

|| JAI SRI GURUDEV ||  
**SRI ADICHUNCHANAGIRI FIRST GRADE COLLEGE,**  
**C R PATANA-573116.**

**Department of Zoology**  
**LESSION PLAN FOR THE ACADEMIC YEAR 2022-23(NEP)**  
**(Annexure-1.2) Criterion 01 (Metric- 1.1.1)**

**Paper name:** Biochemistry and Physiology

**Programme** : B.Sc. Hons  
**Class** : II SEM (DSC) **Total Hours: 56 hours**  
**Name of the faculty** : MN and KMR  
**Duration** : April to July

Sl.No.	Topics Covered	No. of Lecture Hours	Methodology/pe dagogy
01.	<p><b>Chapter 1.</b>  <b>Structure and Function of Biomolecules:</b></p> <ul style="list-style-type: none"> <li>• Structure and Biological importance of carbohydrates (Monosaccharides, Disaccharides, Polysaccharides and Glycoconjugates).</li> <li>• Lipids (saturated and unsaturated Fatty acids, Tri-acylglycerols, Phospho lipids, Glycolipids and Steroids)</li> <li>• Structure, Classification and General Properties of <math>\alpha</math>-amino acids; Essential and non-essential amino acids, Levels of organization in proteins; Simple and conjugate proteins.</li> </ul> <p><b>Chapter 2.</b>  <b>Enzyme Action and Regulation</b></p> <ul style="list-style-type: none"> <li>• Nomenclature and classification of enzymes; Cofactors; Specificity of enzyme action.</li> <li>• Isozymes; Mechanism of enzyme action</li> <li>• Enzyme kinetics; Factors affecting rate of enzyme-catalyzed reactions ; Equation of Michaela's - Mendon, Concept of Km and V max, Enzyme inhibition</li> <li>• Allosteric enzymes and their kinetics; Regulation of enzyme action.</li> </ul>	14	Lectures/Videos / Seminars/ Group discussion/ Assignment/ PPT presentation
02.	<p><b>Chapter 3.</b>  <b>Metabolism of Carbohydrates and Lipids</b></p> <ul style="list-style-type: none"> <li>• Metabolism of Carbohydrates: glycolysis, citricacid cycle, gluconeogenesis, phosphate pentose pathway Glycogenolysis and Glycogenesis LipidsBiosynthesis of palmiticacid; Ketogenesis,</li> <li>• <math>\beta</math>-oxidation and omega - oxidation of saturated fatty acids with even and odd number of carbonatoms</li> </ul> <p><b>Chapter 4.</b>  <b>Metabolism of Proteins and Nucleotides</b></p>	14	Lectures/Videos / Seminars/ Group discussion/ Assignment/ PPT presentation

	<ul style="list-style-type: none"> <li>• Catabolism of amino acids: Transamination, Deamination, Ureacycle, Nucleotides and vitamins</li> <li>• Peptide linkages</li> </ul>		
03.	<p><b>Chapter 5.</b> <b>Digestion and Respiration in humans</b></p> <ul style="list-style-type: none"> <li>• Structural organization and functions of gastrointestinal tract and associated glands.</li> <li>• Mechanical and chemical digestion of food; Absorptions of carbohydrates, lipids, proteins, water, minerals and vitamins; Physiology of trachea and Lung.</li> <li>• Mechanism of respiration, Pulmonary ventilation; Respiratory volumes and capacities; Transport of oxygen and carbon dioxide in blood, Respiratory pigments, Dissociation curves and the factors influencing it;</li> <li>• Control of respiration.</li> </ul> <p><b>Chapter 6.</b> <b>Circulation and Excretion in humans</b></p> <ul style="list-style-type: none"> <li>• Components of blood and their functions; hemopoiesis</li> <li>• Blood clotting: Blood clotting system, Blood groups: Rh-factor, ABO and MN</li> <li>• Structure of mammalian heart</li> <li>• Cardiac cycle; Cardiac output and its regulation, Electrocardiogram, Blood pressure and its regulation</li> <li>• Structure of kidney and its functional unit; Mechanism of urine formation</li> </ul>	14	Lectures/Videos / Seminars/ Group discussion/ Assignment/ PPT presentation
04.	<p><b>Chapter 7.</b> <b>Nervous System and Endocrinology in humans</b></p> <ul style="list-style-type: none"> <li>• Structure of neuron, resting membrane potential(RMP)</li> <li>• Origin of action potential and its propagation across the myelinated and unmyelinated nerve fibers. Types of synapse</li> <li>• Endocrine glands - pineal, pituitary, thyroid, parathyroid, pancreas and adrenal; hormones secreted by them.</li> <li>• Classification of hormones; Mechanism of Hormone action.</li> </ul> <p><b>Chapter 8.</b> <b>Muscular System in humans</b></p> <ul style="list-style-type: none"> <li>• Histology of different types of muscle; Ultra structure of skeletal muscle; Molecular and chemical basis of muscle contraction; Characteristics of muscle twitch; Motor unit, summation and tetanus</li> </ul>	14	Lectures/Videos / Seminars/ Group discussion/ Assignment/ PPT presentation
<b>List of labs to be conducted</b>		<b>56 Hrs.</b>	

1. Preparation of models of nitrogenous bases- nucleosides and nucleotides.
2. Preparation of models of amino acids and dipeptides.
3. Preparation of models of DNA and RNA.
4. Qualitative analysis of Carbohydrates, Proteins and Lipids.
5. Qualitative analysis of Nitrogenous wastes – Ammonia, Urea and Uric acid.
6. Separation of amino acids or proteins by paper chromatography.
7. Determination of the activity of enzyme (Urease)-Effect of [S] and determination of  $K_m$  and  $V_{max}$ .
8. Determination of the activity of enzyme (Urease) - Effect of temperature and time.
9. Action of salivary amylase under optimum conditions.
10. Quantitative estimation of Oxygen consumption by fresh water Crab.
11. Quantitative estimation of salt gain and salt loss by fresh water.
12. Estimation of Hemoglobin in human blood using Sahli's haemoglobinometer.
13. Counting of RBC in blood using Hemocytometer.
14. Counting of WBC in blood using Hemocytometer.
15. Differential staining of human blood corpuscles using Leishman stain.
16. Recording of blood glucose level by using glucometer.

**Virtual Labs (Suggestive sites)**

<https://www.vlab.co.in>

<https://zoologysan.blogspot.com>

[www.vlab.iitb.ac.in/vlab](http://www.vlab.iitb.ac.in/vlab)

[www.onlinelabs.inwww.powershow.com](http://www.onlinelabs.inwww.powershow.com)

<https://vlab.amrita.edu>

<https://sites.dartmouth.edu>

II JAI SRI GURUDEV II  
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**LESSION PLAN FOR THE ACADEMIC YEAR 2023-24(NEP)**

**(Annexure-1.2) Criterion 01 (Metric- 1.1.1)**

**Paper name:** Gene Technology Immunology and Computational Biology

**Programme** : B.Sc. Hons

**Class** : IV SEM (DSC)

**Total Hours: 60 hours**

**Name of the faculty** : MN and KMR

**Duration** : April to July

Sl.No.	Topics Covered	No. of Lecture Hours	Methodology/pe dagogy
01.	<p><b>Chapter 1:</b>  <b>Principles of Gene Manipulation</b></p> <ul style="list-style-type: none"> <li>• Recombinant DNA Technology: Introduction, steps involved.</li> <li>• Restriction Enzymes and Ligases and Nucleic acid modifying enzyme.</li> <li>• Gene cloning Vector: Concept of plasmids-pBR322, Lamda phage vectors, cosmids</li> <li>• Gene transfer techniques (Direct and indirect : Transformation, Transfection, Electroporation).</li> <li>• Screening and selection of recombinant colonies.</li> </ul> <p><b>Chapter 2:</b>  <b>Applications of Genetic Engineering</b></p> <ul style="list-style-type: none"> <li>• Transgenic animals (Transgenic cow, Transgenic Fish); Transgenic plants (cry protein); Gene silencing (Knock out and Knock in mouse).</li> <li>• Production of Human Recombinant insulin and</li> <li>• Hybridoma technology: Synthesis and applications of Monoclonal antibodies</li> <li>• Gene Therapy (SCID)</li> <li>• Biosensors and its applications</li> </ul>	14	Lectures/Videos / Seminars/Group discussion/ Assignment/ PPT presentation
02.	<p><b>Chapter 3:</b>  <b>Introduction to the Immune System</b></p> <ul style="list-style-type: none"> <li>• Defence against diseases: Introduction, First and second line of defense,</li> <li>• Types of Ummunity: Innate and acquired immunity; Humoral immunity and cell mediated immunity</li> <li>• Antigen presenting cells (APC's), Role of Band T-lymphocytes (), primary and secondary immune response.</li> <li>• Functional aspects of organs of the Immune system - Thymus and bone marrow, spleen, Lymph Node.</li> </ul> <p><b>Chapter 4:</b>  <b>Antigens and Antibodies</b></p> <ul style="list-style-type: none"> <li>• Antigens and haptens: Properties (foreignness, molecular</li> </ul>	14	Lectures/Videos / Seminars/ Group discussion/ Assignment/ PPT presentation

	size, heterogeneity). • B and T cell epitopes. • Structure of IgG and functions of different classes of immunoglobulins. • Major histocompatibility complex - Structure of MHC I & II.		
03.	<p><b>Chapter 5:</b> <b>Clinical Immunology</b></p> <ul style="list-style-type: none"> <li>• Immunity against diseases of viral, bacterial and protozoan infections.</li> <li>• Vaccines: Types and Uses - Immunization schedule for children.</li> <li>• Transplantation immunology: Transplantation of organ- Types, graft rejection and Immuno-suppressors</li> </ul> <p><b>Chapter 6:</b> <b>Bioinformatics</b></p> <ul style="list-style-type: none"> <li>• Databases: Sequence and structural</li> <li>• Sequence analysis (homology): Pairwise and Multiple Sequence alignment BLAST, CLUSTALW, Sequence alignment-FASTA.</li> <li>• Scope and applications of Bioinformatics.</li> </ul>	14	Lectures/Videos / Seminars/ Group discussion/ Assignment/ PPT presentation
04.	<p><b>Chapter 7:</b> <b>Biostatistics I</b></p> <ul style="list-style-type: none"> <li>• Measures of central tendency: Mean, Median, Mode.</li> <li>• Data summarizing: Frequency distribution, Graphical presentation - bar diagram, pie diagram, histogram.</li> <li>• Elementary idea of probability and its applications.</li> </ul> <p><b>Chapter 8:</b> <b>Biostatistics II</b></p> <ul style="list-style-type: none"> <li>• Measures of dispersion: Range, Standard Deviation, Variance.</li> <li>• Correlation and Regression.</li> <li>• Tests of significance: F-test, ANOVA, t-test and Chi square test.</li> </ul>	14	Lectures/Videos / Seminars/ Group discussion/ Assignment/ PPT presentation
<b>List of labs to be conducted</b>		<b>56 Hrs.</b>	

1. Calculate the mean, median, mode and standard deviation (with suitable examples).
2. Measure the height and weight of all students in the class and apply statistical measures (Frequency distribution, Bar diagram, pie diagram, histogram)
3. With Suitable data, apply tests of significance : Chi-square test and student ttest 4. Determination of ABO Blood group and Rh factor.
5. Demonstration of agarose gel electrophoresis for detection of DNA.
6. To study Restriction enzyme digestion using teaching kits (Demonstration only).
7. To detect genetic mutations by Polymerase Chain Reaction (PCR) using teaching kits (Demonstration only).
8. Demonstration of Polyacrylamide Gel Electrophoresis (PAGE) for detection of proteins.
9. To calculate molecular weight of unknown DNA and protein fragments from gel pictures. (<https://youtube/mCiCiO0cfbg>)
10. To learn nucleotide sequence database.
11. To learn sequence alignment: Pairwise alignment (Protein/ DNA).

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**LESSION PLAN FOR THE ACADEMIC YEAR 2023-24**

**(Annexure-1.2) Criterion 01 (Metric- 1.1.1)**

**Paper name: Environmental Biology (ELECTIVE 1)**

**Programme** : B.Sc. (CBCS)  
**Class** : VI SEM **Total Hours: 64 hours**  
**Name of the faculty** : MN and KMR  
**Duration** : April to July

Sl.No.	Particulars	No. of Lecture Hours	Methodology/pedagogy
01.	<p><b>UNIT I</b></p> <p>Ecology – Definition, sub-divisions and scope; Environment – Types: composition and strata of Atmosphere, hydrosphere and lithosphere; Ecological factors: Abiotic and biotic; Abiotic factors – light, temperature (thermal stratification), topographic(latitudes and altitudes); Biotic factors – Animal relationships with relevant examples: Intra specific- co-action, aggregation and competition, Gause’s principle; Interspecific: positive interaction – mutualism, commensalism, proto cooperation; negative interactions – parasitism, predation, and competition</p>	12	Lectures/Videos / Seminars/ Group discussion/ Assignment/ PPT presentation
02.	<p><b>UNIT II</b></p> <p><b>1. Biogeochemical Cycles and Food chain:</b> Definition, complete and incomplete cycles, Nitrogen and phosphorous cycles Food chains: types of food chains with examples and food web with examples. Ecological pyramids (number, biomass and energy) with examples. Energy – energy flow and laws of thermodynamics.</p> <p><b>2. Population and Community Ecology:</b> Population ecology – Density – Natality and Mortality, age distribution. Community ecology – types of communities and community structure, bio-indicators of aquatic ecosystem, ecotone and edge effect. Ecological succession – basic types - primary and secondary, climax community.</p>	12	Lectures/Videos / Seminars/ Group discussion/ Assignment/ PPT presentation
01.	<p><b>UNIT III</b></p>	12	Lectures/Videos / Seminars/ Group

	<p><b>Ecosystem Concept</b>, types and structure of ecosystem, natural, human engineered and micro –ecosystems. Fresh water ecosystem – physico-chemical nature of fresh water. Lentic and lotic ecosystems with examples. The tropical pond as an ecosystem – abiotic components, producers, consumers and decomposers, interaction between components. Terrestrial ecosystem –physico-chemical nature, soil profile, classification, biomes: forest, grassland, desert, and characteristic fauna. Culture practice of Indian major carps, Pearl formation.</p>		discussion/ Assignment/ PPT presentation
02.	<p><b>UNIT IV</b></p> <p><b>Environmental Pollution</b></p> <p>Definition and types – air, water, soil and sound pollutions. Sources, effects and control of air, and water pollution with special mention of greenhouse effect, ozone depletion, photochemical smog, acid rain, stone leprosy. Ganga river pollution, mass death of fishes in lakes,; Legislation for environment protection in India, Pollution control board in Karnataka-functions</p>	14	Lectures/Videos / Seminars/ Group discussion/ Assignment/ PPT presentation discussion/ Assignment
03.	<p><b>UNIT V</b></p> <p><b>Zoogeography and Wild life conservation</b></p> <p><b>Zoogeographical realms and their characteristic fauna.</b> Detailed account of fauna of oriental region, a brief account of Wallace’s line.</p> <p><b>Wildlife Depletion:</b> Hunting, over-harvesting, developmental activities</p> <p><b>Wildlife Conservation:</b> conservation strategies (in situ and ex situ), agencies engaged in wildlife conservation, Government organizations and non-government organizations (NGOs). Wildlife (Protection) Act 1972, CITES (Convention on International Trade in Endangered Species of wildlife flora and fauna), Endangered fauna of India, Red data book</p>	12	Lectures/Videos / Seminars/ Group discussion/ Assignment/ PPT presentation



Sl.No.	List of labs to be conducted <span style="float: right;">64 Hrs</span>
1&2.	Collection of water samples from different sources (pond, river, ground water, etc.) and recording color, odour,pH and temperature 15.&16: Field visits to assess the pollution status of water bodies based on odour, water colour, release of sewage etc. Solid waste accumulation and disposal status /collection of data on air pollution from different agencies and preparation of report.
03.	Estimation of dissolved oxygen in two water samples.
04.	Estimation of BOD in two water samples (sewage and tapwater/river water)
05.	Estimation of dissolved carbon dioxide in two water samples.
06.	Estimation of chloride content in two water samples.
07.	Estimation of hardness of two water samples.
8 & 9.	Study of pond ecosystem – observation of various constituents, plankton, fauna and flora.
10.	Study of artificial ecosystem-aquarium
11&12.	Study of garden soil fauna using Berlesse funnel apparatus.
13.	Positive animal interactions: Mutualism – Termite and Trichonympha, Commensalism – Echeineis and Shark, Proto co-operation – Hermit crab and Sea anemone.
14.	Negative animal interactions: Parasitism – Head louse, Bedbug, Female mosquito, Ticks and mites. Predation – Snake and Frog.
15&16.	Field visits to assess the pollution status of water bodies based on odour, water colour, release of sewage etc. Solid waste accumulation and disposal status /collection of data on air pollution from different agencies and preparation of report.

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**(Annexure-1.2) Criterion 01 (Metric- 1.1.1)**

**Paper name: SEC 1: Aquarium FishKeeping**

**Programme : B.Sc. (CBCS)**  
**Class : VI SEM (Skill enhancement course) Total Hours: 32 hours**  
**Name of the faculty : MN**  
**Duration : April to July**

Sl.No	Particulars	No. of Lecture Hours	Methodology/pedagogy
01.	<b>Introduction to aquarium fish keeping</b> The potential scope of aquarium fish industry as a cottage industry, exotic and endemic species of aquarium fishes (List of common fishes).	06	Lectures/Videos / Seminars/ Group discussion/ Assignment
02.	<b>Biology of aquarium fishes</b> Common characters and sexual dimorphism of fresh water and marine aquarium fishes such as Guppy, Molly, Swordtail, Gold fish, Angelfish, Blue morph, Anemone fish and Butterfly fish.	08	Lectures/Videos / Seminars/ Group discussion/ Assignment
03.	<b>Food and feeding of aquarium fishes</b> -Use of live fish feed organisms. Preparation and composition of formulated fish feeds.	5	Lectures/Videos / Seminars/ Group discussion/ Assignment
04.	<b>Fish and transportation</b> -Live fish transport – fish handling, packing and forwarding techniques.	6	Lectures/Videos / Seminars/Group discussion/ Assignment
05.	<b>Maintenance of aquarium</b> -General aquarium maintenance – budget for setting up an aquarium fish farm as a cottage industry.	6	Lectures/Videos / Seminars/Group discussion/ Assignment