Avinashilingam Institute for Home Science and Higher Education for Women  
Coimbatore 641 043, Tamil Nadu, India  
**B.Sc. Zoology**  
(With Language & English for 4 Semesters)  
**Scheme of Instruction & Examination**  
(for students admitted from 2015-2016 & onwards)

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## PART IV Components

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### A. Ability Enhancement Courses

#### I. Ability Enhancement Compulsory Courses (AECC)

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**Total credits** 8

### Total credits to earn the degree

1. Part I, II and III components 128 credits
2. Part IV components 8 credits
Total credits 136 credits

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**Other courses offered by the Department**

- **Discipline Specific Electives** – DSE I - Nonchordates & Chordates- Semester I
  - 15BB0102 DSE I - Nonchordates & Chordates- Practicals I - Semester I
  - 15BB0103 DSE II - Developmental Zoology and Animal Physiology – Semester – II
  - 15BB0104 DSE II - Developmental Zoology and Animal Physiology Practicals II - Semester – II

- **Elective Course** 15BZO001 Ornamental fish culture
- **Value added Courses** 15BZOV01 Vermicomposting

### Invertebrata-I

**Semester I**

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Objectives

- To enable the students to understand the salient features of Invertebrates.
- To know the economic importance of various Invertebrates.

Unit I - Introduction to Invertebrate
Principles of classification, outline classification of animal kingdom, general characters and major classes of Phylum Protozoa, Paramecium and Plasmodium as type study, locomotion, nutrition and reproduction in protozoa, protozoan parasites.

Unit II- Phylum Porifera
General characters and major classes of Phylum Porifera with examples, Leucosolenia type study, origin of metazoa, canal system and economic importance of sponges.

Unit-III Phylum Coelenterata
General characters and major classes of Phylum Coelenterata with examples, Hydra and Obelia as type study, polymorphism in Hydrozoa, symmetry in metazoans, corals and coral reefs.

Unit IV-Phylum Platyhelminthes
General characters and major classes of phylum Platyhelminthes with examples, Fasciola and Taenia as type study.

Unit V-Phylum Aschelminthes
General characters of Phylum Aschelminthes with examples, Ascaris type study, nematode parasites of man parasitic adaptations of helminth parasites.

Total Hours

Text Books

Reference Books
1. Dr. K. S. Kohli, Dr. M. M. Trigunayat and Dr. Kavitha Sahani., 2008, Invertebrates (Structure & function), Ramesh Book Depot, Jaipur- New Delhi.
Objectives

- To enable the students to understand the salient features of Invertebrates.
- To know the economic importance of various Invertebrates.

Unit I – Phylum Annelida I

General characters and major classes of Phylum Annelida with examples, Megascolex and Nereis as type study.

Unit II – Phylum Annelida II

Hirudinaria as type study, metamerism, coelom and excretory systems in annelids, tube dwelling polychaetes.

Unit III- Phylum Arthropoda

General characters and major classes of Phylum Arthropoda with examples, Penaeus type study, larval forms of crustacea, Peripatus and its affinities, Limulus as living fossil, respiratory organs in Arthropoda, economic importance of Arthropods.

Unit IV- Phylum Mollusca

General characters and major classes of Phylum Mollusca with examples, Pila type study, torsion and detorsion in gastropods, economic importance of Mollusca.

Unit V- Echinodermata

General characters and major classes of Phylum Echinodermata with examples, star fish type study, larval forms in Echinodermata.

Total Hours 75

Text Books


Reference Books

3. Dr.G.S. Shukla and Dr. V. B. Upadhyay,(2004-2005), *Economic Zoology*, Fourth edition,
### Practicals I - Invertebrates

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<td>Semester I</td>
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<td>15BZOC03</td>
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9
**Dissections**

Prawn - Mounting of appendages

Nervous system

Pila globosa- Digestive system

Reproductive system

**Salient features and biosystematics, adaptive features and biological significance of the following**

Amoeba, Paramecium, Plasmodium, Euglena
Leucosolenia, spicules and gemmule of sponges
Hydra, Obelia colony and medusa  Sea anemone, Madrepora,
Favia,Tubifora,
Fasciola, Ascaris, Ancylostoma duodenale ,
Neries, Megascolex, Chaetopterus, Arenicola,Hirudinaria,
Naupilus, Cyclops,Daphnia, centipede,millipede, Peripatus,
Freshwater mussel ,mytilus,octopus,Sepia,
Pearl oyster
Starfish, sea urchin

**Anatomy of Earth worm:**Earth worm dissection (CD);
Sources:http://neosci.com

**Live Zoology**

Paramecium culture

Examination of zooplankton from a pond.

**Total hours** 45
### Objectives
- To learn the salient features, biosystematics and biological significance of chordates
- To study the anatomy of higher organisms
- To understand the economic importance of higher animals

### Unit I - Introduction to Chordata
General characters and outline classification of chordates, origin and ancestry of chordates

### Unit II - Prochordata
General characters and classification of prochordates with examples, Amphioxus, Ascidia and Balanoglossus as type study.

### Unit III – Pisces I
General characters and outline classification with examples, Scoliodon and Mugil as type study, accessory respiratory organs, parental care and economic importance of fishes

### Unit IV – Pisces II
Accessory respiratory organs, parental care, migration and economic importance of fishes, Dipnoi and affinities

### Unit V - Amphibians
General characters and outline classification with examples, type study frog, origin of amphibians, metamorphosis in frog, parental care in amphibians

**Total hours: 60**

### Text Book

### Reference Books

Objectives

- To learn the salient features, biosystematics and biological significance of chordates
- To study the anatomy of higher organisms
- To understand the economic importance of higher animals

Unit I - Reptiles
General characters and outline classification with examples, type study calotes, poisonous and non poisonous snakes of South India, key to identification of poisonous snakes, poison apparatus and biting mechanisms, snake venom and first aid.

Unit II - Aves I
General characters and outline classification with examples, pigeon type study.

Unit III - Aves II
Archaeopteryx, Ratitae, bird migration, flight adaptations in birds.

Unit IV - Mammals I
General characters and outline classification with examples, rabbit type study,

Unit V - Mammals II
Origin of mammals, aquatic mammals, flying mammals, adaptive radiation in mammals, economic importance of mammals.

Total hours 75

Text Book

Reference Books


Practicals II - Chordates

Semester II Hours of Instruction/week : 5

15BZOC06 No. of credits : 2
A. Dissections (Demonstration only)
   Teleost fish – Digestive system  
   Reproductive system  

B. Study of the following specimens by observing its salient features 
   and biological significance
   a. Amphioxus, Balanoglossus and Salpa  
   b. Scoliodon, Mugil, Arius, Hippocampus and Electric ray  
   c. Frog, Alytes and Icthyophis,  
   d. Calotes, Chelone, Chameleon, Crocodile, Viper and Cobra  
   e. Pigeon, Woodpecker and Kingfisher  
   f. Rat, Anteater and Porcupine  

C.  
   a. Identification of locally available fishes  
   b. Study of ornamental fishes  
   c. Study of scales of fishes  
   d. Study of different types of feathers of birds  
   e. Study of different types of beaks and feet of birds  

D. Osteology
   Frog: Pectoral girdle, pelvic girdle, fore limb, hind limb and typical vertebrae  

E. Supplementary sources for laboratory exercise
   Anatomy of frog
   a. The dissection works(CD)  
      Source: [http://www.scienceclass.com](http://www.scienceclass.com)  
   b. Prodissector – Frog (CD)  
      Source: [http://www.prodissector.com](http://www.prodissector.com)  

F. Field work
   a. Report on visit to Gauss museum  
   b. Report on visit to SACON  
   c. Report on visit to National park / Zoological park/ Sanctuary  
   
   Total Hours 75

Cell Biology

<table>
<thead>
<tr>
<th>Semester III</th>
<th>Hours of Instruction/week</th>
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<td>15BZOC07</td>
<td>No. of credits</td>
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Objectives

- To learn the various cytological techniques understand the ultra structure of the cell.
- To study structure of functions of cell organelles.

Unit I Cell structure and techniques of cell study

Concepts of a modern cell, cell theory, prokaryotic organization, organization of eukaryotes, cell size, shape, typical cell structure, cell types.

Light, transmission and scanning electron microscopes, preparation of materials for light and electron microscopes, cell fractionation methods, homogenization and centrifugation.

Unit II Plasma membrane

Chemical composition, structure, fluid mosaic model, membrane transport, cell adhesion, cell junction.

Unit III Cell organelles

Morphology, ultra structure and functions of mitochondria, golgi complex, endoplasmic reticulum, ribosomes, lysosomes, centrosomes.

Unit IV Nucleus

Nuclear envelope, nucleolus, organization and functions of nucleus, morphology and ultrastructure of chromosome, euchromatin, heterochromatin, polytene and lamp brush chromosomes, functions.

Unit V Cytology of Cancer

Cancer cell, difference between normal and cancer cells, membrane and biochemical changes, nuclear and chromosomal changes, tumour viruses, oncogenes, environmental factors inducing cancer, hormones in relation to cancer cells, cell ageing and mechanism and purpose of cell death.

Total Hours 60

Text Book


Reference Books


Molecular Biology

Semester III

Hours of Instruction/week : 4

15BZOC08

No. of credits : 3
Objectives

- To enable the students to know about the central dogma of molecular genetics.
- To understand the fundamental basis and expression of inherited genetic information

Unit I Introduction to molecular biology

Nature of genetic material, evidences for DNA as genetic material, bacterial transformation, bacterial conjugation, bacteriophage infection, transduction evidences for RNA as genetic material

Unit II Molecular structure of DNA

 Constituents of nucleic acid, structure of DNA, types of DNA, alternative forms of DNA, supercoiling of DNA, repeated and unusual structures of DNA sequence, properties of DNA

Unit III Replication of DNA

 Basic requirements for DNA synthesis, semi conservative mode of DNA replication, enzymology and proteins associated with DNA replication, mechanism of DNA replication in prokaryotes and eukaryotes, replication models, inhibitors of DNA replication

Unit IV Ribonucleic acid and Transcription

 Structure of RNA, types of RNA, basic features of RNA synthesis, steps in the synthesis of RNA, post transcriptional modifications of RNA, inhibitors of transcription

Unit V Genetic code and Translation

 Features and deciphering of genetic code, requirements and steps involved in protein biosynthesis, inhibitors of protein biosynthesis, post translational modifications

Total Hours 60

Text Book


Reference Books


Practicals III - Cell and Molecular Biology

Semester III Hours of Instruction / week: 5
Cell Biology

1. Principles of light microscope - 2
2. Homogenization and centrifugation of tissue samples - 3
3. Haemolysis - 5
4. Cell division in grass hopper / cockroach testis - 5
5. Squash preparation of onion root tip - 5
6. Buccal smear test - 5
7. Examination of live Paramecium to study streaming movement of cytoplasm - 5
9. Mounting of polytene chromosome - 5
10. Human peripheral leucocyte culture - 5

Molecular Biology

11. Isolation and estimation of DNA from onion - 5
12. Isolation and estimation of DNA from goat liver - 5
13. Isolation of DNA from Bacteria - 5
14. Plasmid DNA isolation - 5
15. Separation of DNA by agarose gel electrophoresis - 5
16. Preparation of competent cells - 5

Total Hours - 75

Genetics

Semester IV

15BZOC10

Hours of Instruction / week: 4

No. of credits : 3

Objectives
To learn the genetic principles in animals.
To understand the inheritance of genetic disorders in man.

Unit I  Introduction

Mendelism, Mendel’s work, mono hybrid, dihybrid, back cross, test cross.
Mendel’s laws- Law of dominance, segregation and independent assortment, Incomplete dominance.

Unit II  Gene interactions

Complementary, supplementary, epistatic, lethal and cumulative genes, Characters of multiple alleles with examples, ABO blood groups, Rh factor.

Unit III  Linkage and crossing over

Definition, types of linkages in drosophila, definition, types of crossing over, mechanism of crossing over, cytological evidence for crossing over, factors affecting crossing over, chromosome mapping.

Unit IV  Sex linked inherentance and Sex determination

Definition, X and Y linked inherentance, haemophilia and colour blindness in man, sex influenced and sex limited genes in man, chromosomal theory, quantitative theory (Lyons hypothesis and dosage compensation), environmental theory, hormonal theory of sex determination, primary and secondary chromosomal non disjuction

Unit V  Human genetics

Pedigree analysis, Mendelian traits, human karyotype, autosomal and sex chromosomal abnormalities, inbreeding, out breeding and hybrid vigour, genetic counseling

Total Hours  60

Text Book


Reference Books


Evolution

Semester IV  Hours of Instruction / week: 4
15BZOC11  No. of credits : 3

Objectives
• To learn about the origin of life.
• To understand the principles of evolution.
• To understand the mechanism of evolution.

Unit I Introduction
History, theories of evolution, origin of life, Urey and Miller’s experiment, evidences for evolution, morphological and comparative anatomical evidences, embryological, physiological and biochemical evidences, taxonomical and paleontological evidences, geographical evidences.

Unit II Mechanism of Evolution
Lamarckism, NeoLamarckism, Darwinism, neo-Darwinism, mutation theory and its modern version highlighting its role in evolution, modern version of natural selection theory, stabilizing, diversifying and directional selection

Unit III Isolation, speciation and origin of higher categories
Premating and postmating isolation mechanism and their significance, modes of speciation, allopatric, sympatric and parapatric speciation, micro, macro and mega evolution.

Unit IV Fossils
Fossil formation, types of fossils, dating of fossils, significance of fossil record, Indian fossils, living fossils, geological time scale

Unit V Evolution of horse/man
Evolution of horse, orthogenensis in horse evolution, evolution of man, biological aspects (with fossils record), cultural evolution of man.

Total Hours 60

Text book

Reference books

General Entomology

Semester IV

15BZOC12

Hours of Instruction/week : 3
No. of credits : 3
• To enable the students to know about the various types of insects,
• To know about the types of pests and their control.

Unit I Classification of insects
Introduction, principles underlying classification, classification up to orders with examples.

Unit II Structure of an insects
Cockroach, external characters, integument, head, mouth parts, abdomen, thorax, wings and legs, metamorphosis, hormones in metamorphosis

Unit III Insect Pests
Gryllids and silver fish as domestic pests, pulse and flour beetles as pests of stored grain, paddy and sugar cane as agricultural pests, pests of medical importance, housefly and mosquitoes.

Unit IV Pest control measures
Mechanical and chemical control, insecticidal formulation, organic and inorganic pesticides, biological control, biological agents, parasites, pathogens and predators, pheromonal technique of pest control

Unit V Social life of Insects
Ants as social insects, polymorphism, colony founding, nest building, food and feeding.
Termites as social insects, polymorphism, reproductive castes, colony founding, nest building, food and feeding, termitophiles and communication

Total Hours 45

Text Books

Reference Books:

Practicals IV - General Entomology

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<th>Semester IV</th>
<th>Hours of Instruction/week</th>
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Dissections

Cockroach –
  - Mouth parts
  - Digestive system
  - Nerves system
  - Reproductive system

Visits to

1. Sugar cane Breeding Institute for survey of sugar cane pests - 3
2. Tamilnadu Agricultural University for survey of agricultural pests - 3
3. Study of life cycle of mosquitoes through hay infusion - 3
4. Institute of Forest Genetics and Tree Breeding - 3

Identification of stored grain pests from household - 3

Male and female identification in cockroach, drosophila and mosquito - 3

Total Hours - 30

Biochemistry

Semester V
15BZOC14

Objectives
• To enable the students to know about the structure of the biomolecules and their metabolism.

Unit I – Introduction to Biochemistry

Introduction, chemical bonds, functional groups, structure, ionization and properties of water, acid base balance, concept of pH, maintenance of blood pH, bicarbonate, phosphate and protein buffers of blood, acidosis and alkalosis.

Unit II – Carbohydrates

Classification, structure and function of carbohydrates, glycolysis, TCA cycle, energetics, HMP shunt, glycogenesis, glycogenolysis and gluconeogenesis.

Unit III – Proteins

Structure, classification and properties of amino acids, primary, secondary, tertiary and quaternary structure of proteins, classification, properties and functions of proteins, transamination and deamination of amino acids.

Unit IV – Lipids

Classification, structure of fatty acids, triacylglycerol, phospholipids, steroids and lipoproteins, properties and functions of lipids, β-oxidation of palmitic acid and valeric acid, ketone bodies formation.

Unit V – Enzymes

Nomenclature and classification, factors affecting enzyme activity, active site, enzyme inhibition, mechanism of enzyme action.

Text Book


Reference Books


Animal Physiology

Semester V

Hours of instruction/week : 5

15BZOC15

No of credits: 3

Objectives

• To enable the students to understand the physiological aspects of life
• To apply the knowledge in day to day life and understand the basis for physiological disorders.
Unit I Introduction
Scope of physiology, nutrition, types of nutrition, digestion and absorption in a mammal. 15

Unit II Respiration and Circulation
Organs of respiration, respiratory pigments, transport of gases, control of respiration, transport systems, heart types, structure of mammalian heart, properties of heart muscle, origin and conduction of heart beat, hemodynamics, blood composition, functions, rbc indices, coagulation, anticoagulants, blood pressure. 15

Unit III Excretion and Nervous system
Excretory organs and excretory products of animals, structure of mammalian kidney, urine formation, composition of urine, osmoregulation in invertebrates and vertebrates, homeostasis, structure of neuron, conduction of nerve impulses, synapses, reflexes, autonomic nervous system 15

Unit IV Receptors and Effectors
Photoreceptors, mechanoreceptors and chemoreceptors of a mammal. Structure and physico-chemical properties of skeletal muscles, physiology and muscle contraction, theories. 15

Unit V Reproduction
Reproductive organs and physiology of reproduction in a mammal, Sexual cycles, Pregnancy, Menopause, Hormones in reproduction 15
Endocrine Glands of a mammal, Pituitary, Thyroid, Parathyroid, Adrenal, Islets of Langerhans
Biological clock, Types and Significance, Bioluminescence, Bioluminescent animals, Physiology, Significance.

Total Hours 75

Text Book

Reference Books

Biostatistics
Semester V Hours of instruction/week : 4
15BZOC16 No of credits: 3

Objectives:
To study the fundamentals of biostatistics
To study the application of biostatistics for testing hypothesis

Unit I - Introduction to biostatistics
Introduction, collection, types, methods of collection of data, sources of data, census and sampling, laws of sampling, probability and nonprobability, sampling methods, sampling and nonsampling errors.

Unit II – Presentation of data
Classification, types of classification, tabulation, parts of a table, types of tables, diagrammatic and graphic presentation, bar, pie diagram, line graph, graph of frequency distribution

Unit III – Measures of central tendency
Objectives, mean, medium, mode, merits and demerits, geometric mean and harmonic mean

Unit IV - Measures of dispersion
Objectives, mean deviation and standard deviation, merits and demerits, variance, standard error, coefficient of variation.

Unit V - Correlation and regression analysis
Objectives, types of correlation, Karl Pearson’s coefficient of correlation, regression types, regression line, regression equations, regression coefficients

Total Hours 60

Text books
2. Ramakrishna. (2003), Biostatistics, Saras, Publication, Nagarcoil.

Reference Book

Aquaculture
Semester V
15BZOC17
Hours of instruction/week : 4
No of credits : 3
Objectives
To enable the students to understand the importance and applications of aquaculture.
To know the commercially important species and its culture practice.

Unit I Introduction to fisheries and aquaculture

History of aquaculture, Fishing gear and conventional fishing methods, Different types of nets (Seines, trawls, gill nets, trap nets, dip nets, casting net and blankets net), Hook and line gear.

Unit II Construction and management of fish farms

Structure of fish ponds (bundhs, slope, berm), types of fish ponds, nursery ponds, Rearing ponds, Production pond. Fish culture in fresh water, Objectives of fish culture, Types of cultivable fishes, Breeding habits of cultivable fishes.

Practical 1: Analysis of morphometric and meristic characters of fish
Practical 2: Gut content analysis

Unit III Composite fish culture

Sewage fed fisheries in carp culture, Brackish water fish culture, Integrated fish farming. Hormonal and genetic approach to fisheries, Cryopreservation of gametes, Hybridization, Transgenic fish, Inbreeding cross breeding and selective breeding.

Practical 3: Fish feed formulation using probiotics, fish waste and vegetable waste

Unit IV Setting and fabrication of aquarium tanks

Accessories used in aquarium tank (aerators, filters, nets, gravels and ornamental objects), common ornamental fishes, and aquarium plants.

Practical 4: Setting up of an aquarium

Unit V Taxonomy and biology of some popular ornamental fishes

Live bearers (ovoviviparous), red sword tail, platy, guppy and molly. Egg layers (oviparous), Gold fish, Siamese fighting fish, gourami, angel fish, Oscar, breeding and spawning of liver bearers and egg layers.

Practical 5: Identification of ornamental fishes

Total Hours : 60

Text Book


Reference Book

1. Ranga and Shammi, (2003), Fish Biotechnology, Agrobios, India.

Practicals V – Biochemistry and Animal Physiology

Semester V

15BZOC18

Hours of instruction/week : 5

Biochemistry

No of credits : 2
1. Quantitative estimation of carbohydrates - 5
2. Quantitative estimation of lipids - 5
3. Quantitative estimation of proteins - 5
4. Effect of enzyme activity at different pH - 5

**Animal physiology**

6. Estimation of excretory products of animals - 5
7. Analysis of digestive enzymes in cockroach - 5
8. Ciliary activity of fresh water mussel in relation to temperature - 5
10. Slides – Striped, Unstriped and Cardiac muscle - 5
11. Human Anatomy - Integument, digestive, respiratory, circulatory, excretory system (from models) - 25

**Total Hours** 75

**Sericulture and Apiculture (Self Study course)**

**Semester V**

**15BZOC19**

**Objectives**

1. To enable students to learn the basics of silk worm rearing techniques.
2. To understand the economic importance of sericulture and obtain knowledge of basic facts about bees and bee keeping.
Unit I - Introduction
History of sericulture, economic importance of sericulture, varieties of silk worms, mulberry, tassar, eri and muga silkworms, life cycle of *bombyx mori*.  

Unit II - Silk worm rearing
Rearing house, facilities, rearing equipments, optimum environmental conditions, spacing, chawki, shelf-floor and shoot rearing, mounting and harvesting, cocoon marketing.  

Unit III - Silkworm diseases
Pebrine, flacherie, grasserie, muscardine, methods of prevention, pests of silkworms.  

Unit IV - Types of honey bees and Bee colony
Rock bee, Indian bee, European bee, Little bee, Dammer bee and their identification, bee colony, its members, life cycle of honey bee  

Unit V - Apiary
Types of bees hives, accessories of apiculture, enemies of bees extraction of honey, honey, properties, chemical composition, preservation and storage of honey, nutritive value and medicinal value.

Total hours 15

Text Book

Reference Books

Microbiology

Semester VI
15BZOC22

Hours of Instruction/week :  4
No. of credits :  3

Objectives
To enable the students to gain knowledge about the applications of microbes and its significance in various fields.

**Unit I Introduction**

History and scope of microbiology, outline classification of bacteria, fungi and virus

**Unit II Microbial culture and growth**

Sterilization, media types and preparation, sample collection, isolation, identification, maintenance of microbes, bacterial growth pattern, factors affecting growth, measurements of growth.

**Unit III Food Microbiology**

Food spoilage, food poisoning, food preservation

**Unit IV Industrial and Environmental Microbiology**

Fermentor design, microbial selection, ethanol and penicillin production, water analysis, sewage treatment.

**Unit V Medical Microbiology**

Bacterial Diseases – Tuberculosis, Leprosy, Syphilis, Cholera.

Fungal Diseases – Cutaneous and systemic mycoses.

Viral Diseases - Chicken pox, Measles, Influenza, Rabies, Hepatitis, Poliomyelitis, AIDS.

**Text Book**


**Reference Books**


**Immunology**

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Unit I Introduction to immunology

History of immunology, immunity, types of immunity, lymphoid organs, primary, thymus, bursa of fabricius, bone marrow, secondary, lymph nodes, spleen.

12

Unit II Antigen and Antibody


12

Unit III Cells of immune system

Lymphocytes and its types, macrophages, eosinophils, basophils, neutrophils, mast cells antigen presenting cells, platelets. Immune response, types, humoral immune responses, B cell activation, cell mediated immune response.

12

Unit IV Complement

Complement activation, classical, alternate pathway, biological functions. Major histocompatibility complex, histocompatible molecules, human leucocyte antigen, functions

12

Unit V Hypersensitivity

Types, mechanism of type 1 hypersensitivity. Transplantation immunology, types of graft, graft acceptance and rejection, mechanism of allograft rejection, prevention of graft rejection.

12

Total Hours 60

Text Book


Reference Books


Developmental Biology

Semester VI Hours of instruction/week : 5
15BZOC24 No of credits: 3

Objectives
- To enable the students to understand the basic principles of growth and development
- To understand the general concept of ontogenic development
- To understand the application of developmental biology.

**Unit I Introduction**

Historical reviews, scope of embryology, gametogenesis, spermatogenesis, structure of a typical sperm, significance, oogenesis, egg types, egg membranes.

**Unit II Fertilization**

Mechanism and significance of fertilization. cleavage, features, planes and patterns of cleavage, morula, blastula, cleavage in frog, chick and rabbit. fate maps, construction of fate maps, fate map of frog and chick.

**Unit III Gastrulation**

Features of gastrulation, morphogenetic movements, gastrulation of frog and chick, significance.

**Unit IV Organogenesis**

Ectodermal derivatives, development of brain and eye, endodermal derivatives, development of alimentary canal and associated glands. mesodermal derivatives, development of heart and kidney, development of foetal membranes in chick.

**Unit V Embryology of the mammal**

Human embryo development during trimester, implantation, tubal pregnancy. placentation in mammals, structure, types, functions.

**Total Hours** 75

**Text Book**


**Reference Books**


**Environmental Biology**

Semester VI  
Hours of instruction/week : 4
Objectives

- To enable the students to understand the various factors of environment
- To know about the interaction between organizations of environment
- To know the effects of population and its control measures

Unit I Introduction

Environment, atmosphere, hydrosphere, lithosphere. abiotic factors, light, temperature, humidity, biogeochemical cycle

Unit II Biotic factors

Community ecology, community characteristics, population ecology, population characteristics. ecosystem, structure and function. animal relationship, interspecific and intraspecific.

Unit III Pollution

Sources, effects, control of air, noise and water pollution, human rights, intellectual property rights, protection, GATT, ethical issues, biosafety regulations.

Unit IV Biodiversity

Types, values, hotspots, threats, conservation. disaster management, land disaster, earth quake. water disaster, flood and tsunami, weather disaster, drought and cyclones, mitigation measures, awareness and safety programs, global warming.

Unit V Environment impact assessment

Steps in EIA, problems and potential solutions, methods of EIA, prospects for the future. EIS. environmental awareness, RIO summit and agenda, social forestry and chipko movement. environmental auditing, types, methods, reporting.

Total Hours 60

Text books


Reference Books


Practicals VI - Microbiology and Immunology

Semester VI

Hours of Instruction / week: 5

15BZOC26

No. of credits : 2
Microbiology

1. Isolation of microbes from soil - 5
2. Isolation of microbes from water - 5
3. Maintenance of microbial cultures by streaking methods - 5
4. Identification of bacteria by Gram staining - 5
5. Estimation of amylase isolated from microbial source - 5
6. Water analysis of Most Probable Number (MPN) technique - 5
7. Identification of fungi by lacto phenol cotton blue staining - 5
8. Methylene blue reductase test for milk - 5
9. Growth curve of E. coli - 5
10. Antibiotic sensitivity test - 5

Immunology

11. Demonstration of Ag – Ab interaction - 5
12. Isolation of lymphocytes on histopaque - 5
13. Precipitating ring test - 5
15. Double radial immunodiffusion - 5

Total Hours 75

Practicals VII - Developmental and Environmental Biology

Semester VI Hours of instruction/week : 5

15BZOC27 No of credits : 2
Developmental Biology

Microscopic examination of slides of frog
1. V.S of ovary of frog
2. Egg of frog (2, 4, 8 and 32 celled stage)
3. T.S of gastrula with yolk plug
4. Frog early gastrula
5. T.S of neural plate
6. T.S of neural fold
7. T.S of neural tube
8. Tadpole larva 4mm
9. Tadpole larva 7mm
10. Tadpole larva 10 mm

Microscopic examination of slides of chick embryology
1. Hen’s egg
2. 18h chick embryo
3. 24h chick embryo
4. 36h chick embryo
5. 48h chick embryo
6. 72h chick embryo
7. 96h chick embryo

Spotters – Embryos of animals
1. Embryo of Rat
2. Embryo of Rabbit
3. Embryo of Pig
4. Embryo of Sheep

Environmental Biology
1. Estimation of pH of different water samples using pH meter
2. Estimation of salinity of different water samples
3. Estimation of dissolved oxygen in water samples
4. Estimation of dissolved carbon dioxide in different water samples
5. Determination of total alkalinity in different water samples
6. Estimation of phosphates in the given water samples
7. Estimation of nickel in the given water sample
8. Estimation of chloride in water samples
9. Estimation of nitrates in water samples

Total Hours 75

Ornamental fish culture (Generic Elective Course)

Semester V

Hours of instruction/week: 2
No. of credits: 2

15BZOO001
Objectives

- To provide self-employment
- To augment our economy through export
- Hobby for refreshing our body and mind
- Paves way for doing research.

Unit I – Fresh water aquarium
Introduction, definition, origin, history of aquarium, types of aquarium, nature of aquaria, space and setting of aquarium tank.

Unit II- Taxonomy and biology of some popular ornamental fishes
Live bearers (ovoviviparous), red swordtail, platy, guppy and molly.
Egg layer (oviparous), gold fish, siamese fighting fish, gourami, angel fish, koi carp, oscar and neon tetra.
Breeding and spawning of live bearers and egg layers.

Unit III- Accessories used in aquarium tank and its maintenance
Accessories used in aquarium tank (aerator, filters, nets, gravel, ornamental objects).
Maintenance of water quality, (temperature, ammonia, pH, O₂ / CO₂) control of snail and algal growth.

Unit IV – Nutritional requirements of ornamental fish
Different kinds of feeds- Live feed, culture of live feed organisms, infusoria, chironomous, tubifex, rotifers cladocerans and brine shrimp.
Artificial feed, feed formulations, uses of natural and synthetic feed additives, balanced diet.

Unit V- Marine ornamental fishes and diseases
Important marine ornamental fishes, purchase and transport of ornamental fishes, other ornamental organisms.
Common diseases, protozoan, fungal, bacterial and nutritional diseases, their diagnosis and treatment.

Total Hours 30

Text Book

Reference Books

2. Venkataramani, V.K., et al., (2004), Biodiversity and Stock Assessment of Marine Ornamental Fishes, Department of Fisheries Biology and Capture Fisheries, Fisheries College and Research Institute, TNAUVAS, Tuticorin – 628 008.
Allied-II - Computer Applications in Zoology

Semester II
15BZOI03

Hours of Instruction/week : 2T+3P
No. of credits : 4

Objectives

- To open up a chance for acquiring basic training in computer and its age
- To familiarize students with the principles and tools of contemporary computer applications
- To learn to use computers for presenting, or learning a biological topic.

UNIT I - Introduction to Computers

Characteristics of computers, generation of computers, classification of computers, components of computer, input and output devices, central processing unit, memory devices, types of software, introduction to operating system, types, MS DOS, MS windows
UNIT II - MS word
Introduction, processing and MS word, creating, saving and closing documents, opening
and painting a document, text formatting, desktop publishing, converting a document into a
web page, mail merge, working with tables.
Practicals - Working with Windows explorer

UNIT III - MS EXCEL
Introduction, features and application of ms excel, creating a new workbook, using a
worksheet, renaming and deleting a worksheet, copying worksheet, formatting the data,
using formulas and functions, data handling in ms excel, sorting data, chart creation
Practicals – MS –Excel

UNIT IV - MS power point
Introduction, opening blank presentation, parts of power point screen, creating and deleting
slides, setting a background layout, saving and closing a presentation, inserting objects,
presenting data using tables, charts and animations, slide show.
Practicals – Power Point

UNIT V - Mapping with Computers
Types of maps and methods of mapping, tool and techniques, introduction of geographical
information system, highlights of map maker software, landscape mapping of rural and
urban ecosystem.

Total Hours 75

References
Education private Ltd, New Delhi
Desktop Quick Reference, Orielly publishers
Bott, E and Leonhard, W (2003), Using Microsoft Office 2003, publisher Paul Boeger
Objectives

- To enable the students to understand the salient features of non-chordates
- To know about the biology of invertebrate and vertebrate animals.

Unit I Introduction to Non-chordates

General characters and outline classification of non chordates with examples, Paramecium, type study, earthworm, type study.

Unit II Arthropoda and Mollusca

Cockroach, Type study, *Pila globosa*, Type study.

Unit III Introduction to Chordates

General characters and outline classification of chordates, Scoliodon (Endoskeleton excluded), Type study.

Unit IV Amphibia

Frog (Endoskeleton excluded), Type study, Parental care in Amphibia

Unit V Mammals

Rabbit (Endoskeleton excluded), Type study, monotremes and Marsupials.

Total Hours 60

Text Book


DSE I Practicals I – Non-chordates and Chordates

<table>
<thead>
<tr>
<th>Semester I</th>
<th>Hours of Instruction/week : 3</th>
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<tbody>
<tr>
<td>15BBOI02</td>
<td>No. of credits : 2</td>
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</tbody>
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Dissections
Cockroach - Digestive system 7
Cockroach - Nervous system 7

**Spotters**
Ameoba, Euglena, Paramecium, Leucosolenia, Obelia colony, Madrepora, Planaria, Ascaris, Nereies, Peripatus, Prawn, *Pila globosa*, Sea star and sea cucumber 15

**Chordates**
**Dissection**
Fish - Visceral organs 6

**Spotters**
Scoliodon, Ophiocephalus, *Rana hexadactyla*, Ichthyophis, Rabbit 10

**Total Hours** 45

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DSE-II - Developmental Zoology and Animal Physiology

Semester II  
15BBOI03  
**Hours of Instruction/week**: 4  
**No. of credits**: 3
Objectives

- To enable the students to understand the basic principles of growth and development
- To understand the application of developmental biology.
- To enable the students to understand the physiological aspects of life, apply the knowledge in day to day life and understand the basis for physiological disorders.

Unit I Gametogenesis

Spermatogenesis, structure of a typical sperm, significance of spermatogenesis, Oogenesis, multiplication, growth phase, maturation phase

Unit II Fertilization

Fertilization, mechanism and significance of fertilization, cleavage, planes and patterns, blastulation and gastrulation in frog, test tube baby, twins

Unit III Digestion and Respiration

Nutrition, types of nutrition, digestion and absorption in a mammal, respiration, organs of respiration, respiratory pigments, transport of gases

Unit VI Circulation

Heart types, structure of mammalian heart, origin and conduction of heart beat, composition and functions of blood, blood pressure

Unit V Excretion

Excretory organs and excretory products of animals, structure of mammalian kidney, urine formation, composition of urine, sexual cycles, pregnancy, menopause, hormones in reproduction

Total Hours 60

Text Book


Reference Books


DSE-II Practicals II - Developmental Zoology and Animal Physiology

Semester II 15BBOI04

Hours of Instruction/week : 3
No. of credits : 2
Developmental Zoology

Microscopic examination of slides on frog embryology
(T.S.of ovary, blastula),
Metamorphosis of frog 10

Animal physiology 10

Human Blood smear preparation

Estimation of excretory products of animals 5
Analysis of digestive enzymes in cockroach 5
Estimation of Oxygen consumption in an aquatic animal 5
Estimation of pH 5
Estimation of salinity of water samples 5

Total Hours 45

Vermicomposting
(Value Added Course)

Semester II to V
15BZOV01

Hours of instructions: 40
No. of credits: 2
Unit I
Introduction to earthworm, origin and evolution, general body structure, external characters, food and feeding habits, digestive system, reproductive system, reproduction and cocoon formation.

Unit II
Vermitechnology, definition, advantages of vermiculture, vermi-cast, vermin-wash, decomposition of biodegradable wastes.

Unit III
Vermicomposting, vermiculture in pollution abatement.

Unit IV
Vermicomposting, Advantages of vermicomposting types of vermicomposting requirements of vermicomposting.

Unit V
Vermicomposting schemes, maintenance of vermicomposting beds and precautions.

Total hours 40

Text Books
