# MASTER OF SCIENCES
# ZOOLOGY

***SYLLABUS & REGULATIONS***

***WITH EFFECT FROM 2024-2025***

**M.Sc. ZOOLOGY**
**P.G. Degree Programme (CBCS) Regulations-2016**
**Amended as per NEP-2020**

(with effect from the batch admitted in the academic year 2024-25)
**CHOICE BASED CREDIT SYSTEM (CBCS)**


**CENTRE FOR DISTANCE AND ONLINE EDUCATION(CDOE)**
**SRI VENKATESWARA UNIVERSITY**
**Accredited by "NAAC" with A+ Grade**
**Tirupati, Andhra Pradesh – 517502**

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# CENTRE FOR DISTANCE AND ONLINE EDUCATION (CDOE)
# SRI VENKATESWARA UNIVERSITY::TIRUPATI
# S.V.U.COLLEGE OF SCIENCES
# DEPARTMENT OF ZOOLOGY

**(Revised Scheme of Instruction and Examination, Syllabus etc., (with effect from the Academic Years 2024-2025)**

## M.Sc. ZOOLOGY

**Semester - I**

| Sl. No | Title of the Course | Title of the Paper | Credit Hrs / Week | Number of Credits | IA Marks | Semester End Marks | Total |
|---|---|---|---|---|---|---|---|
| 1 | ZOO-101 | Animal Diversity | 6 | 4 | 20 | 80 | 100 |
| 2 | ZOO-102 | Biochemistry | 6 | 4 | 20 | 80 | 100 |
| 3 | ZOO-103 | Cell and Molecular Biology | 6 | 4 | 20 | 80 | 100 |
| 4 | ZOO-104 | Immunology | 6 | 4 | 20 | 80 | 100 |
| 5 | ZOO-105P | Practical - I | 6 | 4 | | 100 | 100 |
| 6 | ZOO-106P | Practical - II | 6 | 4 | | 100 | 100 |
| **Total** | | | | **24** | | | **600** |

**Semester – II**

| Sl. No | Title of the Course | Title of the Paper | Credit Hrs / Week | Number of Credits | IA Marks | Semester End Marks | Total |
|---|---|---|---|---|---|---|---|
| 1 | ZOO-201 | Genetics | 6 | 4 | 20 | 80 | 100 |
| 2 | ZOO-202 | Microbiology | 6 | 4 | 20 | 80 | 100 |
| 3 | ZOO-203 | Animal Physiology | 6 | 4 | 20 | 80 | 100 |
| 4 | ZOO-204 | Environmental Biology | 6 | 4 | 20 | 80 | 100 |
| 5 | ZOO-205P | Practical - I | 6 | 4 | | 100 | 100 |
| 6 | ZOO-206P | Practical - II | 6 | 4 | | 100 | 100 |
| **Total** | | | | **24** | | | **600** |

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**Semester - III**

| Sl. No | Title of the Course | Title of the Paper | Credit Hrs / Week | Number of Credits | IA Marks | Semester End Marks | Total |
|---|---|---|---|---|---|---|---|
| 1 | ZOO-301 | Developmental Biology | 6 | 4 | 20 | 80 | 100 |
| 2 | ZOO-302 | Economic Zoology | 6 | 4 | 20 | 80 | 100 |
| 3 | ZOO-303 | Environmental Impact Assessment & Green Auditing | 6 | 4 | 20 | 80 | 100 |
| 4 | ZOO-304 | Toxicology | 6 | 4 | 20 | 80 | 100 |
| 5 | ZOO-305P | Practical - I | 6 | 4 | | 100 | 100 |
| 6 | ZOO-306P | Practical - II | 6 | 4 | | 100 | 100 |
| **Total** | | | | **24** | | | **600** |

**Semester – IV**

| Sl. No | Title of the Course | Title of the Paper | Credit Hrs / Week | Number of Credits | IA Marks | Semester End Marks | Total |
|---|---|---|---|---|---|---|---|
| 1 | ZOO-401 | Environmental Microbiology | 6 | 4 | 20 | 80 | 100 |
| 2 | ZOO-402 | Biodiversity and Conservation | 6 | 4 | 20 | 80 | 100 |
| 3 | ZOO-403 | Principles and Practices of Aquaculture | 6 | 4 | 20 | 80 | 100 |
| 4 | ZOO-404 | Medical Biotechnology, IPR, Biosafety and Bioethics | 6 | 4 | 20 | 80 | 100 |
| 5 | ZOO-405P | Practical - I | 6 | 4 | | 100 | 100 |
| 6 | ZOO-406P | Practical - II | 6 | 4 | | 100 | 100 |
| **Total** | | | | **24** | | | **600** |

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## ZOOLOGY DEPARTMENT

**Vision**

- Provide a sound education in basic science
- Transform society through the empowerment of women
- Provide inexpensive educational services to the weaker sections of society
- Inculcate respect for nature and concern for ethical values among students through good and scientific educational practices.
- Recognizing the essential roles of science and biology in the lives of citizens today and tomorrow, we emphasize biological literacy in our teaching and outreach programs.

**Mission**

- To impart to the students the contemporary advancements in life sciences.
- To impart a global perspective and such skills among students that benefit humanity.
- To promote the discovery and broad communication of knowledge about the biology of animals including their Taxonomy, Evolution, Physiology, Cell, Molecular and Biochemical make up, interaction with their environments and its Zoogeographical realms.
- To develop research aptitude and a scientific advancement.
- Reinvent ourselves in response to the changing demands of society with high moral values as a good citizen

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**CHOICE BASED CREDIT SYSTEM (CBCS):**

The Choice Based Credit System (CBCS) provides an opportunity for the students to choose courses from the prescribed courses comprising core, elective/minor or skill based courses. The courses can be evaluated following the grading system, which is considered to be better than the conventional marks system. Therefore, it has been found necessary to introduce uniform grading system in the entire higher education in India. This will benefit the students to move across institutions to begin with. The uniform grading system will also enable potential employers in assessing the performance of the candidates. In order to bring uniformity in evaluation system and computation of the Cumulative Grade Point Average (CGPA) based on students' performance in examinations, the UGC has formulated the guidelines to be followed.

**Students of this course would be expected to :**

1. Be able to play leading role in industry, research and the public services;
2. Understand and appreciate major public concerns and issues associated with Zoology;
3. Have an understanding and grasp of international research environment where the frontiers of knowledge in Zoology are under research;
4. Be able to adapt and respond positively and flexibly to changing circumstances;
5. Develop the professional skills and personal attributes to deal with complex issues, both systematically and creatively;
6. Have the capacity for individual work and teamwork;
7. Be lifelong learners with intellectual and practical skills.

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**Department Objectives**

The Department is having the following objectives:

- To expose students to updated curricula and to recent advances in the subject and enable the students to face NET, SET and other competitive examinations successfully.
- To create awareness among students about the latest streams of Zoology including advanced subjects like Biotechnology, Tissue culture, Genetic Engineering and Bioinformatics.
- To improve the quality of laboratory and field work for which zoological study tours and excursions have been made compulsory so that the students can become familiar with field status of ecosystem and surrounding study.
- To prepare students to attract and develop interest in applied Parasitology, Animal Physiology, Genetics, Cell Biology, Fisheries science, Toxicology so that the students can select Zoology as their career.
- The BOS in Zoology expects that this new framework of curriculum caters the need of enabling students of subject to accept new challenges of dynamically changing modern era.

**Program Educational Objectives:**

Exposure of students to animal diversity and to provide them systematic tools of traditional and modern types to acquire this knowledge and skill.

To update the syllabus essential for appearing in NET, SET, GATE, ASRB and other competitive exams of UPSC and APPSC.

To make aware the students to know the natural resources of country, to utilize by sustainable methods and conservation of living resources.

To develop trained and knowledgeable human resource for educational and research institutions and industries; to use this human resource for self reliant India.

To develop self employable ability and to apply knowledge for several agro-based industries like Sericulture, Goat farming and Apiculture; it will also provide employment to other dependents.

The M.Sc. degree in Zoology being offered by this University provides its students with a course of study that integrates a range of learning and teaching techniques relevant to their educational development and career ambitions. This Masters programme covers the latest developments in Zoology and its specializations, viz., Applied Parasitology, Animal Physiology, Fishery Science and Entomology. It provides theoretical knowledge as well as training in the practical and intellectual skills to enable students to better understand and then solve some of the problems in this subject. Graduates in this programme will be induced into critical thinking, and would be able to solve complex problems in Zoology. The students would also be inculcated with personal and problem-solving skills that will enhance their employability prospects. Enhanced competence of students has been the key concern in designing and developing this syllabus. Careful thought has gone into selection of topics and setting their scope. Major areas of Zoology like

Genetics, Evolution, Physiology, Biochemistry, Ecology, Immunology, Cytology, Developmental Biology, and Taxonomy have been included in the syllabus only after multiple rounds of thorough discussions and intensive study. Special attention has been paid to subjects like Bioinformatics, Molecular Biology and Genetics to incorporate the latest developments in these fields.

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**OBJECTIVES OF THE COURSE**:

The primary objective of the program is to impart quality education in the subject of Zoology a sa basic science and its applied branches to the students

- To meet the academic to applied aspects in Zoology suited to real problems of regional and National needs
- To expose learners to frontier and thrust areas of Zoology
- To train learners for better performance in various competitive examination and in research careers.
- To enable the learners to acquire and develop self- study habits
- To facilitate Higher education & research in Zoology.
- To provide quality education offering skill based programs and motivate the students for self employment in applied branches of Zoology.
- To Inculcate the spirit of resource conservation and love fornature
- To conduct field studies and different projects of local and global interests.
- To provides opportunities for professional and personal development through curricular and co- curricularactivities.
- Provide consultancy and organize extension activities.
- To shape the learners to become worthy citizens of the Nation in the field of Zoology and interrelated fields.

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**PROGRAMME OUTCOMES :**

The student should acquired the knowledge with facts and figures related to various aspects in life sciences

When you graduate with a Master of Science (Zoology) you will have learned how to work at a high level of academic achievement.

The student to understanding the basic concepts, fundamental principles, and the scientific theories related to various scientific phenomena and their relevancies in the day-to-day life and the applications of Zoology in Aquaculture, Vermiculture, Sericulture, Poultry Science and Fundamentals of Clinical Science and Immunology and to create new industry in their relevant area.

The student could apply the skills to handling scientific instruments, planning and performing in laboratory experiments and also drawing logical inferences from the scientific experiments.

The students analyzed and realized how developments in any science subject helps in the development of other science subjects and vice-versa and how interdisciplinary approach helps in providing better solutions and new ideas for the sustainable developments.

Understand the applications of Biological techniques to various fields of biology.

Attained the knowledge relating to invertebrate & chordate, developmental biology, animal physiology, Cell & Molecular biology, genetics and clinical science, Progression to PG education in Zoology, Aquaculture, Environmental science, Biotechnology, Bioinformatics, Biochemistry, Microbiology and Human genetics, The Students get employment by industries/self employment in Poultry, Veterinary and Aquaculture industries.

Perform, Assess and implement practical techniques and procedure to solve biological problems and analyse and quantify data collected during any project.

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**DEPARTMENT OF ZOOLOGY**

**M.Sc. ZOOLOGY**
**SEMESTER – I**

# ZOO-101: Animal Diversity

**BLOCK - I: CLASSIFICATION OF ANIMALS**

**UNIT 1:** Introduction to the Diversity of Animals, Principles of Classification, Types of Classification and Binomial Nomenclature; Linnaeus

UNIT 2: Species Concept - Typological, Biological and Evolutionary Species Concept.

UNIT 3: Taxonomic Characters and Theories of Taxonomy – Numerical Taxonomy, Cladistics and Molecular Taxonomy.

UNIT 4: Major Divisions and Subdivisions of the Animal Kingdom; Animal Architecture - Cephalization Symmetry - Bilateral and Radial Symmetry; Coelom in Animals: Coelomata, Acoelomata and Psudocoelomata.

**BLOCK - II: PROTOZOA, PORIFERA, COELENTERATA AND HELMINTHES**

UNIT 5: Protozoa: General Characteristics, Classification up to Class Level, Protozoan parasites: Entamoeba and Plasmodium.

UNIT 6: Porifera: General Characters and Classification, Structure of Leucosolenia, Canal System in Sponges, Spicules in Sponges

UNIT 7: Coelenterata: Structure of Obelia Colony, Polymorphism in Coelenterates, Corals and Coral Reefs.

UNIT 8: Helminth Parasites - Taenia Solium, Nematode Parasites – Ascaris and Parasitic Adaptations.

**BLOCK - III: ANNELIDA, ARTHROPODA, MOLLUSCA AND ECHINODERMATA**

UNIT 9: Annelida: General Characters, Classification up to Class – Metamerism in Annelids.

UNIT 10: Arthropoda: General Characters, Classification up to Class – Larval forms of Crustaceans - Adaptive Radiations in Arthropoda, Harmful and Beneficial Insects.

UNIT 11: Mollusca and Echinodermata: General Characters, Classification up to Class - Cephalopod as an Advanced Mollusc; Larval forms of Echinodermata - Water Vascular System in Echinoderms.

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**BLOCK - IV: VERTEBRATES**

UNIT 12: General Characters and Classification of Prochordates and Vertebrates; Pisces - Classification up to Orders, Structural and Functional Adaptation of Fishes

UNIT 13: Amphibians and Reptiles: Definition, General Characters, Classification, Structural and Functional Adaptations of Amphibians and Reptiles - Mesozoic Reptiles - Dinosaurs.

UNIT 14: Aves: Phylogeny, Flight Adaptation, Flightless Birds and Migration of Birds. Mammals: General Characteristics of Prototheria, Metatheria and Eutheria; Aquatic Mammals; Adaptive Radiation in Mammals.

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# ZOO-102: Biochemistry

**BLOCK I: INTRODUCTION TO BIOMOLECULES**

**UNIT-1: Carbohydrates:** Functions, Classification (Mono, Di and Polysaccharides), Structural Aspects of Monosaccharide, Disaccharides and Polysaccharides.

**UNIT-2: Lipids:** Classification and Functions of Lipids, Fatty Acids, Essential Fatty Acids, Triacylglycerols, Phospholipids, Glycolipids, Lipoproteins and Steroids, Properties of Fats and Waxes.

**UNIT-3: Proteins and Aminoacids:** Functions, Structure (Primary, Secondary, Tertiary and Quaternary Structure), Classification and Properties of Proteins. General Structure, Classification and Chemical Properties of Aminoacids.

UNIT-4: Nucleic Acids: Functions and Components of Nucleic Acids. Structure and Nomenclature of Nucleotides. Structure of DNA (Watson and Crick Model), Different Forms of DNA Double Helix and Organization of DNA in the Cell.

**BLOCK II: ENZYMES, VITAMINS AND HORMONES**

**UNIT-5: Enzymes:** Nomenclature and Classification of Enzymes, Active Site, Factors Affecting Enzyme Activity. Mechanism of Enzyme Action (Lock and Key Model, Induced Fit Model, Substrate Strain Model).

**UNIT-6:** Isoenzymes, Regulation of Enzyme Activity in Living System, Enzyme Kinetics (MM Equation, Line-Weaver and Burk Plot).

**UNIT-7: Vitamins:** Classification of Vitamins, Chemistry, Sources, Biochemical Functions, Recommended Dietary Allowances (RDA), Deficiency, Symptoms and Hypervitaminosis.

**UNIT-8: Hormones:** General Classification, Mechanism of Action, Origin and Major Functions of Hormones - Pituitary and Gonadal.

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**BLOCK III: METABOLISM**

**UNIT-9: Carbohydarte Metabolism:** Glycolysis, Citric acid Cycle, Glyconeogenesis, Glycogenesis, Glycogenolysis, Hexose Monophosphate Shunt, Uronic Acid Pathway.

**UNIT-10: Lipid Metabolism:** Fatty Acid Oxidation, Ketogenesis, Biosynthesis of Fatty Acids, Metabolism of Cholesterol.

**UNIT-11: Aminoacid Metabolism:** Amino Acid Pool, Transamination, Deamination, Metabolism of Ammonia, Urea Cycle, Fate of Carbon Skeleton of Aminoacids.

**UNIT-12: Nucleotide Metabolism:** Biosynthesis and Degradation of Purine and Pyrimidine Ribonucleotides.

**BLOCK IV: METABOLIC DISORDERS**

**UNIT-13**: Diabetes Mellitus, Diabetes Insipidus, Glycogen Storage Diseases, Ketoacidosis, Hyperlipoproteinemia, Fatty Liver-Antherosclerosis; Phenylketonuria, Maple Syrup Urine Disease, Glutaric Acidemia Type I,Carbamoyl Phosphate Synthetase I Deficiency.

**UNIT-14: Alcaptonuria;** Lesch-Nyhan Syndrome; Gout; Lipoid Congenital Adrenal Hyperplasia; Kearns-Sayre Syndrome; Zellweger Syndrome; Gaucher's Disease, Niemann Pick Disease.

# ZOO-103: Cell and Molecular Biology

**BLOCK - I: CELL STRUCTURE**

**Unit 1:** Cell theory - Structural organization of Prokaryotic and Eukaryotic cells.

**Unit 2**: Ultrastructure of Cell membrane, Nucleus, Chromosomes, Mitochondria.

**Unit 3:** Endoplasmic reticulum, Golgi apparatus, Lysosomes, Ribosomes, Peroxisomes and their functions.

**Unit 4:** The cytoskeleton - Microtubules and Microfilaments - Cell cycle -Mitosis and Meiosis.

**BLOCK - II: NUCLEIC ACIDS**

**Unit 5:** Structure and functions of DNA,Types of RNA and its function

**Unit 6:** Enzymes involved in Molecular Biology-DNA polymerases, RNA polymerase, Helicase, Primase, Ligase, Exonuclease and endonuclease.

**Unit 7:** Mechanism of prokaryotic and eukaryotic replication; machinery for replication; Synthesis of leading and lagging strands, Okazaki fragments, Difference between Prokaryotic and Eukaryotic replication.

**BLOCK - III: TRANSCRIPTION AND TRANSLATION**

**Unit 8: Prokaryotic transcription:** Promoters, Properties of bacterial RNA polymerase, Steps: Initiation, Elongation and Termination.

**Unit 9: Eukaryotic transcription:** Promoters, Enhancers, Factors, properties of RNA polymerase I, II and III. Post transcriptional modification, Reverse transcription.

**Unit 10: Protein synthesis:** Machinery, Formation of initiation complex, Translocation, Chain elongation and Termination. Post-translational modifications.

**Unit 11:** Cell free protein synthesis, Comparison of protein biosynthesis in prokaryotes and eukaryotes.

**BLOCK - IV: REGULATIONS OF GENE EXPRESSION**

**Unit 12** Concept of operon - Lac and trp operons, Positive and negative control, Repressor and Inducer.

**Unit 13:** Hormonal regulation of gene expression, Transcription factors, Steroid receptors; DNA binding motifs in pro- and eukaryotes.

**Unit 14:** Analysis of Gene expression using Molecular Methodolgy.

# ZOO-104 : Immunology

**BLOCK 1: INTRODUCTION TO IMMUNOLOGY**

**UNIT I** Historical Perspectives and Scope of Immunology

**UNIT II** Lymphoid Organs Structure and Functions of Primary and Secondary Lymphoid Organs

**UNIT III** Molecules of Immune System–Antibodies, Complements, Cytokines, Interferons, Types, Sources and Functions. Antigen: Classification and Epitopes.

**Unit IV Elements of Immune System:** Hematopoiesis, T- Lymphocytes, B- Lymphocytes, Generation of Lymphocyte specificity and diversity.

**UNIT V** Antigen Processing and Presentation, Subsets of T Cells, Memory, Helper and Suppressor Cells, Myeloid Cells, Major histocompatiability complex (MCH)

**BLOCK II IMMUNITY AND IMMUNE RESPONSE**

**UNIT VI Immunity:** Types of Immunity – Innate, Adaptive Immunity.

**UNIT VII** Immune Response: Types of Immune Response, Effector Mechanism of humoral and Cell Mediated Immune Responses.

**UNIT VIII** Antibody-Dependent Cell-Mediated Cytotoxicity, Natural killer cells. Immunity to infections-Immunoprophylaxis, Vaccines and immunization schedule.

**BLOCK III IMMUNE DISORDRS**

**UNIT IX** Infectious Diseases; Hypersensitivity – Types I, II, III and IV.

**UNIT X** Autoimmune disorders and Immunodeficiency diseases. Organ Transplantation. Antibody Engineering.

**UNIT XI** Cancer, Types and Nature, Immunotherapy; Immune Responses against Tumors and Transplants.

**BLOCK IV IMMUNOLOGICAL TECHNIQUES**

**UNIT XII** Immunocytochemistry, Antibody generation and Radioimmunoassay.

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**UNIT XIII** Detection of Molecules Using Immunoblot Techniques, ELISA and Vaccine development.

**UNIT XIV** Immunoprecipitation and Immunofluorescence microscopy, Acquired Immuno deficiency Syndrome (AIDS) detection and Hybridoma technology, FACS, Immunofluorescent assay.

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# M.Sc. ZOOLOGY
# SEMESTER – II

## ZOO-201 : Genetics

**BLOCK-I: CLASSICAL GENETICS**

**Unit I**

Definition, Terminology and Scope of Genetics – Mendel and his Contribution – Hybridization Techniques of Mendel.

**Unit II**

Mendelian Principles – Monohybrid and Dihybrid Crosses, Simple Mendelian Traits in Man.

**Unit III**

Polygenetic Inheritance, Multiple Alleles – Blood Group Inheritance in Man.

**Unit IV**

Interaction of Genes – Allelic and Non-Allelic Interaction – Complementary, Supplementary, Duplicate and Epistatic interaction.

**BLOCK-II: LINKAGE, CROSSING OVER AND CHROMOSOME MAPPING**

**Unit V**

Mechanism and Theories of Linkage and Crossing Over.

**Unit VI**

Chromosomal and Gene Mapping Methods. Linkage Maps, Tetrad Analysis, Mapping with Molecular Markers and QTL Mapping.

**Unit VII**

Structure and Types of Chromosome. Sex Chromosomes, Sex Determination in Animals – Human and Honey Bee. Heterochromatization and Barr Bodies.

**Unit VIII**

Sex Linked Inheritance, Non Disjunction – Syndromes and Pedigree Analysis.

**BLOCK-III: MOLECULAR GENETICS**

**Unit IX**

Mutation – Types and its Applications, Chromosomal Abnormalities, Inbreeding and Out Breeding.

**Unit X**

Population Genetics: Hardly – Weinberg Equilibrium – Gene Pool, Gene Frequency, Genotypic Frequency and Factors Affecting Hardy – Weinberg Equilibrium.

**Unit XI**

Twin Study, Eugenics, Euthenics and Euphenics.

**BLOCK-IV: GENETIC CONCEPT**

**Unit XII**

Concept of Gene – Gene Expression Control in Prokaryotes, Eukaryotes, and Phages.

**Unit XIII**

Genetic Regulation in Development and Role of Cell Death.

**Unit XIV**

Differential and Sequential Expression of Genes with Reference to Drosophila.

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# ZOO-202 : Microbiology

**BLOCK-I: INTRODUCTORY MICROBIOLOGY**

**Unit I**

**Introduction to Microbiology,** Haeckel's three–kingdom concept, Whittaker's Five-kingdom concept, Three-domain concept of Carl Woese.

**Unit II**

**Classification of Bacteria according to Bergey's Manual. Fungi:** Classification of fungi based on Alexopoulos system. General Characteristics of Fungi, Industrial uses of Yeast and Moulds.

Lichens - Structural organization and their properties.

**Unit III**

**Viruses:** ICTV system of classification, General properties, Morphology and ultra-structure of virus (RNA, DNA).

**BLOCK-II: MICROSCOPY, METHODS, NUTRITION AND MICROBIAL GROWTH**

**Unit IV**

Principles and their applications of Simple, Compound, Fluorescent, Electron microscopes.(SEM & TEM) and Confocal microscopes.

**Unit V**

**Stains and staining techniques**: Simple, Differential and Structural staining methods, Imaging techniques.

**Unit VI**

Preservation methods of microbes for storage and microscopic studies, Culture collections, Sterilization and disinfection

**Unit VII**

Auxenic and Synchronous culture, Aerobic and Anaerobic Culture media and Nutritional types. Growth curve, Generation time and growth kinetics. Factors influencing microbial growth.

**BLOCK-III: GENERAL CHARACTERISTICS OF BACTERIA, ALGAE AND PROTOZOA**

**Unit VIII**

Prokaryotic cell structure & Organization: Cell membrane, Plasma membrane, Cytoplasmic matrix, Inclusion bodies, Ribosome, Nucleiod, Prokaryotic cell wall, Capsule, Slime layers, S layers, Pili and Fimbriae, Flagella and Motility.

**Unit IX**

Classification of Algae based on Fritsch system – General characteristicss of Micro and Macroalgae - Biological and Economic importance.

**Unit X**

**Protozoa** –General characteristics, .Impotance of Entamoebahistolytica and Plasmodium sp.

**BLOCK-IV: MOLECULAR TECHNIQUES FOR IDENTIFICATION, INFECTIOUS DISEASES**

**Unit XI**

Molecular Taxonomy, 16S/18S rRNAs and its importance in identification of microorganisms.

**Unit XII**

Phylogenetic tree, Types and construction of Phylogenetic tree, Molecular tools in assessing microbial diversity.

**Unit XIII**

Metagenomics - Sequencing methods, Data Analysis and applications.

**Unit XIV**

Bacterial Diseases (Tuberculosis, Typhoid, Leprosy) Viral diseases (Hepatitis, HIV, Ebola)

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# ZOO-203 : Animal Physiology

**BLOCK – I: INTRODUCTION TO DIGESTIVE, RESPIRTORY AND EXCRETORY SYSTEMS**

**Unit- I:** Definition, Divisions of physiology, Relationship of physiology with other sciences, Significance of the study.

**Unit –II:** Digestive system in man, Physiology of digestion, Absorption and Assimilation, Gastrointestinal hormones and their control in digestion.

**Unit—III:** Respiratory system in man, Types and mechanism of respiration-Transportation of gases, Control of respiration.

**Unit- IV:** Excretory system of human, Structure and functions of nephron, Urine formation and its regulation.

**BLCOK – II: CARDIO VASCULAR SYSTEM AND NERVOUS SYSTEM**

**Unit –V:** Blood: Composition, Haemopoiesis, formed elements, Blood volume and its regulation, Haemostasis.

**Unit- VI:** Types of heart, Structure of human heart, Heart beat and Cardiac cycle, Blood pressure, ECR and its application.

**Unit –VII:** Types and functions of neurons, Central and Peripheral Nervous System, Synapse and its transmission, Resting and action potential, Neuro-muscular junction.

**BLOCK – III: EFFECTORS AND RECEPTORS**

**Unit VIII :** General structure and types of muscles, Sarcomere, Ultra structure of skeletal muscle, Mechanisms of muscle contraction, Chemical changes during muscle contraction, Kymograph.

**Unit -IX:** Physiology of vision, hearing and tactile response.

**Unit –X:** Thermoregulation in animals. Tolerance to high temperature, cold and freezing, Physiology of hibernation and aestivation.

**Unit –XI:** Osmo-ionic regulation in freshwater and marine fishes and crustaceans. Response to hyper and hypo-osmotic media. Adaptation to pressure in high altitude – Buoyancy.

## BLOCK – IV: ENDOCRINOLOGY AND ANIMAL BEHAVIOUR

**Unit – XII:** Endocrine glands and their hormones – Mechanism in action of hormones. Hypo and Hyper secretion of hormones (Thyroid, adrenal and pancreas) and their diseases.

**Unit- XIII:** Neuro endocrine control of hormones, Invertebrate hormones and Hormonal control of insect metamorphosis.

**Unit- XIV:** Biological clock, Endogenous rhythm, Circadian, Circannual and Lunar periodicities.

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# ZOO-204 : Environmental Biology

**BLOCK – I: ECOSYSTEM**

**UNIT I** Structure, Functions and types of ecosystem - Trophic structures, Food chains, Food web, Energy flow and Ecological pyramids.

**UNIT II** Abiotic factors, Soil organisms, Biological effects of light, and temperature.

**UNIT III** Thermal stratification, Concept of limiting factors, Shelford's law of tolerance and ecotypes - Grassland and Pond ecosystem.

**BLOCK – II: MARINE ECOLOGY**

**UNIT IV** Divisions of marine environment, Physical and chemical properties of seawater, Major and minor elements.

**UNIT V** Primary and secondary production, Estimation and factors influencing productivity; Adaptation of plankton, Red tide, Inter tidal and deep sea ecology.

**UNIT VI** Unique features of Coral Reefs, Seaweeds, Seagrasses; Mangroves and estuaries.

**BLOCK – III: BIOGEOCHEMICAL CYCLE AND POPULATION ECOLOGY**

**UNIT VII Biosphere**: Types - Hydrosphere, Lithosphere and Atmosphere.

**UNIT VIII** General account of complete and incomplete cycle; Gaseous cycle Carbon, Nitrogen and Oxygen cycles.

**UNIT IX** Sedimentary cycle: Phosphorus and Sulphur cycles.

**UNIT X** The population concept, Natality, Mortality, Growth rate, Population density and Age distribution, Carrying capacity, Fluctuation and Regulation.

**BLOCK – IV COMMNUNITY ECOLOGY AND ENVIRONMENTAL POLLUTION**

**UNIT XI** Community structure, Ecotone and edge effects, Ecological niche

**UNIT XII** Ecological succession, Climax community - Monoclimax and polyclimax theories.

**UNIT XIII** Air, Water and Soil pollution - Their biological effects - Pollution control measures; Climatic changes - Green house effects, Global warming; Bioremediation and environmental awareness.

**UNIT XIV** Conservation of natural resources; Biodiversity hot spots of India; Endangered and threatened species, Germplasm conservation - Environmental laws.

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