# B.Sc., Zoology – Course Structure

(For Candidates To Be Admitted From The Academic Year 2008-2009 Onwards)

<table>
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<tr>
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Head of the Department of Zoology
### B.Sc., ZOOLOGY – COURSE STRUCTURE UNDER AUTONOMOUS
(For Candidates Admitted For The Academic Year 2009-2010 onwards)

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### B.Sc., ZOOLOGY – COURSE STRUCTURE UNDER AUTONOMOUS

**For Candidates Admitted For The Academic Year 2007-2010 (120 credits)**

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I – SEMESTER
Core course I – INVERTEBRATA

UNIT – I:
Classification of major phyla of Invertebrata upto class level, and their salient features with suitable examples.

Phylum – Protozoa
Detailed study – Paramecium
General topics: 1. Protozoan parasites
2. Locomotion in Protozoa

UNIT – II:
Phylum – Porifera and coelenterata
Detailed study – Sycon and Aurelia
General topics: 1. Canal system in Porifera
2. Polymorphism in hydrozoa
3. Coral and coral reefs

UNIT – III:
Phylum: Platyhelminthes and Aschelminthes
Detailed Study – Liver fluke.
General topics: 1. Parasitic adaptations in helminthes.
2. Human Nematode parasites

UNIT – IV:
Phylum Annelida: and Arthropoda
Detailed study – Leech and Prawn
General topics: 1. Metamerism in Annelida
2. Excretory organs in Annelida
3. Larval forms in crustacea

UNIT – V:
Phylum Mollusca and Echinodermata
Detailed study: - Pila and starfish
General topics: 1. Torsion in gastropoda;
2. Cephalopods as advanced invertebrates
3. Larval forms of echinoderms.

REFERENCE BOOKS:
ALLIED ZOOLOGY course I

BIOLOGY OF INVERTEBRATES AND CHORDATES

UNIT I:

Systematic position and Detailed study of Paramoecium, Obelia, Faciola hepatica

UNIT II:

Systematic position and Detailed study of Earthworm and Prawn

UNIT III:

Systematic position and Detailed study of Fresh water mussel and Sea star.

UNIT IV:

Systematic position and Detailed study of Shark- Morphology – Placoid scale, digestive system, respiratory system, circulatory system, urinogenital system and brain of Shark, Frog detailed study of all system(Exclusive of Endoskeleton. Systematic position and Morphology and Urinogenital system of Calotes.

UNIT V:

Systematic position and morphology, feathers, Digestive system, Respiratory system of Pigeon. Systematic position, Morphology and all systems of Rabbit exclusive of Rabbit exclusive of Endoskeleton.

Reference:

II – SEMESTER

Core course II – CHORDATA

UNIT-I:
Sub Phylum: Prochordata
Systematic position & Detailed study: Ascidian, and Amphioxus,
(Exclusive of endoskeletoen)
2. Affinities of Prochordates

UNIT-II:
Class: Pisces
Systematic position & Detailed study: Scoliodon. (Exclusive of endoskeletoen)
General topics: 1. Accessory respiratory organs in fishes
2. Parental care in fishes
3. Migration in fishes

UNIT – III:
Class: Amphibia
Systematic position & Detailed study – Frog (Inclusive of endoskeletoen)
General topics: 1. Parental care in Amphibia

UNIT – IV:
Class: Reptilia
Systematic position & Detailed study – Calotes (Exclusive of endoskeletoen)
General topics: 1. Identification of poisonous snakes
2. Poison apparatus and biting mechanism

UNIT-V:
Class: Aves and Mammalia
Systematic position & Detailed study: Pigeon and Rabbit (Exclusive of endoskeletoen)
General topics: 1. Migration in birds
2. Aquatic mammals
3. Dentition in mammals

REFERENCE BOOKS:


Thandudaiya vilangugal. BARD
Core course III – INVERTEBRATA & CHORDATA PRACTICAL

INVERTEBRATA:

Dissections: 1. Earthworm – nervous system, Digestive system
2. Pila – Digestive system and nervous system

Mountings: 1. Earthworm – body setae and pineal setae.
3. Radula mounting
4. Mouthparts of Housefly/Honeybee

Spotters:

1. Protozoa: Paramecium, Paramecium conjugation, Paramecium binary fission.
2. Porifera: Sponge, Sponge spicules, Sponge Gemmule

CHORDATA:

Dissections: Frog/ calotes – digestive and nervous system using video clippings.
Rat – demonstration of digestive, arterial, venous & urino genital systems using video clippings.

Mountings: 1. Placoid/ Ctenoid scales.

Spotters:

1. Prochordata: Amphioxus, Ascidian, Tornaria larva
3. Amphibia: Alytes, Axolotl larva, Hyla, Salamander, Ichthyophis
4. Reptilia: Naja naja, Viper, Draco, Chelone mydas
5. Aves: Pigeon, Quill feather
6. Mammalia: Bat, Rabbit
7. Dentition: Rabbit, Dog and Man
8. Osteology: Frog pectoral pelvic girdles, forelimb and hindlimb bones

Students will be introduced to learning of dissections/ anatomy adapting CDs/ web sources
AZC II – GENERAL PRINCIPLES OF ZOOLOGY

UNIT – I:

Physiology: Respiration – Respiratory pigments and transport of gases.
Mechanism of blood clotting
Types of excretory products, Ornithine cycle.
Metabolism – Biological oxidation, Glycolysis, TCA cycle, and oxidative phosphorylation

UNIT – II:

Genetics and Evolution:
Quantitative inheritance – inheritance of skin colour and height.
Human Genome Project.
Evolution: Biological and cultural evolution of man.

UNIT – III:

Developmental Biology: Fertilization, cleavage, gastrulation in frog, development of eye.
Immunology – Types of immunity – innate acquired lymphoid organs – A brief account on humoral and cell mediated immune response.

UNIT – IV:

Molecular Biology – DNA as the genetic material, structure of DNA and RNA, genetic code, protein synthesis.
Recombinant DNA Technology – cloning.

UNIT – V:

Structure of Bacteria and bacteriophage.
Epidemiology, pathogenesis, prevention, treatment and control measures of AIDS
Epidemiology, pathogenesis, prevention, treatment and control measures of leprosy.

REFERENCE BOOKS:

3. David Freidfelder, Molecular biology II nd ed., Narosa publishing house
1. DISSECTIONS

   Earthworm: Nervous system

2. MOUNTINGS

   Earthworm : Body and penial setae
   Honey Bee : Mouth parts
   Shark : Placoid scales

3. SPOTTERS

   Amoeba, Paramoecium, Sponge, Obelia colony, Sea anemone,
   Ascaris, Faciola hepatica, Taenia solium, Earthworm, Nereis,
   Leech, Prawn, Fresh water mussel, Pila, Star fish,
   Amphioxus, Shark, Frog, Calotes, Pigeon, Rabbit.

4. Qualitative test for ammonia, urea and uric acid.
5. Normal human karyotype of Female & male
6. Frog Egg, Blastula and Gastrula
7. DNA model
8. Simple staining of microbes.
III SEMESTER
Core course IV CELL BIOLOGY

UNIT I:


UNIT II:

Cytoplasm – Composition, physicochemical, properties of cytoplasm – ultra structure & models of plasma membrane – physiology of plasma membrane.

UNIT III:


UNIT IV:


UNIT V:

Cell cycle – cell division – cell growth; Aging – Cancer – Effect of radiation on cell.

REFERENCE BOOKS:

1. De Roberties, E.D.P and E.M.F De Roberties 1987 cell and molecular biology
III SEMESTER
Part IV – Non Elective Course -I
PUBLIC HEALTH AND GYGIENE
(For non-Zoology students)

Objective of the course: To educate create awareness about the importance of personal hygiene and their impact on individual community health for non biology students

UNIT I:

Introduction to health and hygiene – Types of health, hygiene and disease

UNIT II:

Epidemiology of communicable diseases – air borne (small pox, tuberculosis) food and water borne diseases (food poisoning, amoebiasis) zoonoses (leptospirosis) arthropod borne (filariasis)

UNIT III:

Epidemiology of non-communicable diseases – cancer, diabetes

UNIT IV:

Individual health – nutritional requirements (balanced diet, malnutrition) mental health, personal hygiene, hazards of drugs, tobacco and alcohol.

UNIT V:

Community health – environment, housing plan, occupational health hazards, family planning, maternity and child care, health education.

REFERENCE BOOKS:

Core course V – CELL BIOLOGY AND PHYSIOLOGY PRACTICALS

CELL BIOLOGY:

1. Operation of compound and dissection microscopes
2. Spotters – Epithelial, muscular, vascular and nervous tissues.
3. Spotters: centrifuge, camera Lucida
4. Preparation and observation of squamous epithelial smear
5. Onion root tip- Squash preparation and study of mitotic stages.

PHYSIOLOGY:

2. Enumeration of RBC
3. Enumeration of WBC
4. Qualitative tests for carbohydrates proteins, and lipids.
5. Haemoglobinometer, kymograph, Sphygmomanometer(spotters)
6. Models of hemoglobin and ATP
7. Qualitative tests for NH₃,Urea,Uric acid
IV SEMESTER
Core course V- PHYSIOLOGY

UNIT I:


UNIT II:

Respiration: Respiratory pigments in animals, Transport of O2 &CO2 in man – Control of respiration.
Circulation: Composition of blood, function, Clotting, Working of Heart – Properties of Heart muscles – Heart Beat – Control of heart.

UNIT III:


UNIT IV:

Osmoionic regulation: Euryhaline, stenohaline, Osmoregulators & Osmoconformers – Osmoregulation in freshwater, marine and terrestrial animals.

UNIT V:

Receptors: Types of receptors- structure of photo and phono receptors.

REFERENCE BOOKS
1. Textbook of Medical physiology. Guyton and Hall, IX Ed WB. Saunders Publication
PART IV – NON – ELECTIVE COURSE –II
AQUACULTURE

UNIT I:
Importance of aquaculture – Scope for aquaculture in India – construction & Management of fish pond.

UNIT II:
Cultivable species of fish, Types of farming: extensive, intensive and semi intensive culture. Integrated farming. Induced breeding.

UNIT III:
Culture of common carp species – catla, Rohu, Mirgal: Freshwater prawn culture, ornamental fish culture – preparation and maintainence of home aquaculture – Gold fish, Angal, Guppy.

UNIT IV:
Types of feed: feeding schedule. Fish disease management: Common bacterial and viral diseases – their symptoms and treatment(any three in each)

UNIT V:
Harvesting and transport – Marketing: Marketing the fish to local markets and for export. Quality control and norms of MPEDA for export of fishes. Fish processing – Canning And Freezing.

Reference
V – SEMESTER
Core course VII – Evolution

UNIT – I:
Theories of Origin of life – abiogenesis, biogenesis, cosmozoic theory, special creation theory, organic evolution theory..

UNIT-II:
Theories of evolution - Lamarckism, neo Lamarckism, Darwinism, neo Darwinism, De Vries theory of mutation and Modern synthetic theory of evolution

Unit – III

Unit – IV
Speciation – types, factors influencing speciation, Isolating mechanisms, Mimicry and coloration. Fossils and fossilization

Unit – V
Animal distribution, Evolution of horse and man.

REFERENCE BOOKS:

1. Darwin, C 1872, The Orgin of specis, Grolier Enterprises Corp, USA.
Core course XII - DEVELOPMENTAL BIOLOGY

Unit I

Historical perspective - aim and scope of Developmental Biology, Gametogenesis, spermatogenesis and oogenesis, Vitellogenesis, egg membranes.

Unit II:

Fertilization – sperm – egg interactions – biochemical events, Post fertilization event, parthenogenesis.

Unit III:

Types of animal eggs, Types and patterns of Blastulation and gastrulation in Amphioxus, frog and chick. Cell Lineage, fate maps. Extra-embryonic membranes in Chick, types and physiology of placenta in mammals.

Unit IV:

Competence, determination, differentiation – Primary Organizer concept, induction and its mechanism of action, morphogenetic movements in frog, Organogenesis of brain, heart, kidney, eye and ear.

Unit V:

Regeneration in invertebrates and vertebrates, Metamorphosis, Influence of hormones on metamorphosis of insects and amphibians.

REFERENCE
1. Balinsky, Introduction to Embryology
5. Verma, P.S., Chordate Embryology
CORE COURSE – IX GENETICS

Unit : 1
Mendelian genetics, Interaction of genes – complementary, supplementary, inhibitory & lethal, Multiple alleles – ABO blood group system.

Unit:2
Linkage and crossing over, chromosomal maps. Sex determination, sex linked inheritance. Extra chromosomal inheritance.

Unit:3

Unit : 4
DNA as the genetic material – Gene concept, Gene expression and regulation operon model in prokaryotes, Lac operon Model.

Unit : 5
Human genetics, karyotype, pedigree analysis – Autosomal & Sex chromosoma, syndromes in man; Inborn errors of metabolism, single cell disease, Eugenics & Human betterment.

Reference Books
1. Winchester A. Genetics, Oxford & IBH Publications
4. Veer Bala Rastogi, A text book of Genetics – Kerdarnath Rammnath Publication
**Elective course –I**  
**BIO STATISTICS**

**UNIT :1**

Biostatistics Introduction Definition and scope – collection of data – primary and secondary data, type of sampling random and stratified.

**UNIT :2**

Processing of data- classification and tabulation of data.

**UNIT: 3**

Organization of data presentation of data – Diagrammatic and geographical

**UNIT: 4**

Measure of central tendency –mean, median, mode , Measures of dispersion SD , SE variance & cumulate variance.

**UNIT : 5**

Common statistical tools: Chi square test, test of significance – ANOVA – One way Correlation & Regression ,SPSS in brief.

**Reference Books:**

2. Ramakrishnan , P . 1996 Bio statistics saras publications Nagercoil  
Elective Course – II
BIO CHEMISTRY

UNIT : 1


UNIT : 2

Biomolecules – structure and classification of carbohydrates – Metabolism – Glycolysis, Glycogenolysis – TCA cycle & Oxidative phosphorylation

UNIT : 3

Structure & classification of amino acids & proteins – Protein configuration – Primary, Secondary, Tertiary, Quaternary.

UNIT : 4

Structure & Classification – Fatty acids and Lipids – Metabolism β-oxidation, Structure of DNA & RNA - Structure of nitrogenous of insulin.

UNIT : 5

Biochemistry of Enzymes & Characteristics, Three dimensional structure of Lysozyme- Classification of Hormones – Structure of insulin.

Reference of Books:
2. Fundamental of Biochemistry. J.L Jain
3. Fundamental of Biochemistry for Medical students – Ambika, Shanmugam.
4. Text Books of Bio Chemistry – Abraham Mazur, Benjamin Harrow
CC VIII - ENVIRONMENTAL BIOLOGY

UNIT I:

UNIT II:
Ecosystem: Definition, A typical ecosystem: pond ecosystem, primary production, secondary production, food chains, food web, trophic levels, energy flow, pyramids of biomass, pyramids of energy – biogeo chemical cycle – nitrogen and phosphorus.

UNIT III:

UNIT IV:
Biodiversity: Definition, types, values of bio diversity, India as a mega diversity nation – Hot spots of India Wild life resources conservation and management, animal diversity policies and acts in India.

UNIT V:

REFERENCE BOOKS:
Core course XIV - MICROBIOLOGY

UNIT- I:

History and scope of Microbiology, Characterization, outline classification and identification of microorganisms. General structure of microorganisms (Bacteria, virus, fungi)

UNIT- II:

Sterilization techniques, culture of bacteria, bacterial growth and reproduction, pure culture and culture characteristics.

UNIT III:

Microbial genetics: Recombination in bacteria, transformation, conjugation, sexduction, recombination in bacteriophage, transduction, lytic and lysogenic cycles of bacteriophage.

UNIT-IV:

Food microbiology: food poisoning, food spoilage, food preservation. Industrial microbiology: Production of antibiotics (penicillin) production of lactic acid, Alcohol fermentation (methanol), Soil Microbiology: Role of soil microbes in Nitrogen fixation.

UNIT- V:

Medical microbiology: Host – Microbes Interaction, The process of infection, Bacterial diseases- tuberculosis and leprosy. Viral diseases - AIDS and polio. Fungal diseases - mycoses and mycotoxicoses. (Causative organisms, symptoms, impact on the host and control measures)

REFERENCE BOOKS:

5. Microbial genetics - David Freifelder- Narosa Publishing house.
CORE COURSE X –  
Evolution, Genetics, Developmental Biology  
Practical

EVOlUTION

Animals of evolutionary significance – Peripatus, Archeopteryx  
Homologous organ – forelimb modification  
Analogous organ – wing modification  
Coloration–Chameleon, Glycodon, Krait  
Mimicry – Leaf insect, stich insect, Monarch and Viceroy butterfly.

GENETICS

Recording of mendelian traits in man  
Drosophila – genetic, culture, mutants, male and female identification  
Pedigree Analysis – human karyotype, DNA Model  
ABO – Blood grouping

DEVELOPMENTAL BIOLOGY

1. Examination of Prepared microslides to study the following Frog : egg, cleavage, blastula, yolk plug stage.  
   Chick – egg, developments stages 24, 48, 72  
2. Placenta types
CORE COURSE XI - Environmental Biology, Microbiology and Biotechnology practical

ENVIRONMENTAL BIOLOGY
1. Estimation of dissolved O₂
2. Estimation of Salinity
3. Estimation of carbon dioxide in water
4. Estimation of Marine Plankton
4. Spotters: Animals association,
5. Intertidal fauna- Rocky, sandy & muddy shores any four examples in each category.
6. PH meter, secchi disc. Six’s maximum & minimum thermomether, Barometer Aygrometer

Bio Technology
DNA Isolation eukaryotes - Onion (demonstration only)
Spotters Models of PCR, Southern blotting, vectors

Microbiology
Fixing and staining of Bacteria.
Demonstration of sterilization Procedure
Motility of bacterial cells
Serial dilution techniques, pour plate techniques
Spotters: Autoclave, Petriplate, bacteria, T₄ Bactriphage, Micropipette, Inoculation loop.
Core course XIII - BIOTECHNOLOGY

UNIT I:

UNIT II:

UNIT III:

UNIT IV:
Agricultural Biotechnology: biofertilizers: microbes as biofertilizers, culture methods: Single cell Protein; Biopesticides. Application of biotechnology in agriculture and environment.

UNIT V:

REFERENCE BOOKS:
ELECTIVE COURSE IV - Basic medical knowledge

Unit I
Basic blood tests - Complete blood count, white blood cell count, differential WBC Count, RBC count, hematocrit, packed cell volume, hemoglobin, Erythrocyte sedimentation rate, platelet count - Bleeding time, Clotting time, hemostatis and coagulation

UNIT II
Chemistry studies - Use of autoanalyser, Blood glucose fasting, post prandial, Glucose tolerance tests, Blood bilirubin, urea nitrogen, choline esterase, creatinine and uric acid-thyroid function tests-free Thyroxine T₃ & T₄, TSH, Lipo protein tests- cholesterol, HDL, LDL, Triglycerides- Enzyme tests: Alanine transaminase, Alkaline phosphatase, Aspartate Transaminase.

UNIT III
Urine analysis - Routine analysis - urine volume, colour, urine protein, bilirulin, Urobilinogen - Microscopic examinations - urine RBC & casts, WBC & casts, epithelial cells and casts, hyaline casts, granular Casts, waxy casts, oval fat bodies and fatty casts, urine crystals & urine shreds, urine creatinine test, urine pregnancy test.

UNIT IV
Immunodiagnostic studies –Bacterial-Tuberculin test, widal test, Dipstick, viral Hepatitis, HIV, Herpes, parasitic – Amebiasis Autoimmune disease - Rhumatoid arthritis, Immuno haematology test - Blood groups, ABO and Rh factor.

UNIT V
Radiography – Description & Types of X-rays, CT.Scan, Endoscopy, ultrasound scans, and MRI scans – Prenatal Diagnosis - Aminiocentosis, Amniotic fluid total volume.

REFERENCE