenzymes, Isoenzymes & metalloenzymes. Membrane bound enzymes-their extraction assay. Lipid-protein interaction and the effect of fluidity on enzyme activity.


PGDBT23 - Bio-Informatics

Unit 1: Overview of Bio-Informatics- Database types,
Unit 2: Sequence database-nucleotide and protein sequence database,
Unit 3: Primary and secondary database, Gene Bank,
Unit 4: Structure database-protein Data Bank (PDB),
Unit 5: Visualization of structural information,
Unit 6: Genomics and the genome.
Unit 7: Project sequencing and sequence assembling using computers.
PGDBT 24 - Molecular Biology-II

Unit 1: TRANSPOSABLE GENETIC ELEMENTS: Discovery & definition of transposons, simple transposons ( IS elements ), composite transposons (Tn3, Tn5, Tn9, Tn10 ), Ac/Ds elements in maize, P elements in drosophila, Retrotansposons, mechanisms of transposition.

Unit 2: Gene Expression:- Structure, classes & function of RNA. RNA transcription and processing in Eukaryotes and prokaryotes genetic code and protein synthesis Transcription and translational controls.


Unit 5: Gene as unit of Mutation & Recombination :- Physical and Chemical Basis of Mutation: Mechanism of mutagenesis, Mutation of DNA & protein levels. Recombination is Bacteria - Transformation, transduction and conjugation, mechanism of gene transfer and application.

Unit 6: Oncogenes and their properties ; classification, characteristics and significance in development, Differentiation and Carcinogens . An overview of Apoptosis its phases and significance, Apoptosis in pathogenesis & therapeutic implication.

PGDBT25 – Practical

- Study of transduction, transformation, conjugation in E.coli.
- Study of mutation is E.coli.
- Assay of Enzyme activity.
- Kinetic studies on enzyme.
- Alkaline phophatase estimation.
- Elisa test
- Immobilization of Enzymes.
- Urease estimation by colorimetric method.
- Isolation of genomic DNA from bacterial cells.
- Isolation of plasmid DNA from bacterial cells.
- Isolation of genomic DNA from plant cells.
- Transformation of CaCl2

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