


Digambarrao Bindu Arts Commerce & Science College, Bhokar, Dist Nanded

Annual Teaching Plan for 2017-2018

Department of Biophysics

Work Distribution

Class	Teachers					
	Mr.V.A.Jadhav		Mr. Jondhale M.B.		Miss. P.P.Hamwate	
	Theory	Practical	Theory	Practical	Theory	Practical
B.Sc. I Sem.-I	Paper-I	Paper-V			Paper-II	
B.Sc. I Sem.-II	Paper-III				Paper-IV	
B.Sc. II Sem.-III	Paper-VI	Paper-X	Paper-VII	Paper-XI		
B.Sc. II Sem.-IV	Paper-VIII		Paper-IX			
B.Sc. III Sem.-V	Paper-XII	Paper-XVI	Paper-XIII		Paper-XIII	Paper-XVII
B.Sc. III Sem.-VI	Paper-XIV		Paper-XV		Paper-XV	


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2017-18



DIGAMBARRAO BINDU ARTS, COMMERCE & SCIENCE,
COLLEGE, BHOKAR DIST. NANDED

DEPARTMENT OF BIOPHYSICS

Class: B.Sc. First Year

Title of the Paper & No.: CCBP-I: Molecular Biophysics


CCBP-III: Biostatistics & Computer Fundamentals

Name of the Teacher: Mr. Vyankatesh A.Jadhav

ANNUAL TEACHING PLAN 2017-18		
Month	Course content	Expected Periods
June	ADMISSION PROCESS & Introductory Lectures Unit 1: Atomic & Molecular structure Structure of atom-Models & theories, Quantum numbers, Hunds rule , Periodic table, Concept of bonding; valence of carbon; hybridizations of carbon, nitrogen & oxygen; Molecular orbital theories, polar & non polar molecules; inductive effect.	8
July	Secondary bonding: weak interactions, hydrogen bonding; dipole-dipole & dipole-induced dipole interactions; London dispersion forces. Bonds within molecules-Ionic, covalent, Hydrogen, Electrostatic, Van-der Waals forces, Bond lengths & Bond energies , Bond angles, Structural isomerism; optical isomerism & optical activity. Unit 2 : Physico-chemical Foundations Biophysics of Water: Physicochemical properties of water, Molecular structure, Nature of hydrophobic interactions, Water Structure. Small-Molecule Solutes: Hydrophiles, Hydrophobes, Aqueous Environment of the Cell,	12
Aug	Acid & Bases: Acid-Base theories, Mole concept, Molarity, Molality & Normality, Ampholyte, concept of pH, measurements of pH , Henderson–Hasselbatch equation , Titration curve & pK values, numerical problems. Unit 3 : Physical Foundations of Biophysics Thermodynamics of Biological system: First and second laws of thermodynamics, activation energy. Biological systems as open, non-equilibrium systems. Concept of free energy, entropy, Enthalpy, Negative entropy as Significant to biological systems. biological clocks. Bioenergetics: Concept of energy coupling in biological processors, structure and role of mitochondria, high energy phosphate bond, Electron-transport chain, Oxidative Phosphorylation including chemiosmotic hypothesis.	13
Sept	Unit 4. Biomolecules as molecular alphabets of life Nucleic acids: Purine and Pyrimidine bases, nucleosides, nucleotides, basic differences in structure and function of RNA and DNA Amino acids & Proteins: Amino acid general structure & types, peptide bond, Structure of Proteins - primary, secondary, tertiary and quaternary, Carbohydrates: Structure and function carbohydrate, Structure and conformation of cellulose, amylopectin & glycogen, Chitin. Lipids : Definition: Types of lipids and Function. Vitamins & hormones: Structure, classification & function.	12
Oct	Revision and SRTMU Nanded End semester Examination	4
Nov	SRTMU Nanded End semester Examination	Invigilation
Dec	Unit 1 –Introductory Biostatistics Statistics, Biostatistics and Biometry, Aims of Biostatistics, Applications of Biostatistics. Data Collection, Sampling, Classification of Data, Tabular Representation of Data, Graphic Representation of Data: Line	13

	Diagram, Histogram, Frequency Polygon, Frequency Curve, Cumulative Frequency Curve or Ogive, Scatter or Dot Diagram, Bar Diagram, pie diagram, Pictogram And Cartogram.	
Jan	<p>Unit 2- Central Tendency, Dispersion, Correlation & regression Average. Objectives of Averages, Characteristics of an Ideal Measure of Central Tendency Types of Averages, Mean, Median, Mode, Measures of Dispersion, Range, Standard Deviation, Standard Error. Correlation. Types of Correlation, Measures of Simple Correlation, Regression, Simple Regression, Regression Equation,</p> <p>Unit 3- Probability, Test of Hypothesis and Significance Important Terms and Concepts, Sample point, Sample space, Trial and Event; Classical Definition of Probability, Frequency Definition of Probability, Rules of Probability (Addition Rule and Multiplication Rule), Probability Distributions: Binomial Distribution, Poisson Distribution and Normal Distribution. Test of Significance</p>	15
Feb	<p>Unit 4: Computer Fundamentals Computer system at a glance processor (CPU, ALU) Memory (ROM, RAM,) Storage, Input & Output devices, Computer peripherals, Binary code and binary system, Algorithms and Flow charts, Software & Hardware, Operating systems (Dos, Windows) Application software's (MS-office) Types of computers, Network concepts (LAN, WAN, MODEM,). Internet protocols WWW (World wide webs) Internet connectivity, search engines, biological databases.</p>	15
March	<p>Revision Final Practical Examinations SRTMU Nanded End semester Examination</p>	3
April	SRTMU Nanded End semester Examination	Invigilation


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DEPARTMENT OF BIOPHYSICS

Class: B.Sc. Second Year

Title of the Paper & No.: CCBP VI: Molecular Biology
CCBP-VIII Molecular Enzymology


Name of the Teacher: Jadhav V A

ANNUAL TEACHING PLAN 2017-18

Month	Course content	Expected Periods
June	ADMISSION PROCESS & Introductory Lectures Unit 1 - Introduction to molecular biology The Central Dogma, DNA Structure and Chemistry, The Molecular Nature of Genes & Organization, Gene Function, Protein-DNA Interactions (prokaryote and eukaryote), DNA Topology and the Nucleosome, Introduction to bacterial genetics. <u>DNA Replication</u> : The Replication Fork, Origins and Telomeres, Enzymes of DNA synthesis, DNA Repair, DNA Recombination.	8
July	Unit II- Transcriptional Machinery RNA Structure, RNA Types, genetic code, Eukaryotic RNA Polymerases and Their Promoters, reverse transcriptase, General Transcription Factors and Transcription. Activators in Eukaryotes Messenger RNA Processing: Splicing, Capping and Polyadenylation, Ribozymes, and Regulatory RNA Phage, Bacterial & Eukaryotic transcriptional Control.	12
Aug	Unit - III Transcriptional Machinery The Mechanism of Translation: Initiation, Elongation and Termination, Post Translational processing, Translational Control, Posttranslational modifications. Control of genetic expression: Lac and Trp operons, regulation of protein synthesis.	13
Sept	Unit - IV Principles of r-DNA technology Steps involved in r-DNA Technology, Restriction enzymes and its applications in medicine, agriculture, and in the production of commercially important proteins.	12
Oct	Revision and SRTMU Nanded End semester Examination	4
Nov	SRTMU Nanded End semester Examination	Invigilation
Dec	Unit I: Introduction to Enzymes General and unique features of enzyme, nomenclature and classification of enzymes, Enzyme commission code, Catalysis, Acid-base catalysis and	15

	<p>covalent catalysis, characteristics and mechanism of enzyme action, lock & key hypothesis, induced fit hypothesis, Active site structure, Enzyme specificity & selectivity, Co-enzymes and cofactors, Role of various cofactors in enzyme catalysis, Measurement of enzyme activity and its expression as Enzyme units, specific activity, katal, Intracellular localization of enzymes,</p> <p>Unit 2: Kinetics of enzyme Michaelis-Menton equation, steady state hypothesis, V_{max}, K_m & turnover number and their significance.</p>	
Jan	<p>Metal ions as enzyme inhibitors and activators. Line Weaver-Burk plots and its limitation. Eddie- Hofstee plot, Factors affecting enzyme activity-pH, temperature, pressure,.</p> <p>Unit 3: Enzyme Inhibitions Nature of enzyme inhibitors and activators, Reversible, irreversible, competitive, non- competitive, uncompetitive and mixed types of inhibition, Metalloenzymes</p>	18
Feb	<p>Unit 4: Use of Enzymes Extraction and purification of enzymes by using various techniques. Tests for purification and characterization . . . Immobilization of enzymes, Industrial and clinical applications of enzymes. Use of enzymes in food, Feed, dairy, leather, textile and drug industries. Enzyme electrodes</p>	12
March	<p>Revision Final Practical Examinations SRTMU Nanded End semester Examination</p>	3
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**DIGAMBARRAO BINDU [ACS] COLLEGE,
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DEPARTMENT OF BIOPHYSICS**

Class: B.Sc. Third Year

Title of the Paper & No.: **DSEBP -XIII: Bioinformatics & Structural Biology**
DSEBP -XIV: Radiation Biophysics.

Name of the Teacher: JADHAV V A

ANNUAL TEACHING PLAN 2017-18

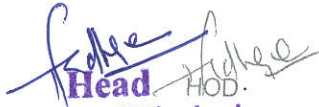
Month	Course content	Expected Periods
June	<p>ADMISSION PROCESS & Introductory Lectures</p> <p>Unit 1: Bioinformatics I</p> <p>Bioinformatics-Definition aims and tasks of bioinformatics, applications of bioinformatics, intrinsic & extrinsic views in bioinformatics.</p> <p>Data bases – Major Bioinformatics Resources:Nucleic acid sequence databases: NCBI ,EMBL, DDBJ; GenBank; Protein sequence databases: Uniprot-KB: SWISS-PROT, TrEMBL, Derived Structure classification database: CATH,SCOP; Genome Databases at NCBI, SANGER ;3D Structure Database - PDB, Chemical Structure database: Pubchem; Gene Expression database: GEO, SAGE, ExPASy.</p> <p>Genomics: DNA Sequence Analysis-Introduction, why analyze DNA , gene structure and DNA sequences, feature of DNA sequence analysis, expression profile of a cell, cDNA libraries, and ESTS, different approaches to EST analysis, Micro-array technology and its applications.</p>	8
July	<p>Unit 2: Bioinformatics II</p> <p>Phylogenetic Analysis-Phylogenetics, cladistics and ontology, building phylogenetic trees,Distance based methods and character based methods, molecular approaches to phylogeny,phylogenetic analysis databases.</p> <p>Sequence Alignment-Algorithm, goals and type of alignment, pair wise database searching, FASTA, BLAST, multiple sequence alignment, Detecting Open Reading Frames, Mutation Matrices, Interpreting results.</p>	12
Aug	<p>Unit 3: Structural Biology</p> <p>Levels of structures in Biological macromolecules, Basic structural & conformational principles, Protein and Nucleic acid structure, rotation angles, hydrogen bonding, hydrophobic interactions and water structures; ionic interactions, disulphide bonds, Ramachandran plot, Folding and flexibility, Types of proteins and Interactions that govern protein folding, folding mechanisms, Prediction, engineering and design of protein structures. Supra-molecular interactions, Functional importance of Protein-protein and protein-nucleic acid interactions.</p>	13
Sept	<p>Unit 4: Structural Bioinformatics</p> <p>Molecular Modeling : Predictive methods using DNA and Protein Sequences, Gene-prediction and Proteins-prediction strategies, Methods for Prediction of Structure, homology modeling, comparative modeling, threading, energy minimization , molecular visualization, Comparative modeling, Molecular visualization-protein conformation and visualization tool (RASMOL), Structures of oligomeric proteins and study of interaction interfaces.</p> <p>Drug Discovery and Pharmaco-informatics-drug discovery -role of bioinformatics in drug discovery target identification, validation, identification the lead compounds, optimization of lead compounds, pharmacoinformatics, chemical libraries, search programming docking and prediction of drug quality. Bioinformatics companies.</p>	12

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Oct	Revision and SRTMU Nanded End semester Examination	4
Nov	SRTMU Nanded End semester Examination	Invigilation
Dec	<p>Unit 1: Basics of Radiation Physics Atomic structure models, Constituents of atomic nuclei, Isotopes, Isobars, Isotones, Radioactivity, law of Radioactivity, General properties of alpha, beta and gamma radiations, Radiation units; Units of measurement of radioactivity. Curie, Becquerel. Units of exposure, Roentgen, Rad, Gray, relative biological effectiveness, Interaction of radiation with matter: Excitation and ionization, Photo electric effect, Compton Effect, pair production, Characteristic radiation. Properties, Characteristics X-rays , Interaction with different biosystems, Nonionizing radiations-UV, IR, Microwaves & Radio waves, their characteristics, interactions & implications in bio systems.</p>	13
Jan	<p>Unit 2: Basics of Radiochemistry and Radiobiology Radiolysis of water, Production of free radicals & their interactions, Direct and indirect effects of radiation. Radiation chemical yield and G value, Target theory, Single hit & Multi hit theory, Effect of radiation on Nucleic acids, Proteins, Enzymes, Action of radiation on living system – Viruses, Prokaryotic & Eukaryotic cells Cellular effects of radiation, somatic & genetic effects, Inhibition of Mitosis, survival curves, concept of LD50, acute and chronic (whole body) effects of radiation, Radiation syndrome in human beings.</p> <p>Unit 3: Radiation Detection & Measurement Radiation sources, Tele-gamma Unit (Cobalt unit), Gamma chamber, Nuclear reactors, gamma camera, Principles of radiation detection and measurement, General principles of Dosimeters., Basic principle, design and utility of ionization chamber, proportional counter, GM-counter, Scintillation Detectors. Thermo-luminescent dosimeter, chemical dosimeter-Fricke, Free radical dosimeters.</p>	15
Feb	<p>Unit 4: Radiation Safety measures and Application Natural & Man-made radiation exposures, Basic Principles of Radiation protection concept of Maximum permissible dose (MPD) personal and area monitoring, legal aspect of radiation protection, Disposal of radioactive waste. <u>Radioisotopes in biology</u>, Medicine (Therapy & diagnosis), Agriculture, Plant breeding, Soil plant relationship & plant physiology, Biological applications of radioisotope, Radio-labeling & Tracer techniques, Food irradiation, radiation sterilization of medical product. Autoradiography-Principle procedure and Application of autoradiography.</p>	15
March	<p>Revision Final Practical Examinations SRTMU Nanded End semester Examination</p>	3
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B.Sc. I Sem.-II	Paper-III				Paper-III	
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B.Sc. II Sem.-IV	Paper-VIII		Paper-VIII			
B.Sc. III Sem.-V	Paper-XIII	Paper-XVII	Paper-XII		Paper-XII	
B.Sc. III Sem.-VI	Paper-XV		Paper-XIV		Paper-XIV	Paper-XVI

[Signature]
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DEPARTMENT OF BIOPHYSICS

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CCBP-VIII: Molecular Enzymology

Name of the Teacher: Jadhav V A

ANNUAL TEACHING PLAN 2018-19

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July	<p>Unit II- Transcriptional Machinery RNA Structure, RNA Types, genetic code, Eukaryotic RNA Polymerases and Their Promoters, reverse transcriptase, General Transcription Factors and Transcription. Activators in Eukaryotes Messenger RNA Processing: Splicing, Capping and Polyadenylation, Ribozymes, and Regulatory RNA Phage, Bacterial & Eukaryotic transcriptional Control.</p>	12
Aug	<p>Unit - III Transcriptional Machinery The Mechanism of Translation: Initiation, Elongation and Termination, Post Translational processing, Translational Control, Posttranslational modifications. Control of genetic expression: Lac and Trp operons, regulation of protein synthesis.</p>	13
Sept	<p>Unit - IV Principles of r-DNA technology</p>	12

	Steps involved in r-DNA Technology, Restriction enzymes and its applications in medicine, agriculture, and in the production of commercially important proteins.	
Oct	Revision and SRTMU Nanded End semester Examination	4
Nov	SRTMU Nanded End semester Examination	Invigilation
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Jan	Metal ions as enzyme inhibitors and activators. Line Weaver-Burk plots and its limitation. Eddie-Hofstee plot, Factors affecting enzyme activity- pH, temperature, pressure, Unit 3: Enzyme Inhibitions Nature of enzyme inhibitors and activators, Reversible, irreversible, competitive, non-competitive, uncompetitive and mixed types of inhibition, Metalloenzymes	18
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DEPARTMENT OF BIOPHYSICS**

Class: B.Sc. Third Year

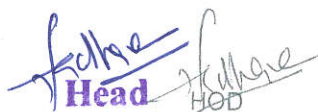
Title of the Paper & No.: **DSEBP -XIII: Bioinformatics & Structural Biology**
DSEBP -XIV: Radiation Biophysics.

Name of the Teacher: JADHAV V A

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Month	Course content	Expected Periods
June	<p>ADMISSION PROCESS & Introductory Lectures</p> <p>Unit 1: Bioinformatics I Bioinformatics-Definition aims and tasks of bioinformatics, applications of bioinformatics, intrinsic & extrinsic views in bioinformatics. Data bases – Major Bioinformatics Resources:Nucleic acid sequence databases: NCBI ,EMBL, DDBJ; GenBank; Protein sequence databases: Uniprot-KB: SWISS-PROT, TrEMBL, Derived Structure classification database: CATH,SCOP; Genome Databases at NCBI, SANGER ;3D Structure Database - PDB, Chemical Structure database: Pubchem; Gene Expression database: GEO, SAGE. ExpASy. Genomics: DNA Sequence Analysis-Introduction, why analyze DNA , gene structure and DNA sequences, feature of DNA sequence analysis, expression profile of a cell, cDNA libraries, and ESTS, different approaches to EST analysis, <u>Micro-array technology</u> and its applications.</p>	8
July	<p>Unit 2: Bioinformatics II Phylogenetic Analysis-Phylogenetics, cladistics and ontology, building phylogenetic trees,Distance based methods and character based methods, molecular approaches to phylogeny,phylogenetic analysis databases. Sequence Alignment-Algorithm, goals and type of alignment, pair wise database searching, FASTA, BLAST, multiple sequence alignment, Detecting Open Reading Frames, Mutation Matrices, Interpreting results.</p>	12
Aug	<p>Unit 3: Structural Biology Levels of structures in Biological macromolecules, Basic structural & conformational principles, Protein and Nucleic acid structure, rotation angles, hydrogen bonding, hydrophobic interactions and water structures; ionic interactions, disulphide bonds, Ramachandran plot, Folding and flexibility, Types of proteins and Interactions that govern protein folding, folding mechanisms, Prediction, engineering and design of protein structures. Supra-molecular interactions, Functional importance of Protein-protein and protein-nucleic acid interactions.</p>	13
Sept	<p>Unit 4: Structural Bioinformatics Molecular Modeling : Predictive methods using DNA and Protein Sequences, Gene-prediction and Proteins-prediction strategies, Methods for Prediction of Structure, homology modeling, comparative modeling, threading, energy minimization , molecular visualization, Comparative modeling, Molecularvisualization-protein conformation and visualization tool (RASMOL), Structures of oligomeric proteins and study of interaction interfaces. Drug Discovery and Pharmaco-informatics-Drug discovery -role of bioinformatics in drug discovery target identificationand validation, identification the lead compounds, optimization of lead compounds, pharmaco-informatics, chemical libraries, search programming docking and prediction of drug quality. Bioinformatics companies.</p>	12

Oct	Revision and SRTMU Nanded End semester Examination	4
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Dec	<p>Unit 1: Basics of Radiation Physics Atomic structure models, Constituents of atomic nuclei, Isotopes, Isobars, Isotones, Radioactivity, law of Radioactivity, General properties of alpha, beta and gamma radiations, Radiation units: Units of measurement of radioactivity. Curie, Becquerel. Units of exposure, Roentgen, Rad, Gray, relative biological effectiveness, Interaction of radiation with matter: Excitation and ionization, Photo electric effect, Compton Effect, pair production, Characteristic radiation. Properties, Characteristics X-rays, Interaction with different biosystems, Nonionizing radiations-UV, IR, Microwaves & Radio waves, their characteristics, interactions & implications in bio systems.</p>	13
Jan	<p>Unit 2: Basics of Radiochemistry and Radiobiology Radiolysis of water, Production of free radicals & their interactions, Direct and indirect effects of radiation. Radiation chemical yield and G value, Target theory, Single hit & Multi hit theory, Effect of radiation on Nucleic acids, Proteins, Enzymes, Action of radiation on living system – Viruses, Prokaryotic & Eukaryotic cells Cellular effects of radiation, somatic & genetic effects, Inhibition of Mitosis, survival curves, concept of LD50, acute and chronic (whole body) effects of radiation, Radiation syndrome in human beings.</p> <p>Unit 3: Radiation Detection & Measurement Radiation sources, Tele-gamma Unit (Cobalt unit), Gamma chamber, Nuclear reactors, gamma camera, Principles of radiation detection and measurement, General principles of Dosimeters., Basic principle, design and utility of ionization chamber, proportional counter, GM-counter,</p>	15
Feb	<p>Scintillation Detectors. Thermo-luminescent dosimeter, chemical dosimeter-Fricke, Free radical dosimeters.</p> <p>Unit 4: Radiation Safety measures and Application Natural & Man-made radiation exposures, Basic Principles of Radiation protection concept of Maximum permissible dose (MPD) personal and area monitoring, legal aspect of radiation protection, Disposal of radioactive waste. <u>Radioisotopes in biology, Medicine (Therapy & diagnosis), Agriculture, Plant breeding, Soil plant relationship & plant physiology, Biological applications of radioisotope, Radio-labeling & Tracer techniques, Food irradiation, radiation sterilization of medical product. Autoradiography-Principle procedure and Application of autoradiography.</u></p>	15
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Class: B.Sc. Third Year

Title of the Paper & No.: **DSEBP -XIII: Bioinformatics & Structural Biology**
DSEBP -XIV: Radiation Biophysics.


Name of the Teacher: JADHAV V A


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CCBP-III: Biostatistics & Computer Fundamentals

Name of the Teacher: Mr. Vyankatesh A. Jadhav

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Month	Course content	Expected Periods
June	ADMISSION PROCESS & Introductory Lectures Unit 1: Atomic & Molecular structure Structure of atom-Models & theories, Quantum numbers, Hund's rule, Periodic table, Concept of bonding; valence of carbon; hybridizations of carbon, nitrogen & oxygen; Molecular orbital theories, polar & non polar molecules; inductive effect.	8
July	Secondary bonding: weak interactions, hydrogen bonding; dipole-dipole & dipole-induced dipole interactions; London dispersion forces. Bonds within molecules-Ionic, covalent, Hydrogen, Electrostatic, Van-der Waals forces, Bond lengths & Bond energies, Bond angles, Structural isomerism; optical isomerism & optical activity. Unit 2 : Physico-chemical Foundations Biophysics of Water: Physicochemical properties of water, Molecular structure, Nature of hydrophobic interactions, Water Structure. Small-Molecule Solutes: Hydrophiles, Hydrophobes, Aqueous Environment of the Cell,	12
Aug	Acid & Bases: Acid-Base theories, Mole concept, Molarity, Molality & Normality, Ampholyte, concept of pH, measurements of pH, Henderson-Hasselbatch equation, Titration curve & pK values, numerical problems. Unit 3 : Physical Foundations of Biophysics Thermodynamics of Biological system: First and second laws of thermodynamics, activation energy. Biological systems as open, non-equilibrium systems, Concept of free energy, entropy, Enthalpy, Negative entropy as Significant to biological systems. biological clocks. Bioenergetics: Concept of energy coupling in biological processors, structure and role of mitochondria, high energy phosphate bond, Electron-transport chain, Oxidative Phosphorylation including chemiosmotic hypothesis.	13
Sept	Unit 4. Biomolecules as molecular alphabets of life Nucleic acids: Purine and Pyrimidine bases, nucleosides, nucleotides, basic differences in structure and function of RNA and DNA Amino acids & Proteins: Amino acid general structure & types, peptide bond, Structure of Proteins - primary, secondary, tertiary and quaternary. Carbohydrates: Structure and function carbohydrate, Structure and conformation of cellulose, amylopectin & glycogen, Chitin. Lipids : Definition: Types of lipids and Function. Vitamins & hormones: Structure, classification & function.	12
Oct	Revision and SRTMU Nanded End semester Examination	4
Nov	SRTMU Nanded End semester Examination	Invigilation
Dec	Unit I -Introductory Biostatistics Statistics, Biostatistics and Biometry, Aims of Biostatistics, Applications of Biostatistics. Data Collection, Sampling, Classification of Data, Tabular Representation of Data, Graphic Representation of Data: Line	13

Jan	<p>Diagram, Histogram, Frequency Polygon, Frequency Curve, Cumulative Frequency Curve or Ogive, Scatter or Dot Diagram, Bar Diagram, pie diagram, Pictogram And Cartogram.</p> <p>Unit 2- Central Tendency, Dispersion, Correlation & regression Average, Objectives of Averages, Characteristics of an Ideal Measure of Central Tendency Types of Averages, Mean, Median, Mode, Measures of Dispersion, Range, Standard Deviation, Standard Error. Correlation, Types of Correlation, Measures of Simple Correlation, Regression, Simple Regression, Regression Equation,</p> <p>Unit 3- Probability, Test of Hypothesis and Significance Important Terms and Concepts, Sample point, Sample space, Trial and Event; Classical Definition of Probability, Frequency Definition of Probability, Rules of Probability (Addition Rule and Multiplication Rule), Probability Distributions: Binomial Distribution, Poisson Distribution and Normal Distribution. Test of Significance</p>	15
Feb	<p>Unit 4: Computer Fundamentals Computer system at a glance processor (CPU, ALU) Memory (ROM, RAM,) Storage, Input & Output devices, Computer peripherals, Binary code and binary system, Algorithms and Flow charts, Software & Hardware, Operating systems (Dos, Windows) Application software's (MS-office) Types of computers, Network concepts (LAN, WAN, MODEM,). Internet protocols WWW (World wide webs) Internet connectivity, search engines, biological databases.</p>	15
March	<p>Revision Final Practical Examinations SRTMU Nanded End semester Examination</p>	3
April	SRTMU Nanded End semester Examination	Invigilation


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Digambarrao Bindu Arts Commerce & Science College, Bhokar, Dist Nanded

Annual Teaching Plan for 2019-2020

Department of Biophysics

Work Distribution

Class	Teachers					
	Mr.V.A.Jadhav		Mr.Jondhale M.B.		Miss. P.P.Hamwate	
	Theory	Practical	Theory	Practical	Theory	Practical
B.Sc. I Sem.-I	Paper-I	Paper-V			Paper-II	
B.Sc. I Sem.-II	Paper-III				Paper-IV	
B.Sc. II Sem.-III	Paper-VI	Paper-X	Paper-VII	Paper-XI		
B.Sc. II Sem.-IV	Paper-VIII		Paper-VIII			
B.Sc. III Sem.-V	Paper-XIII	Paper- XVII	Paper-XII		Paper-XII	
B.Sc. III Sem.-VI	Paper-XV		Paper-XIV		Paper-XIV	Paper-XVI


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DEPARTMENT OF BIOPHYSICS

Class: B.Sc. First Year

Title of the Paper & No.: CCBP-I: Molecular Biophysics
CCBP-IV: Basic Biophysical Techniques

Name of the Teacher: Mr. Vyankatesh A. Jadhav


ANNUAL TEACHING PLAN 2019-20		
Month	Course content	Expected Periods
June	ADMISSION PROCESS & Introductory Lectures Unit 1: Atomic & Molecular structure Structure of atom-Models & theories, Quantum numbers, Hund's rule, Periodic table, Concept of bonding; valence of carbon; hybridizations of carbon, nitrogen & oxygen; Molecular orbital theories, polar & non polar molecules; inductive effect.	8
July	Secondary bonding; weak interactions, hydrogen bonding; dipole-dipole & dipole-induced dipole interactions; London dispersion forces. Bonds within molecules-Ionic, covalent, Hydrogen, Electrostatic, Van-der Waals forces, Bond lengths & Bond energies, Bond angles, Structural isomerism; optical isomerism & optical activity. Unit 2 : Physico-chemical Foundations Biophysics of Water: Physicochemical properties of water, Molecular structure, Nature of hydrophobic interactions, Water Structure. Small-Molecule Solutes: Hydrophiles, Hydrophobes, Aqueous Environment of the Cell,	12
Aug	Acid & Bases: Acid-Base theories, Mole concept, Molarity, Molality & Normality, Ampholyte, concept of pH, measurements of pH, Henderson-Hasselbatch equation, Titration curve & pK values, numerical problems. Unit 3 : Physical Foundations of Biophysics Thermodynamics of Biological system: First and second laws of thermodynamics, activation energy. Biological systems as open, non-equilibrium systems, Concept of free energy, entropy, Enthalpy, Negative entropy as Significant to biological systems. biological clocks. Bioenergetics: Concept of energy coupling in biological processors, structure and role of mitochondria, high energy phosphate bond, Electron-transport chain, Oxidative Phosphorylation including chemiosmotic hypothesis.	13
Sept	Unit 4. Biomolecules as molecular alphabets of life Nucleic acids: Purine and Pyrimidine bases, nucleosides, nucleotides, basic differences in structure and function of RNA and DNA Amino acids & Proteins: Amino acid general structure & types, peptide bond, Structure of Proteins - primary, secondary, tertiary and quaternary, Carbohydrates: Structure and function carbohydrate, Structure and conformation of cellulose, amylopectin & glycogen, Chitin. Lipids : Definition: Types of lipids and Function. Vitamins & hormones: Structure, classification & function.	12
Oct	Revision and SRTMU Nanded End semester Examination	4
Nov	SRTMU Nanded End semester Examination	Invigilation
Dec	Unit 1. Optical Techniques: Light: Reflection, Refraction, Diffraction, Interference phenomena, Light microscopy: Principle, design, resolution, numerical aperture: Simple, compound optical microscope, Polarimetry: optical activity of some biomolecules and its significance. Refractometry: Refraction of light and snell's law, Abbe's refractometer, Unit 2. Centrifugation and Viscometry	13


Department of Biophysics
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Annual Teaching plan 2019-20

	Concept of sedimentation Basic principles, Forces involved RCF, Centrifugation techniques-Differential centrifugation, principle, design, types and applications of different Centrifuges.	
Jan	Viscometry: factors affecting viscosity, Oswald's viscometer, applications of viscometry. Unit 3. Physico-chemical techniques: Chromatography: Adsorption, Partition, Partition Basic principles of Adsorption & Partition Chromatography, Principle. Methodology & Applications of all types of Adsorption & Partition Chromatography methods-chromatography using paper, thin layer, Column (gel filtration, ion exchange, affinity).	15
Feb	Unit 4. Spectroscopy Electromagnetic spectrum, properties of electromagnetic radiations, concept and types of spectroscopy, absorption spectrum, energy characteristics of spectrum, fundamental laws of photometry, Lamberts law, Beer's law and its deviation ,concept of λ_{max} , chromophoric shifts, Colorimeter, spectrophotometer - design, working and application	15
March	Revision Final Practical Examinations SRTMU Nanded End semester Examination	3
April	SRTMU Nanded End semester Examination	Invigilation


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DEPARTMENT OF BIOPHYSICS

Class: B.Sc. First Year

Title of the Paper & No.: CCBP-I: Molecular Biophysics
CCBP-IV: Basic Biophysical Techniques

Name of the Teacher: Mr. Vyankatesh A. Jadhav

ANNUAL TEACHING PLAN 2019-20

Month	Course content	Expected Periods
June	ADMISSION PROCESS & Introductory Lectures Unit 1: Atomic & Molecular structure Structure of atom-Models & theories, Quantum numbers, Hund's rule, Periodic table, Concept of bonding; valence of carbon; hybridizations of carbon, nitrogen & oxygen; Molecular orbital theories, polar & non polar molecules; inductive effect.	8
July	Secondary bonding: weak interactions, hydrogen bonding; dipole-dipole & dipole-induced dipole interactions; London dispersion forces. Bonds within molecules-Ionic, covalent, Hydrogen, Electrostatic, Van-der Waals forces, Bond lengths & Bond energies, Bond angles, Structural isomerism; optical isomerism & optical activity. Unit 2 : Physico-chemical Foundations Biophysics of Water: Physicochemical properties of water, Molecular structure, Nature of hydrophobic interactions, Water Structure. Small-Molecule Solutes: Hydrophiles, Hydrophobes, Aqueous Environment of the Cell,	12
Aug	Acid & Bases: Acid-Base theories, Mole concept, Molarity, Molality & Normality, Ampholyte, concept of pH, measurements of pH, Henderson-Hasselbatch equation, Titration curve & pK values, numerical problems. Unit 3 : Physical Foundations of Biophysics Thermodynamics of Biological system: First and second laws of thermodynamics, activation energy. Biological systems as open, non-equilibrium systems, Concept of free energy, entropy, Enthalpy, Negative entropy as Significant to biological systems. biological clocks. Bioenergetics: Concept of energy coupling in biological processors, structure and role of mitochondria, high energy phosphate bond, Electron-transport chain, Oxidative Phosphorylation including chemiosmotic hypothesis.	13
Sept	Unit 4. Biomolecules as molecular alphabets of life Nucleic acids: Purine and Pyrimidine bases, nucleosides, nucleotides, basic differences in structure and function of RNA and DNA Amino acids & Proteins: Amino acid general structure & types, peptide bond, Structure of Proteins - primary, secondary, tertiary and quaternary, Carbohydrates: Structure and function carbohydrate, Structure and conformation of cellulose, amylopectin & glycogen, Chitin. Lipids : Definition: Types of lipids and Function. Vitamins & hormones: Structure, classification & function.	12
Oct	Revision and SRTMU Nanded End semester Examination	4
Nov	SRTMU Nanded End semester Examination	Invigilation
Dec	Unit 1. Optical Techniques: Light: Reflection, Refraction, Diffraction, Interference phenomena, Light microscopy: Principle, design, resolution, numerical aperture: Simple, compound optical microscope, Polarimetry: optical activity of some biomolecules and its significance. Refractometry: Refraction of light and Snell's law, Abbe's refractometer, Unit 2. Centrifugation and Viscometry	13


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Annual Teaching plan 2019-20

	Concept of sedimentation Basic principles, Forces involved RCF, Centrifugation techniques-Differential centrifugation, principle, design, types and applications of different Centrifuges.	
Jan	Viscometry: factors affecting viscosity, Oswald's viscometer, applications of viscometry. Unit 3. Physico-chemical techniques: Chromatography: Adsorption, Partition, Partition Basic principles of Adsorption & Partition Chromatography, Principle. Methodology & Applications of all types of Adsorption & Partition Chromatography methods-chromatography using paper, thin layer, Column (gel filtration, ion exchange, affinity).	15
Feb	Unit 4. Spectroscopy Electromagnetic spectrum, properties of electromagnetic radiations, concept and types of spectroscopy, absorption spectrum, energy characteristics of spectrum, fundamental laws of photometry, Lamberts law, Beer's law and its deviation ,concept of λ_{max} , chromophoric shifts, Colorimeter, spectrophotometer - design, working and application	15
March	Revision Final Practical Examinations SRTMU Nanded End semester Examination	3
April	SRTMU Nanded End semester Examination	Invigilation


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Annual Teaching plan 2019-20



**DIGAMBARRAO BINDU ARTS, COMMERCE & SCIENCE,
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DEPARTMENT OF BIOPHYSICS

Class: B.Sc. Second Year

Title of the Paper & No.: CCBP VI: Membrane Biophysics
CCBP-VI: Physiological Biophysics


Name of the Teacher: P P Hanwate/ Jondhale M B

ANNUAL TEACHING PLAN 2019-20

Month	Course content	Expected Periods
June	<p>ADMISSION PROCESS & Introductory Lectures Unit I: Membrane structure and Models:</p> <p>Membrane architecture, Lipid vesicles and planar Bilayer membrane, Membrane permeability, Membrane Channels, transmembrane helices, hydrophobic Plot, Membrane Asymmetry, Membrane fluidity, Functional reconstitution of membranes. Models of membrane fusion: bilayer fusion, viral fusion, cellular fusion, cell-cell fusion, fusion in mitochondria, Lipid bilayer and early models, Fluids mosaic model, Evidence from model system and biomembranes.</p>	8
July	<p>Unit II: Physical Properties of membrane:</p> <p>Elastic properties, Elastic constants, Charge-induced microstructures and domain. Hysteresis of domain formation. Lateral phase separation. Critical concentrations fluctuation, selective lipid protein interactions, Membrane melting.</p>	12
Aug	<p>Unit III: Membrane transport:</p> <p>Transport system with non-electrolytes and electrolytes. Transport with chemical reaction system: Primary and secondary active transport. Transports of molecules by simple and facilitated diffusion Transport by flux coupling. Transport by phosphotransferase system, Transport by vesicle formation</p> <p>Electron Transport & Oxidative phosphorylation: Reduction potentials and free energy changes in redox reaction, organization of electron transport chain, chemiosmotic coupling, proton gradient drive and synthesis of ATP, P/O ratio for oxidative phosphorylation, Cytosolic NADH electron feeding into electron transfer</p>	13
Sept	<p>Unit IV: Membrane potentials:</p> <p>Cell surface charge, Resting membrane potential, Action potential, properties of action potential, Nernst equation, Membrane impedance and</p>	12

	capacitance, Transmembrane potential, Zeta, stern and total electrochemical potential.	
Oct	Revision and SRTMU Nanded End semester Examination	4
Nov	SRTMU Nanded End semester Examination	Invigilation
Dec	Unit I- Digestive & Excretory systems Digestive system :oesophagus, stomach and small and large intestine and liver. Process of digestion. Excretary :structure of kidney, ureter, urinary bladder urethra, functions of kidney, formation of urine and its composition. Unit II- Cardiovascular & Respiratory system Circulatory system: Heart as a pump, cardiac cycle, Composition of blood and lymph, blood vessels. Structure of arteries, veins and capillaries,,Haemodynamic principles. Respiratory system : Respiratory tract, lungs. Process of respiration	13
Jan	Unit III- Nervous system & Sense organs Central nervous system., brain and spinal cord. Functions of cerebrum, cerebellum and medulla oblongata, Peripheral nervous system, Structure of neuron, Neuroglia. Myelinated and unmyelinated nerve fibers. Polarisation and depolarisation Sense organs -Physiology of Vision, audition, olfaction, taste,tactile sensation	15
Feb	Unit IV- Endocrine & Reproductive systems Endocrine glands – Role of hypothalamus, functions of pituitary, thyroid, adrenal glands, parathyroid and gonads. Reproductive Systems-Structure & physiology concepts of IVF, IUI, sperm anylsis.	15
March	Revision Final Practical Examinations SRTMU Nanded End semester Examination	3
April	SRTMU Nanded End semester Examination	Invigilation


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**DIGAMBARRAO BINDU [ACS] COLLEGE,
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DEPARTMENT OF BIOPHYSICS**

Class: B.Sc. Third Year

Title of the Paper & No.: DSEBP-XII: Immunology
DSEBP- XV: Medical Biophysics


Name of the Teacher: P P Hanwate & Jondhale M B

ANNUAL TEACHING PLAN 2019-20

Month	Course content	Expected Periods
June	ADMISSION PROCESS & Introductory Lectures Unit 1: - Introduction to Immunology. Concept and principles of immune system, origin of immune system in invertebrates and vertebrates, Innate immunity, Barriers of innate immunity, Anatomical, physiological and chemical barriers, Adaptive Immunity, active and passive immune system. Molecules, Cells and tissues of immune system	8
July	Unit 2: - Cells and Organs of the Immune System: The lymphatic system, Haematopoiesis, Haematopoietic growth factors, Primary lymphoid organs: Thymus, Bone marrow and Bursa of fabricius Secondary lymphoid organs: Thymus, Lymphnodes, Spleen, tonsils, Payer's patches, Mucosa associated lymphoid tissues, B lymphocytes	12
Aug	tissues, B lymphocytes, T-lymphocytes, NK cells, Granulocytes etc. The complement system. Unit 3 : Antigen: Antibody & their interaction Concepts of antigen, Antigenic determinant, Factors affecting Antigenicity, Exogenous & Endogenous antigen, Alloantigens, Immunogen and Immunogenicity, Hapten, Carrier effect, Cross reactivity. Immunoglobulin, Structure of Immunoglobulin, Classes and subclasses of Immunoglobulins	13
Sept	Immunoglobulin, Structure of Immunoglobulin, Classes and subclasses of Immunoglobulins, function of different Immunoglobulins, Immunoglobulin diversity. Physico-chemical basis of Ag- Ab interaction, Avidity, strength of binding between Ag and Ab and its measurement. Unit 4 : - Immunotechniques. Detection of Ag-Ab interaction: Precipitation, Agglutination and Complement fixation, Cytokines Concept of Monoclonal and polyclonal Antibodies, Immunization, Methods for purification of antibodies, Antibody assays : Precipitation reaction in gel and solutions Double, Single, Radial immunoprecipitation, Agglutination reactions, Prozone effect, Haemagglutination, Bacterial agglutination, Passive agglutination, Coomb's test, Complement fixation test, Immunoelectrophoresis Immunofluorescence, Radioimmunoassay, ELISA.	12
Oct	Revision and SRTMU Nanded End semester Examination	4

Nov	SRTMU Nanded End semester Examination	Invigilation
Dec	<p>Unit 1 Unit 1: Basic Electrophysiology: Nature of bioelectric signal, Fundamental concepts in bioelectricity & bioelectronics, principles & utility of patch-clamp, ELECTROCARDIOGRAPHY (ECG) Fundamental principles of electrocardiography, Cardiac electrical field generation during activation, Electrocardiograph lead systems, The normal P wave, Atrial repolarisation, Atrio-ventricular node conduction and the PR segment, Ventricular activation and the QRS complex, Ventricular recovery and ST-T wave U wave, Normal variants, Rate and rhythm Principle, instrument design and medical utility: EEG, EMG, ERG, EOG, Visual evoked potentials, biological impedance. and its significance.</p>	13
Jan	<p>Physical aspects of medical imaging, LASER beam in biology & medicine, Fundamentals of laser physics, Medical lasers (Carbon Dioxide Laser, Nd:YAG Laser,), Applications of Lasers in therapy and diagnosis, photo-thermal effects, photochemical effects, Principle, instrumental set up, procedure and medical utility of X-ray imaging, Xeroradiography, Fluoroscopy, Computer Tomography Scan, Magnetic Resonance Imaging, Ultrasound in medicine-Physical properties of ultrasound (the velocity, the frequency, intensity) Ultrasound interactions with the tissues (reflection, diffraction, refraction, diagnostic and therapeutic ultrasound. absorption, scattering,), Ultrasound application in medicine. safety Aspects</p>	15
Feb	<p>In-vitro & in-vivo imaging using radioisotopes, Blood volume determinations by isotopic method, Radioiodine diagnosis & therapy in thyroid disorders, Principle, method and applications of Radioimmunoassay, organ scans-thyroid, liver, brain, bone, renal imaging, cardiac imaging, PET scan, nuclear medicine for therapy, radiopharmaceuticals-concept, production & use.</p> <p>Unit 4: Biomedical Instrumentation Basic concepts in medical instrumentation, Basic sensors-principles, transducers, amplifiers, measurement of blood pressure, blood volume, blood flow, respiratory measurements, cardiac output measurements, patient monitoring equipments, audiometers, cardiac pacemakers, surgical diathermy, physiotherapeutic equipments, hemo dialysis machine, automated drug delivery systems, ICU and Operation theater equipments, blood bank instrumentation.</p>	15
March	<p>Revision Final Practical Examinations SRTMU Nanded End semester Examination</p>	3
April	SRTMU Nanded End semester Examination	Invigilation


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Department of Biophysics

Annual Teaching Plan for 2020-2021

Workload Distribution

Class	Name of Teachers			
	Mr.V.A. Jadhav		CHB	
	Theory	Practical	Theory	Practical
B.Sc. I Sem.-I	Paper-I	Paper-V	Paper-II	Paper-V
B.Sc. I Sem.-II	Paper- III		Paper- IV	
B.Sc. II Sem.-III	Paper-VI	Paper-X	Paper-VII	Paper-XI
B.Sc. II Sem.-IV	Paper-VIII		Paper-IX	
B.Sc. III Sem.-V	Paper-XIII	Paper-XVII	Paper-XII	Paper-XVI
B.Sc. III Sem.-VI	Paper-XV		Paper-XIV	


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DEPARTMENT OF BIOPHYSICS

Class: B.Sc. First Year

Title of the Paper & No.: Paper CCBP-I: Molecular Biophysics

Paper CCBP-III: Cellular Biophysics

Name of the Teacher: Vyankatesh A Jadhav

ANNUAL TEACHING PLAN 2020-21

Month	Course content	Expected Periods
June	-	
July	-	
Aug	Admission process	
Sept	Admission process	
	Paper CCBP-I: Molecular Biophysics	
Oct	Unit 1: Atomic & Molecular structure Structure of atom-Models & theories, Quantum numbers, Hunds rule , Periodic table, Concept of bonding; valence of carbon; hybridizations of carbon, nitrogen & oxygen; molecular orbital theories, polar & non polar molecules; inductive effect. Secondary bonding: weak interactions, hydrogen bonding; dipole-dipole & dipole-induced dipole interactions; London dispersion forces. Bonds within molecules-Ionic, covalent, Hydrogen, Electrostatic, Van-der Waals forces, Bond lengths & Bond energies , Bond angles, Structural isomerism; optical isomerism & optical activity.	12
Nov	Unit 2 : Physico-chemical Foundations Biophysics of Water: Physicochemical properties of water, Molecular structure, Nature of hydrophobic interactions, Water Structure. Small-Molecule Solutes: Hydrophiles, Hydrophobes, Aqueous Environment of the Cell, Acid & Bases: Acid-Base theories, Mole concept, Molarity, Molality & Normality, Ampholyte, concept of pH, measurements of pH , Henderson-Hasselbatch equation Titration curve & pK values, numerical problems	10
Dec	Unit 3 : Physical Foundations of Biophysics Thermodynamics of Biological system: First and second laws of thermodynamics, activation energy. Biological systems as open, non-equilibrium systems, Concept of free energy, entropy, Enthalpy, Negative entropy as Significant to biological systems. biological clocks. Bioenergetics: Concept of energy coupling in biological processors, structure and role of mitochondria, high energy phosphate bond, Electron-transport chain, Oxidative Phosphorylation including chemiosmotic hypothesis.	10
Jan	Unit 4. Biomolecules as molecular alphabets of life Nucleic acids: Purine and Pyrimidine bases, nucleosides, nucleotides, basic differences in structure and function of RNA and DNA Amino acids & Proteins: Amino acid general structure & types, peptide bond,	13

	Structure of Proteins - primary, secondary, tertiary and quaternary, Carbohydrates: Structure and function carbohydrate, Structure and conformation of cellulose, amylopectin & glycogen, Chitin. Lipids : Definition: Types of lipids and Function. Vitamins & hormones: Structure, classification & function.	
	SRTM University Winter Examination-2020	
	Paper CCBP-III: Cellular Biophysics; Sem-II	
March	Unit 1: Cell Organization Cell as the basic structural unit, Origin & organization of Prokaryotic and Eukaryotic cell, Cell size & shape, Fine structure of Prokaryotic & Eukaryotic cell organization Internal architecture of cells, cell organelles, Ribosome, Polysomes, Lysosomes & Peroxisomes, Connection between cell & its environment, Extracellular Matrix.	15
April	Unit 2: Cell Cycle & Growth The Cell Cycle, Interphase-G1,S,G2,M molecular events at different cell cycle phases, A cytoplasmic clock times, Growth Factors & Control of cell proliferation. Mitosis & Cell division-Molecular mechanism, Events in mitosis, significance of mitosis, Meiosis & Sexual reproduction, Molecular mechanism of meiosis, significance of meiosis.	10
	Unit 3: Cell differentiation & Interactions General characteristics of cell differentiation, cytoplasmic determinants, Molecular mechanism of cell differentiation, Connection between the cell and its environment, Glycocalyx, Extracellular Matrix, collagen, Elastin, Fibronectin, Lamin, Integrins, Cell Junctions, Desmosomes, Gap junction, connexins, Tight Junctions, Plasmodesmata.	10
May	Unit 4: Basics of Cell Signaling Cell Signaling, General principle of cell signaling, Paracrine, Autocrine, Endocrine & synaptic signaling, Heat Shock Proteins, G-Protein structure and role in signaling, Intracellular Cyclic AMP, Role Ca ⁺⁺ in cell signaling, CAM Kinases, (Calmodulin/Ca ⁺⁺ dependent protein kinases), Interaction between cyclic AMP & Ca ⁺⁺ , bacterial chemotaxis.	10
	SRTM University Winter summer -2021	


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**DIGAMBARRAO BINDU ARTS & COMMERCE
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DEPARTMENT OF BIOPHYSICS

Class: B.Sc. Second Year

Title of the Paper & No.: **CCBP-VII: Molecular Biology**

CCBP-VIII: Physiological Biophysics

Name of the Teacher: Vyankatesh A Jadhav

ANNUAL TEACHING PLAN 2020-21

Month	Course content	Expected Periods
June	Admission process	
July	- Admission process	
	CCBP-VII: Molecular Biology	
Aug	Unit I - Introduction to Molecular biology (10 lectures) The Central Dogma, DNA Structure and Chemistry, The Molecular Nature of Genes & Organization,	10
Sept	Gene Function, Protein-DNA Interactions (prokaryote and eukaryote), DNA Topology and the Nucleosome, Introduction to bacterial genetics. DNA Replication: The Replication Fork, Origins and Telomeres, Enzymes of DNA synthesis, DNA Repair, DNA Recombination.	
Oct	Unit II- Transcriptional Machinery & Processes (10 lectures) RNA Structure, RNA Types, genetic code, Eukaryotic RNA Polymerases and Their Promoters, General Transcription Factors and Transcription. Messenger RNA Processing: Splicing, Capping and Polyadenylation, Ribozymes, Activators, Inhibitors, RNA phage, Bacterial & Eukaryotic transcriptional Control.	10
Nov	Unit - III Translation Machinery & Processes (12 lectures) The Mechanism of Translation: Initiation, Elongation and Termination, Post Translational processing, Translational Control, Posttranslational modifications. Control of genetic expression: Lac and Trp operons, regulation of protein synthesis.	12
Dec	Unit - IV Principles Methodology & Applications of r-DNA technology (13 lectures) Steps involved in r-DNA Technology, PCR, RT-PCR, Blotting Technique, Restriction enzymes and its applications in medicine, agriculture, and in the production of commercially important proteins.	13
	SRTM University Winter Examination-2020	
	CCBP-VIII: Physiological Biophysics	
JAN	Unit I- Digestive & Excretory systems(10 lectures) Digestive system – oesophagus, stomach and small and large intestine and liver. Process of digestion. Excretory system – structure of kidney, ureter, urinary bladder urethra, functions of kidney, formation of urine and its composition	10

Feb	<p>Unit II- Cardiovascular & Respiratory system (10 lectures) Circulatory system: Heart as a pump, cardiac cycle, Composition of blood and lymph, blood vessels. Structure of arteries, veins and capillaries, Haemodynamic principles. Respiratory system – Respiratory tract, lungs. Process of respiration. Transport and exchange of oxygen and carbon dioxide in body.</p>	10
March	<p>Unit III- Nervous system & Sense organs(15 lectures) Central nervous system, Peripheral nervous system, Structure of neuron, Myelinated and unmyelinated nerve fibers. Action potential, Properties of nerve fibers –excitability, conductivity, all-or none law, Accommodation, adaptation, summation, refractory period, synaptic potentials, synaptic transmission of the impulse, neurotransmitters. Motor unit. Degeneration and Regeneration of neuron-brief idea. The neuromuscular junctions – structure, events in transmission, end-plate potential. Sense organs -Physiology of Vision, audition, olfaction, taste, tactile sensation</p>	15
April	<p>Unit IV- Endocrine & Reproductive systems (10 lectures) Endocrine glands – Role of hypothalamus, functions of pituitary, thyroid, adrenal glands, Parathyroid and gonads. Reproductive Systems-Structure & physiology, concepts of IVF, IUI, sperm analysis</p>	10
	SRTM University Winter summer -2021	


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Bhokar, Tq. Bhokar Dist. Nanded


HOD
Department of Biophysics
Digambarao Bindu College, Bhokar.



**DIGAMBARRAO BINDU ARTS & COMMERCE
COLLEGE, BHOKAR DIST. NANDED**

DEPARTMENT OF BIOPHYSICS

Class: B.Sc. Third Year

Title of the Paper & No.: **DSEBP-XII: Immunology**
DSEBP -XIV: Radiation Biophysics

Name of the Teacher: Vyankatesh A Jadhav


ANNUAL TEACHING PLAN 2020-21

Month	Course content	Expected Periods
June	-	
July	-	
	Admission process	
Aug Sept	Unit 1: - Introduction to Immunology. Concept and principles of immune system, origin of immune system in invertebrates and Vertebrates, Innate immunity, Barriers of innate immunity, Anatomical, physiological and chemical barriers, Adaptive Immunity, active and passive immune system. Molecules, Cells and tissues of immune system.	15
Oct	Unit 2: - Cells and Organs of the Immune System: The lymphatic system, Haematopoiesis, Haematopoietic growth factors, Primary lymphoid organs: Thymus, Bone marrow and Bursa of fabricius Secondary lymphoid organs: Thymus, Lymphnodes, Spleen, tonsils ,Payer's patches ,Mucosa associated lymphoid tissues,B lymphocytes ,T-lymphocytes, NK cells, Granulocytes etc.	10
Nov	Unit 3: Antigen-Antibody & their interaction Concepts of antigen, Antigenic determinant, Antigenicity, Immunogen and Immunogenicity, Factors affecting Antigenicity, Exogenous antigens, Endogenous antigen, Alloantigen, Hapten, Carrier effect, Cross reactivity. <u>Immunoglobulin</u> , Structure of Immunoglobulin, Classes and subclasses of Immunoglobulins, function of different Immunoglobulins, Immunoglobulin diversity.	10

	Physico-chemical basis of Ag- Ab interaction, Avidity, strength of binding between Ag and Ab and its measurement.	
Dec	<p>Unit 4 : - Immunotechniques.</p> <p>Detection of Ag-Ab interaction, Precipitation, Agglutination and Complement fixation, The complement system, Cytokines Concept of Monoclonal and polyclonal Antibodies, Immunization, Methods for purification of antibodies, Antibody assays : Precipitation reaction in gel and solutions Double, Single, Radial immunoprecipitation, Agglutination reactions, Prozone effect, Haemagglutination, Bacterial agglutination , Passive agglutination , Coomb's test, Complement fixation test, Immuno electrophoresis, Radioimmunoassay, ELISA</p>	10
	SRTM University Winter Examination-2020	
	DSEBP -XIV: Radiation Biophysics	
Jan	<p>Unit 1: Basics of Radiation Physics</p> <p>Atomic structure models, Constituents of atomic nuclei, Isotopes, Isobars, Isotones, Radioactivity, law of Radioactivity, General properties of alpha, beta and gamma radiations, Radiation units: Units of measurement of radioactivity. Curie, Becquerel. Units of exposure, Roentgen, Rad, Gray, relative biological effectiveness, Interaction of radiation with matter: Excitation and ionization, Photo electric effect, Compton Effect, pair production, Characteristic radiation. Properties, Characteristics X-rays , Interaction with different biosystems, Nonionizing radiations-UV, IR, Microwaves & Radio waves, their characteristics, interactions & implications in bio systems.</p>	15
Feb	<p>Unit 2: Basics of Radiochemistry and Radiobiology</p> <p>Radiolysis of water, Production of free radicals & their interactions, Direct and indirect effects of radiation. Radiation chemical yield and G value, Target theory, Single hit & Multi hit theory, Effect of radiation on Nucleic acids, Proteins, Enzymes, Action of radiation on living system – Viruses, Prokaryotic & Eukaryotic cells Cellular effects of radiation, somatic & genetic effects, Inhibition of Mitosis, survival curves, concept of LD₅₀, acute and chronic (whole body) effects of radiation, Radiation syndrome in human beings.</p>	10
March	<p>Unit 3: Radiation Detection & Measurement</p> <p>Radiation sources, Tele-gamma Unit (Cobalt unit), Gamma chamber, Nuclear reactors, gamma camera, Principles of radiation detection and measurement, General principles of Dosimeters., Basic principle, design and utility of ionization chamber, proportional counter, GM-counter, Scintillation Detectors.</p>	10

	Thermo-luminescent dosimeter, chemical dosimeter-Fricke, Free radical dosimeters.	
April	<p>Unit 4: Radiation Safety measures and Application</p> <p>Natural & Man-made radiation exposures, Basic Principles of Radiation protection concept of Maximum permissible dose (MPD) personal and area monitoring, legal aspect of radiation protection, Disposal of radioactive waste.</p> <p><u>Radioisotopes in biology</u>, Medicine(Therapy & diagnosis),Agriculture, Plant breeding, Soil plant relationship & plant physiology, Biological applications of radioisotope, Radio-labeling & Tracer techniques, Food irradiation, radiation sterilization of medical product. Autoradiography-Principle procedure and Application of autoradiography</p>	10
	-	
	SRTM University summer -2022	45


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Annual Teaching Plan for 2021-2022

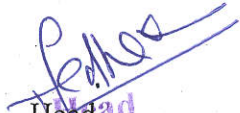
Department of Biophysics

Workload Distribution

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Class	Name of Teachers			
	Mr.V.A. Jadhav		CHB	
	Theory	Practical	Theory	Practical
B.Sc. I Sem.-I	Paper-I	Paper-V	Paper-II	Paper-V
B.Sc. I Sem.-II	Paper- III		Paper- IV	
B.Sc. II Sem.-III	Paper-VI	Paper-X	Paper-VII	Paper-XI
B.Sc. II Sem.-IV	Paper-VIII		Paper-IX	
B.Sc. III Sem.-V	Paper-XIII	Paper-XVII	Paper-XII	Paper-XVI
B.Sc. III Sem.-VI	Paper-XV		Paper-XIV	




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DEPARTMENT OF BIOPHYSICS

Class: B.Sc. Third Year

Title of the Paper & No.: Paper DSEBP -IX: Radiation Biophysics

Paper DSEBP -XII: Medical Biophysics

Name of the Teacher: Vyankatesh A Jadhav


ANNUAL TEACHING PLAN 2021-22

Month	Course content	Expected Periods
June	-	
July	-	
Aug	Admission process	
Sept	Unit 1: Basics of Radiation Biophysics Atomic structure models, Constituents of atomic nuclei, Isotopes, Isobars, Isotones, Radioactivity, law of Radioactivity, General properties of alpha, beta and gamma radiations,	15
Oct.	Radiation measurement units, Interaction of radiation with matter: Excitation and ionization, Photo electric effect, Compton Effect, pair production. Non-ionizing radiations-UV, IR, Microwaves & Radio waves, their characteristics, interactions & implications in bio systems. Unit 2: Basics of Radiochemistry Radiolysis of water, Production of free radicals and their interactions, Direct and indirect effects of radiation. Radiation chemical yield and G value, Target theory, Single hit & Multi hit theory, Effect of radiation on Nucleic acids, Proteins, Enzymes.	10
Nov	Unit 3: Basics of Radiobiology Action of radiation on living system – Viruses, Prokaryotic & Eukaryotic cells Cellular effects of radiation, somatic & genetic effects, Inhibition of Mitosis, survival curves, concept of LD50, acute and chronic (whole body) effects of radiation, Radiation syndrome in human beings. Radiation Detection & Measurement	10
Dec.	Unit 4: Radioisotopes in biology, Basic Principles of Radiation protection, Maximum permissible dose (MPD).	10
Jan	Applications in Medicine (Therapy & diagnosis), Agriculture & plant physiology, Biological	

	applications of radioisotope: Radio-labeling & Tracer techniques, Food irradiation, radiation sterilization of medical product. Autoradiography - Principle procedure and Application of autoradiography.	
Feb	SRTM University Winter Examination-2021	45
	Paper DSEBP -XII: Medical Biophysics Sem-VI	
March	Unit 1: Basic Electrophysiology: Nature of bioelectric signal, Fundamental concepts in bioelectricity & bioelectronics, principles & utility of patch-clamp, ELECTROCARDIOGRAPHY (ECG) Fundamental principles of electrocardiography, Electrocardiograph lead systems, The normal P wave and the QRS complex, Ventricular recovery and ST-T wave U wave, Normal variants, Rate and rhythm Principle, instrument design and medical utility of EEG, EMG, ERG, EOG, Visual evoked potentials, biological impedance and its significance.	15
April	Unit 2: Medical Imaging: Physical aspects of medical imaging, Fundamentals of LASER, Applications of Lasers in therapy and diagnosis, Basic Principle: X-ray imaging, Xeroradiography, CT Scan, MRI, Ultrasound in medicinal application and therapeutic safety. Unit 3: Nuclear Medicine In-vitro & in-vivo imaging using radioisotopes, isotopic method, Organ scans: thyroid, liver, brain, bone, renal imaging and cardiac imaging. Radioimmunoassay: Principle, method and applications. Nuclear medicine in therapy and Radiopharmaceuticals.	10 10
May	Unit 4: Biomedical Instrumentation Basic concepts in medical instrumentation, Basic sensors-principles, transducers, amplifiers, Measurement of blood pressure, blood volume, blood flow, respiratory measurements, cardiac Output measurements, patient monitoring equipments, audiometers, cardiac pacemakers, physiotherapy equipments, hemodialysis machine, ICU and Operation theatre equipments, bloodbank instrumentation.	10
Jun	SRTM University summer -2022	45


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Annual Teaching plan 2021-22



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DEPARTMENT OF BIOPHYSICS

Class: B.Sc. Second Year

Title of the Paper & No.: CCBP-VII: Molecular Biology

CCBP-VIII: Physiological Biophysics


Name of the Teacher: Vyankatesh A Jadhav

ANNUAL TEACHING PLAN 2021-22

Month	Course content	Expected Periods
June	-	
July	-	
Aug	Admission process	
Sept	Unit I - Introduction to Molecular biology (10 lectures) The Central Dogma, DNA Structure and Chemistry, The Molecular Nature of Genes & Organization,	10
Oct	Gene Function, Protein-DNA Interactions (prokaryote and eukaryote), DNA Topology and the Nucleosome, Introduction to bacterial genetics. DNA Replication: The Replication Fork, Origins and Telomeres, Enzymes of DNA synthesis, DNA Repair, DNA Recombination.	
Nov	Unit II- Transcriptional Machinery & Processes (10 lectures) RNA Structure, RNA Types, genetic code, Eukaryotic RNA Polymerases and Their Promoters, General Transcription Factors and Transcription. Messenger RNA Processing: Splicing, Capping and Polyadenylation, Ribozymes, Activators, Inhibitors, RNA phage, Bacterial & Eukaryotic transcriptional Control.	10
Dec	Unit - III Translation Machinery & Processes (12 lectures) The Mechanism of Translation: Initiation, Elongation and Termination, Post Translational processing, Translational Control, Posttranslational modifications. Control of genetic expression: Lac and Trp operons, regulation of protein synthesis.	12
Jan	Unit - IV Principles Methodology & Applications of r-DNA technology (13 lectures) Steps involved in r-DNA Technology, PCR, RT-PCR, Blotting Technique, Restriction enzymes and its applications in medicine, agriculture, and in the production of commercially important proteins.	13
Feb	SRTM University Winter Examination-2021	
	CCBP-VIII: Physiological Biophysics	
March	Unit I- Digestive & Excretory systems(10 lectures) Digestive system – oesophagus, stomach and small and large intestine and liver. Process of digestion. Excretory system – structure of kidney, ureter, urinary bladder urethra, functions of kidney, formation of urine and its composition	10
April	.Unit II- Cardiovascular & Respiratory system (10 lectures) Circulatory system: Heart as a pump, cardiac cycle, Composition of blood and lymph, blood vessels. Structure of arteries, veins and capillaries, Haemodynamic principles.	10

	<p>Respiratory system – Respiratory tract, lungs. Process of respiration. Transport and exchange of oxygen and carbon dioxide in body.</p> <p>Unit III- Nervous system & Sense organs(15 lectures) Central nervous system, Peripheral nervous system, Structure of neuron, Myelinated and unmyelinated nerve fibers. Action potential, Properties of nerve fibers –excitability, conductivity, all-or none law, Accommodation, adaptation, summation, refractory period, synaptic potentials, synaptic transmission of the impulse, neurotransmitters. Motor unit. Degeneration and Regeneration of neuron-brief idea. The neuromuscular junctions – structure, events in transmission, end-plate potential. Sense organs -Physiology of Vision, audition, olfaction, taste,tactile sensation</p>	15
May	<p>Unit IV- Endocrine & Reproductive systems (10 lectures) Endocrine glands – Role of hypothalamus, functions of pituitary, thyroid, adrenal glands,Parathyroid and gonads. Reproductive Systems-Structure & physiology, concepts of IVF, IUI,sperm analysis</p>	10
Jun	SRTM University Winter summer -2022	


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DEPARTMENT OF BIOPHYSICS

Class: B.Sc. First Year

Title of the Paper & No.: Paper CCBP-I: Molecular Biophysics

Paper CCBP-III: Cellular Biophysics


Name of the Teacher: Vyankatesh A Jadhav

ANNUAL TEACHING PLAN 2021-22

Month	Course content	Expected Periods
June	-	
July	-	
Aug	Admission process	
Sept	Admission process	
	Paper CCBP-I: Molecular Biophysics	
Oct	Unit 1: Atomic & Molecular structure Structure of atom-Models & theories, Quantum numbers, Hunds rule , Periodic table, Concept of bonding; valence of carbon; hybridizations of carbon, nitrogen & oxygen; molecular orbital theories, polar & non polar molecules; inductive effect. Secondary bonding: weak interactions, hydrogen bonding; dipole-dipole & dipole-induced dipole interactions; London dispersion forces. Bonds within molecules-Ionic, covalent, Hydrogen, Electrostatic, Van-der Waals forces, Bond lengths & Bond energies , Bond angles, Structural isomerism; optical isomerism & optical activity.	12
Nov	Unit 2 : Physico-chemical Foundations Biophysics of Water: Physicochemical properties of water, Molecular structure, Nature of hydrophobic interactions, Water Structure. Small-Molecule Solutes: Hydrophiles, Hydrophobes, Aqueous Environment of the Cell, Acid & Bases: Acid-Base theories, Mole concept, Molarity, Molality & Normality, Ampholyte, concept of pH, measurements of pH , Henderson–Hasselbatch equation Titration curve & pK values, numerical problems	10
Dec	Unit 3 : Physical Foundations of Biophysics Thermodynamics of Biological system: First and second laws of thermodynamics, activation energy. Biological systems as open, non-equilibrium systems, Concept of free energy, entropy, Enthalpy, Negative entropy as Significant to biological systems. biological clocks. Bioenergetics: Concept of energy coupling in biological processors, structure and role of mitochondria, high energy phosphate bond, Electron-transport chain, Oxidative Phosphorylation including chemiosmotic hypothesis.	10
Jan	Unit 4. Biomolecules as molecular alphabets of life Nucleic acids: Purine and Pyrimidine bases, nucleosides, nucleotides, basic differences in structure and function of RNA and DNA Amino acids & Proteins: Amino acid general structure & types, peptide bond,	13

	Structure of Proteins - primary, secondary, tertiary and quaternary, Carbohydrates: Structure and function carbohydrate, Structure and conformation of cellulose, amylopectin & glycogen, Chitin. Lipids : Definition: Types of lipids and Function. Vitamins & hormones: Structure, classification & function.	
Feb	SRTM University Winter Examination-2021	
	Paper CCBP-III: Cellular Biophysics; Sem-II	
March	Unit 1: Cell Organization Cell as the basic structural unit, Origin & organization of Prokaryotic and Eukaryotic cell, Cell size & shape, Fine structure of Prokaryotic & Eukaryotic cell organization Internal architecture of cells, cell organelles, Ribosome, Polysomes, Lysosomes & Peroxisomes, Connection between cell & its environment, Extracellular Matrix.	15
April	Unit 2: Cell Cycle & Growth The Cell Cycle, Interphase-G ₁ , S, G ₂ , M molecular events at different cell cycle phases, A cytoplasmic clock times, Growth Factors & Control of cell proliferation. Mitosis & Cell division-Molecular mechanism, Events in mitosis, significance of mitosis, Meiosis & Sexual reproduction, Molecular mechanism of meiosis, significance of meiosis.	10
	Unit 3: Cell differentiation & Interactions General characteristics of cell differentiation, cytoplasmic determinants, Molecular mechanism of cell differentiation, Connection between the cell and its environment, Glycocalyx, Extracellular Matrix, collagen, Elastin, Fibronectin, Lamin, Integrins, Cell Junctions, Desmosomes, Gap junction, connexins, Tight Junctions, Plasmodesmata.	10
May	Unit 4: Basics of Cell Signaling Cell Signaling, General principle of cell signaling, Paracrine, Autocrine, Endocrine & synaptic signaling, Heat Shock Proteins, G-Protein structure and role in signaling, Intracellular Cyclic AMP, Role Ca ⁺⁺ in cell signaling, CAM Kinases, (Calmodulin/Ca ⁺⁺ dependent protein kinases), Interaction between cyclic AMP & Ca ⁺⁺ , bacterial chemotaxis.	10
Jun	SRTM University Winter summer -2022	


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