**THIRUVALLUVAR UNIVERSITY**

**BACHELOR OF SCIENCE**

**DEGREE COURSE**

**B.Sc. ZOOLOGY**

**UNDER CBCS**

[with effect from 2008-2009]

**The Course of Study and the Scheme of Examinations**

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* Note:
“For the students admitted in the academic year 2008-2009 those who have taken Biochemistry as allied subject, should not take Biochemistry as elective subject.”
THIRUVALLUVAR UNIVERSITY

B.Sc. ZOOLOGY

SYLLABUS

UNDER CBCS

(with effect from 2008-2009)

I SEMESTER

PAPER I

INVERTEBRATA

Objective

To understand the systemic and functional morphology of various groups of invertebrates.

To study their economic importance, affinities and adaptations.

UNIT-I

Principles of Taxonomy - Binomial nomenclature - classification of the animal kingdom.

PROTOZOA: General characters and classification up to class with examples.

Type study plasmodium, parasitic protozoans (Entamoeba, Trypansosoma and Leishmania).

UNIT-II

PORIFERA: General characters and classification up to classes with examples.

Type study Sycon, Canal system in sponges.

COELENTERATA: General characters and classification up to classes with examples.

Type study - Obelia, Polymorphism
UNIT-III

HELMINTHES: General characters and classification up to classes with examples.

Type study - Taenia solium. Nematode parasites and diseases - Wuchereria bancrofti, Enterobius vermicularis, Ancylostoma duodenale.

ANNELIDA: General characters and classification up to classes with examples.

Type study - Earthworm, Trochophore larva, and its evolutionary significance.

UNIT-IV

ARTHROPODA: General characters and classification up to classes with examples.

Type study - Prawn. Peripatus and its affinities.

UNIT-V

MOLLUSCA: General characters and classification up to classes with examples.

Type study - Fresh water Mussel.

ECHINODERMATA: General characters and classification up to classes with examples.

Type study - Sea star. Echinoderm larvae and their significance.

Reference Books


5. L.A. Borradile and F.A. Pott. The Invertebrates. Cambridge University press.UK
ENVIRONMENTAL STUDIES
(For all UG Degree Courses)

UNIT-I: INTRODUCTION TO ENVIRONMENTAL SCIENCES: NATURAL RESOURCES:
Environmental Sciences - Relevance - Significance - Public awareness - Forest resources - Water resources - Mineral resources - Food resources - conflicts over resource sharing - Exploitation - Land use pattern - Environmental impact - fertilizer - Pesticide Problems - case studies.

UNIT-II: ECOSYSTEM, BIODIVERSITY AND ITS CONSERVATION:
Ecosystem - concept - structure and function - producers, consumers and decomposers - Food chain - Food web - Ecological pyramids - Energy flow - Forest, Grassland, desert and aquatic ecosystem.

Biodiversity - Definition - genetic, species and ecosystem diversity - Values and uses of biodiversity - biodiversity at global, national (India) and local levels - Hotspots, threats to biodiversity - conservation of biodiversity - Insitu & Exsitu.

UNIT-III: ENVIRONMENTAL POLLUTION AND MANAGEMENT

UNIT-IV: SOCIAL ISSUES - HUMAN POPULATION
UNIT-V: FIELD WORK

Visit to a local area / local polluted site / local simple ecosystem - Report submission

REFERENCES


2. RAJAMANNAR, 2004, ENVIRONEMNTAL STUDIES, EVR COLLEGE PUB, TRICHEY

3. KALAVATHY, S. (ED.) 2004, ENVIRONMENTAL STUDIES, BISHOP HEBER COLLEGE PUB., TRICHEY
II SEMESTER  
PAPER II  
CHORDATA

OBJECTIVES:

To understand the systemic and functional morphology of various groups of chordates.

To study their affinities and adaptations to different modes of life.

UNIT-I
1. Salient Features, General classification of Phylum Chordata upto orders.
2. Origin of Chordata.
3. Prochordata: General Characters and affinities of Hemichordata, Cephalochordata & urochordata

UNIT-II

PISCES
1. General characters and classification up to orders.
2. Type study: Shark.
3. Parental care.

AMPHIBIA

1. General characters and classification up to orders.
2. Type study: frog
4. Parental care in Amphibia
UNIT-III

REPTILIA
1. General characters and classification upto order level.
2. Type study-Calotes.
4. Identification of poisonous and non-poisonous snakes.

UNIT-IV

AVES
1. General characters and classification upto orders
2. Type study-Pigeon
3. Characters of Archaeopteryx.
4. Ratitae.
5. Flight adaptation.

UNIT-V

MAMMALIA
1. General characters and classification upto orders.
2. Type study-Rabbit.
3. Flying Mammals.
4. Dentition in mammals.
5. Aquatic mammals.

References:
CORE PRACTICAL I

MAJOR PRACTICAL

CD*/Model/Chart - Anatomical observation and comment

Cockroach - Digestive, reproductive and Nervous system.

Frog - Digestive system, urino genital system, Arterial and venous systems.

MINOR PRACTICAL

Slides/Model/Chart – Identification (draw and label)

1. Cockroach: Mouth Parts.
2. Earthworm: Penial setae and body setae.
3. Honey bee, House fly, Mosquito - Mouth Parts.
4. Prawn - Appendages
5. Frog vertebrate: Brain and Hyoid apparatus.
6. Placoid Scales.

SPOTTERS

1. Study of the following specimens to bring out and their adaptations to their respective modes of life.
   Entamoeba, Trypanosoma, Leishamania, Sycon, Taeniasolium, Ancylostoma duodenale, Enterobius vermicularis, Ascaris, Wuchereria bancrofti, Chaetopterus, Leech, Limulus, Any Two Crustaceaen Larvae, Starfish, Balanoglossus, Ascidian, Ichthyophis, Draco, Phyrynosoma, Seasnake and Bat.

2. Study of the following specimens to bring out their biological significance;
3. **Study of the following to relate structure and function:**
   Sponge Spicules, Obelia ployp, Taenia Scolex, Prawn Appendages, Pedicellaria of Star Fish, Placoid Scale of Shark, Quill Feather of Pigeon.

4. **Study of the following to draw labeled sketches:**

5. **Osteology**
   Study of the following skulls with reference to dentition — Cat or Dog, Rat or Rabbit, Man
   
   i. Pectoral girdles of Frog, Calotes, Pigeon, Rabbit/Rat.
   ii. Pelvic girdles of Frog, Calotes, Pigeon, Rabbit/Rat.
   iii. Fore limbs of Frog, Calotes, Pigeon, Rabbit/Rat.
   iv. Hind limbs of Frog, Calotes, Pigeon, Rabbit/Rat.
   v. Synascrum.

*REFERENCES:*

1. Prof.Baskaran, HOD of Zoology, Iyyanadar Janagiammal College, Sivakasi
   Ph.No.04562-254100
2. www.prodissector.cum
3. www.sciencelass.cum
VALUE EDUCATION
(For all UG Degree Courses)

UNIT-I
Value Education - Definition - relevance to present day - Concept of Human Values - self introspection - Self esteem.

UNIT-II
Family values - Components, structure and responsibilities of family - Neutralization of anger - Adjustability - Threats of family life - Status of women in family and society - Caring for needy and elderly - Time allotment for sharing ideas and concerns.

UNIT-III
Ethical values - Professional ethics - Mass media ethics - Advertising ethics - Influence of ethics on family life - psychology of children and youth - Leadership qualities - Personality development.

UNIT-IV
Social values - Faith, service and secularism - Social sense and commitment - Students and Politics - Social awareness, Consumer awareness, Consumer rights and responsibilities - Redressal mechanisms.

UNIT-V
Effect of international affairs on values of life/ Issue of Globalization - Modern warfare - Terrorism. Environmental issues - mutual respect of different cultures, religions and their beliefs.
Reference Books


WEBSITES AND e-LEARNING SOURCES:

www.rkmissiondhe.org/education.html/
www.clallam:;org/lifestyle/education.html/
www.sun.com/.../edu/progrmws/star.html/
www.infoscouts.com
www.secretofsuccess.com
www.1millionpapers.com
http://militarlyfinance.umuc.edu/education/edu-network.html/
III SEMESTER

PAPER III

CELL AND MOLECULAR BIOLOGY

Objectives:
1. To learn the cytological techniques, the structure and functions of various cellular components.
2. To understand the integrated activity of the whole cell as in mitosis, meiosis and protein synthesis.
3. To understand the molecular basis of cell structure DNA structure and functions.

UNIT-I


UNIT-II


UNIT-III

Nucleus - Ultrastructure, Composition and Function - Nuclear Membrane Nucleoplasm - Chromosomes DNA, RNA, Protein synthesis - Nucleolus - Cell Division and Cell cycle - Amitosis, Mitosis and Meiosis and their significance.

UNIT-IV

Cell - Cell signalling : Cell Surface receptors - second messenger system MDP kinase pathways - Signalling from plasma membrane to nucleus.
UNIT-V
Semi conservative replication, mechanism and enzymology of DNA replication, Structure and functions of DNA & RNA (mRNA, tRNA, rRNA).

References:
1. Cohn, N.S., 1979, Elements of Cytology, Freeman Book Co., New Delhi
IV SEMESTER

PAPER IV

GENETICS AND BIOTECHNOLOGY

Objectives:

Genetics
To know the principles of genetics, pedigree analysis and population genetics.
To learn some genetic studies in man and applied Genetics.

Biotechnology
To integrate biology with technology. To study the application of scientific and engineering processes in the processing of materials by biological agents.

GENETICS

UNIT-I

UNIT-II

UNIT-III
Non-Disjunction and Gynandromorphs — Cytoplasmic Inheritance — Maternal Effect on Limnaea [shell coiling], Fine structure of Gene — Cistron — Recon, Muton — Gene Regulation — Operon concept — Lac Operon
UNIT-IV

BIOTECHNOLOGY
UNIT-V
Definition — Tools of Genetic Engineering — Enzymes, linkers and adaptors, cloning vectors [plasmids, pBr 322, Phageλ, Cosmids and phagemids].
Techniques of genetic engineering — recombinant DNA Technology and gene cloning in prokaryotes [cDNA and genomic Library].
Applications of Recombinant DNA Technology, in Medicine & agriculture.

References :
CORE PRACTICAL II

CELL AND MOLECULAR BIOLOGY, GENETICS AND BIOTECHNOLOGY

A. CELL AND MOLECULAR BIOLOGY

1. Use of Microscope, Camera Lucida, Stage and Ocular Micrometers
2. Blood Smear Preparation - Differential count of W.B.C.
3. Total count of RBC and WBC using Haemocytometer
5. Mitosis in onion root tip squash.
6. Study of prepared slides of histology:
   a) Columnar Epithelium
   b) Ciliated Epithelium
   c) Glandular Epithelium
   d) Cartilage T.S.
   e) Bone T.S.
   f) Cardiac muscle
   g) Striated Muscle
   h) Non striated muscle
   i) Neuron
   j) Male germ cell
   k) Female germ cell

B. GENETICS

7. Observation of common mutants of Drosophila.
8. Human blood grouping.

C. BIOTECHNOLOGY

9. Study of prepared slides, models or specimen.
   a) Escherichia coli
   b) Bacteriophage
   c) Plasmid
11. Visit to Biotechnology Lab and report.
ALLIED PAPER

CHEMISTRY I

UNIT - I
1.1 Extraction of Metals - Minerals and Ore difference - Minerals of Iron, Aluminum and Copper - Ore Dressing or concentration of Ore - Types of Ore Dressing Froth Floatation and Magnetic separation.

1.2 Refining of Metals - Types of Refining - Electrolytic, Van Arkel and Zone Refining.

1.3 Extraction of Uranium and Thorium.

UNIT - II
2.1 Cyclo-alkanes preparation properties of Cyclo-hexane – Bayers strain theory.

2.2 Polarization - Inductive effect, mesomeric effect and steric effect - (Acid and Base strength.)

2.3 Stereo isomerism - Types, Causes of optical activity of (lactic acid) and tartaric acid - Racemisation - Resolution - Geometrical isomerism - maleic and fumaric acid.

UNIT - III
3.1 Chemical Kinetics - Distinction between Order and Molecularity - derivation of First order rate equation - half life period of first order reaction - determination of rate constant of hydrolysis of ester

Catalysis - catalyst - auto catalyst - enzyme catalyst - promoters - catalytic poisoning - Active center - Distinction between homogeneous and heterogeneous catalysts - Industrial application of catalysts.

3.3 Photochemistry - Grothus Drapers law, stark einsteines law - quantum yield - photosynthesis, phosphorescence - fluorescence - chemiluminescence’s - photosensitization.
UNIT - IV
4.1 VSEPR Theory - Shapes of Simple Molecules BF₃, PCl₅, SF₆ and XeF₆


4.3 Osmosis - Osmotic pressure - reverse osmosis - desalination of sea water.

UNIT - V

5.2 Crude Oil - Petroleum - Petroleum Refining - Cracking - Applications of Cracking. Naphthalene - Preparations, Properties and uses of Naphthalene - Structure of Naphthalene.

5.3 Elements of symmetry - unit cell - crystal lattice - types of cubic lattice - one example for each.
CHEMISTRY II

UNIT - I
1.1 Co-ordination Chemistry:
Nomenclature of co-ordination compounds - Werner Theory of Co-ordination Compound - Chelation - Functions and structure of Haemoglobin and Chlorophyll.

1.2 Industrial Chemistry:
Fertilizers and manures - Bio-fertilizers- Organic Manures and their importance - Role of NPK in plants - preparation and uses of Urea, Ammonium nitrate, potassium nitrate and super phosphate of lime.

1.3 Contents in Match sticks and match box - Industrial making of safety matches. Preparation and uses of chloroform, DDT, gamhexane and Freon.

UNIT - II
2.1 Carbohydrates:
Classification - structure of glucose - Properties and uses of starch - uses of Cellulose Nitrate - Cellulose acetate.

2.2 Amino Acid and Protein:
Classification of Amino Acids - preparation and properties of Glycine - Classification of Protein based on Physical properties and biological functions

2.3 Primary and Secondary structures of protein (Elementary Treatment only) composition of RNA and DNA and their biological role. Tanning of leather - alum (aluminum tri chloride tanning - vegetable tanning)

UNIT - III
3.1 Electro Chemistry:
Specific and equivalent conductivity - their determination - effect of dilution of conductance.
3.2 Kohlrawsh Law - Determination of dissociation constant of weak Electrolyte using Conductance measurement - Conductometric Titrations

3.3 pH and determination by indicator method - Buffer solutions - Buffer action - Importance of buffer in the living system - Derivation of Henderson equation.

UNIT - IV

4.1 Paints - Pigments - Components of Paint - Requisites of a good paint. Colour and Dyes - Classification based on constitution and application.

4.2 **Vitamins:**
  Biological activities and deficiency diseases of Vitamin A, B, C, D, E and K - **Hormones** - Functions of insulin and adrenaline.

4.3 Chromatography - Principles and application of column, paper and thin layer chromatography

UNIT - V

5.1 **Drugs**: Sulpha Drugs - Uses and Mode of action of Sulpha Drugs -- Antibiotics - Uses of Penicillin, Chloramphenicaol, streptomycin. Drug abuse and their implication alcohol - LSD

5.2 **Anaesthetics** - General and Local Anaesthetics - Antiseptics - Example and their application. Definition and one example each for analgesics antipyretics, tranquilizers, sedatives, causes for diabetes, cancer and AIDS.

5.3 Electrochemical corrosion and its prevention - fuel cells.
ALLIED PAPER

PLANT BIOLOGY AND BIOTECHNOLOGY I

UNIT-I: Cell Biology
Prokaryotic and Eukaryotic cell (plant cell)
Cell organells - Chloroplast, Mitochondrion and Nucleus.
Cell division - Mitosis and Meiosis.

UNIT-II: Anatomy

UNIT-III: Bacteria and Viruses

UNIT-IV: Structure and Life History of
a) Chlorella, Sargassum and Gracilaria
b) Albugo, Penicilium and and Agaricus

UNIT-V: Structure and Life History of
a) Funaria
b) Lycopodium
c) Cycas
Economic importance of Chlorella, Penicillium and Agaricus.
PLANT BIOLOGY AND BIOTECHNOLOGY II

UNIT-I: Taxonomy
General outline of Bentham and Hooker’s system of classification. Study of the range of characters and economic importance of the following families: Annonaceae, Rutaceae cucurbitaceae, Apocynaceae, Euphorbiaceae and Liliaceae.

UNIT-II: Embryology

UNIT-III: Plant Physiology & Plant Tissue Culture

UNIT-IV: Ecology

UNIT-V: Genetics & Evolution

BOOKS SUGGESTED

ALLIED PAPER

ECONOMIC ENTOMOLOGY I

Objectives:

To study the insect pests and their control measures.

To study the economic importance of insects as vectors, pollinators, predators & parasites.

UNIT-I

1. Classification of insects [Major orders].
2. Biology of Butterfly

UNIT-II

Beneficial insects. Mode of life, economic importance and development.

1. Honey bee.
2. Silk worm (Bombyx mori)

Silk Worm [Bombyx mori] rearing

1. Equipment required.
2. Rearing procedure up to harvesting of cocoons.

UNIT-III

Harmful insects
An account of any three pests of:

1. Rice 3. Coconut
2. Cotton
UNIT-IV

Principles and methods of pest control – Conventional, Physical, mechanical, chemical and Biological control.

UNIT-V

Vector borne diseases. A brief account of insect vectors affecting the health of man and domestic animals.

References:

ECONOMIC ENTOMOLOGY II

Objective:
To study the basic concepts of pesticides and integrated pest control

UNIT-I
Insects and their interrelations with environments, Insects as Pollinators, parasitoids, Scavengers and weed Killers

UNIT-II
Classification of insecticides — based on mode of action, contact, systemic, fumigants, nerve and stomach poison. Biological control. Integrated pest control.

UNIT-III
Basic principles of insecticide formulation and their application in pest control — Plant Protection appliances used — working and application.

UNIT-IV
Precautions in handling of pesticides. Pesticides and environmental pollution.

UNIT-V
Assessment to pest population, Estimation of pest damage — pest outbreak — pest surveillance.

References:
ALLIED PRACTICAL
CHEMISTRY

VOLUMETRIC ANALYSIS

1) Estimation of hydrochloric acid using std. sulphuric acid
2) Estimation of Borax using std sodium carbonate
3) Estimation of sodium hydroxide using std sodium carbonate.
4) Estimation of FeSO₄ using std. Mohr salt Solution.
5) Estimation of Oxalic acid using std FeSO₄
6) Estimation of FAS using Std oxalic acid
7) Estimation of Fe²⁺ using diphenylamine / N phenyl anthranilic acid as indicator.

ORGANIC ANALYSIS:

Reactions of aldehyde (aromatic), carbohydrate, carboxylic acid (mono and dicarboxylic), phenol, aromatic primary amine, amide and diamide. Systematic analysis of organic compounds containing one functional group and characterization by confirmatory tests.
ALLIED PRACTICAL

PLANT BIOLOGY AND BIOTECHNOLOGY

1. To make suitable micropreparation describe and identify materials of Algae, Fungi, Bryophyte, Pteridophyte, Gymnosperm and angiosperm prescribed.

2. To describe in technical terms, Plants belong to any of the families prescribed and identify the family.

3. To dissect a flower, construct floral diagram and write floral formula.

4. To describe simple experimental setup in plant physiology.

5. To describe and identify the micro preparation materials of Embryology prescribed.
ALLIED PRACTICAL

ECONOMIC ENTOMOLOGY

MAJOR PRACTICAL

Model/Chart - Draw and Comment

1. Life Cycle of Holometabolous, Hemimetabolous and Ametabolous Insects (atleast one example in each)
2. Insect formulations and Plant protection appliances

MINOR PRACTICAL

Slides/Model/Chart - Identification (draw and label)

1. Mouth parts - Bed bug, Pediculus, Grasshopper and Butterfly
2. Sting apparatus of honeybee

SPOTTERS


RECORD

Collection and Preservation of insects-Insect store box

Note: The students may be asked to submit a minimum of 10 whole mounts of the insects.
V SEMESTER
PAPER V
BIOSTATISTICS AND BIOINFORMATICS

Objectives:
To get a basic knowledge of statistical methods and computations in biology.
To study the application of information sciences (mathematics, statistics and computer sciences) in biology.
To study the application of information technology to the management and analysis of biological data.

UNIT-I
Biostatistics - Definition and Scope-Census and sampling methods-collection and presentation of Data. Diagrams and graphs; bar, pie Histogram, line graph-Concept of Statistical population and sample characteristics of frequency distribution sampling.

UNIT-II
Measures of Central tendency: mean, median mode and Measures of Dispersion, Range, Quartile deviation, Mean deviation & Standard deviation.

BIOINFORMATICS

UNIT-III
UNIT-IV
Bioinformatics—Definition—Literature databases-NCBI-Pubmed, Medline, Protein and nucleic sequence databases-PIR, Swiss-prot, GeneBank, DDBJ-structure databases - PDB, SCOP, CATH, structure visualization Tools, RasMol, Swiss PDB viewer.

UNIT-V
Pairwise sequence Alignment — Scoring Matrice-PAM and BLOSUM—Statistics of alignment scored Dot plot — local and global alignment — Database Searching — FASTA and BLAST multiple sequence alignment clustal W-Phylogenetic trees-PHYLIP.

References:
4. MS. OFFICE for Win-Microsoft office press.
PAPER VI

DEVELOPMENTAL BIOLOGY & IMMUNOLOGY

UNIT-I

Spermatogenesis and oogenesis-comparative study of Invertebrate, vertebrate sperms and Eggs, polarity & symmetry of eggs-Fertilization Mechanism, physiology & theories-parthenogenesis-Natural-Artificial-Experiements on Artificial parthenogenesis

UNIT-II

Cleavage-Factors influencing cleavage-Fate map-Blastulation and Gastrulation; General principles-physiology and comparative study in Amphioxus, Frog and chick-Experimental works of speerman and Mangold-Development of brain and eye in Frog-Regeneration in invertebrates.

UNIT-III


UNIT-IV

Types of immunity-their role in parasitic, bacterial & viral infection, in hypersensitivity and graft rejection-Lymphoid organs, cells of immune system-their role in immune response-Antigen-Antibody reaction.

UNIT-V

References:

PAPER VII

ANIMAL PHYSIOLOGY

Objectives:
To study the basic principles of animal physiology, chemical and physical properties of living matter.
To understand the physiology of various organs and organ systems.

UNIT I
Nutrition-Food requirements-Carbohydrates, Proteins, Fats, Minerals, and Vitamins. Digestive-enzymes and their role in digestion – Metabolism-metabolic pathways with reference to carbohydrates

UNIT II

UNIT III

UNIT IV
UNIT-V

Endocrine glands - structure, secretions and functions of Endocrine glands of vertebrates-pituitary, Hypothalamus, thyroids, parathyroid, Adrenal, Thymus, Islets of Langherhans, sex organs - Hormones of insects and crustaceans.

References:
VI SEMESTER

PAPER VIII

ENVIRONMENTAL BIOLOGY AND EVOLUTION

Objectives:

To realize the importance of inter relationship between every organism and environment.

To study the impact of eco factors on the morphology & distribution of organisms.

To study, the theories of evolution.

UNIT-I


UNIT-II


UNIT-III

Population: Definition - characteristics - Natality mortality, age distribution, population growth Forms, population fluctuation. Community

Ecotone and edge effects – ecological succession.
Conservation - wild life management: preservation — laws enforced — sanctuaries, national parks.

Natural resources management: renewable and non-renewable

UNIT-IV

Environmental degradation - deforestation, urbanization, population explosion and other environmental hazards - depleting natural resources and relationship between poverty and environmental degradation and vice versa. Environmental ethics and laws - Earth summits — role of governmental agencies for environmental monitoring.

UNIT-V : EVOLUTION


References :
PAPER IX

ECONOMIC ZOOLOGY

Objectives:
To encourage young learners to take up the small scale industries
To generate motivation for Self-Employment
To disseminate information on economic aspects of Zoology
To inculcate knowledge on useful animals to Mankind
To satisfy the learners with modern techniques of Animal culture

UNIT-I
A) Vermiculture and Composting
Economic Entomology: Useful Insects of commercial values,
B) Apiculture – Species of Honeybees – Honey extraction – Economics of Apiculture and management.
C) Sericulture – Nature and economic importance of Sericulture in India

UNIT-II
Economics of aquaculture-
A) Pisciculture – Techniques of induced breeding Commercial culture of catla & catfish By-Products of Fishing and its commercial values.
B) Prawn culture -Culture techniques of fresh water (Macrobrachium rosembergii) & Marine water (Penaeus monodon) preservation – processing and export techniques adopted in Prawn fishery.
C) Pearl culture: Formation and nature of Pearls – Commercial importance of Pearl Culture in India.

UNIT-III
Economics of Poultry keeping: Morphology of different breeds of Chicken-Brooding and Rearing of Chicks-Processing of Egg, Meat and By-Products of Poultry.
UNIT-IV:
A): Dairy farm management, Milch breeds. Draught breeds, Dual purpose breeds and New Cross breeds of Cows and Buffaloes in India.

UNIT-V

References:
1. Sukla, G.S. and Upadhyay, V.B., 2000
   Rastogi Publications, Meerut, India.
2. Jawaid Ahsan and Subhas Prasad Sinha, 2000
   S. Chand & Co., Ltd., New Delhi.
3. Ashok Kumar and Prem mohan Nigam, 1991
   Economic and Applied Entomology
   Emkay Publications, New Delhi.
4. Shammi, Q.J. and Bhatnagar, S., 2002
   Agrobios (India), Jodhpur – India.
5. Major Hall, C.B. 2005
   Ponds and Fish culture - ISBN-81-7754-146-3
   Agrobios (India), Jodhpur – India.
6. Keith Wilson, N.D.P., 2005
   Agrobios (India), Jodhpur – India.
8. Banerjee, 1988
   Agrobios (India), Jodhpur – India.
    Longman, India
11. A. Mary violet Christy 2008 vermy technology MJP Publ. Chennai
CORE PRACTICAL III

ANIMAL PHYSIOLOGY, IMMUNOLOGY AND DEVELOPMENT BIOLOGY

A. ANIMAL PHYSIOLOGY
4. Use of Kymograph unit, B.P. apparatus, Stethoscope.

B. IMMUNOLOGY
1. Study of Antigen-Antibody reaction-Human blood grouping (ABO and Rh)
2. Study of prepared slides of histology:
   a) Thymus
   b) Spleen
   c) Bone marrow
   d) Lymph node.

C. DEVELOPMENT BIOLOGY
   Study of the following prepared slides/museum specimens
1. Sections of Testis and Ovary (Mammalian)
2. Slides of Mammalian sperm and ovum.
3. Study of Egg types-Frog’s egg, Hen’s egg.
5. Slides of different stages of chick embryo-18 Hours (Primitive streak stage), 24 hours, 48 hours and 96 hours.
6. Placenta of Sheep, Pig and Man
CORE PRACTICAL IV
ENVIRONMENTAL BIOLOGY AND ECONOMIC ZOOLOGY

1. ENVIRONMENTAL BIOLOGY
   1. Estimation of Dissolved oxygen, Salinity, pH, free CO2, carbonate and Bicarbonates in water samples.
   2. Use of Rain gauge, Maximum and minimum thermometer, Hygrometer and Anemometer.
   3. Plankton study - Fresh water and Marine plankton.
   4. Study of natural ecosystem and field report.

2. ECONOMIC ZOOLOGY PRACTICALS
   Study of the following prepared slides/specimens

   **Earthworm types (any two) - (vermiculture)**
   - Megascolex mauritii - South Indian species - surface crawlers
   - Drawida modesta - Redsoil with calciferous gland
   - Pheretima posthuma - North Indian - Large specimen
   - Eudrilus engenia-Redworm, Exotic.

   **Fish parasites (Lernea, Argulus)**
   - Larvivorous fishes
     - Poecelia reticulate - Guppy
   - Gambusia affinis - Gambusia
   - Colisa labia - Dwarfgourami

   **Different stages of silk worm**
   **Types of bees**
   **Common pests.**
ELECTIVE

1. BIOCHEMISTRY

Objective:
To define and explain the basic principles of biochemistry

UNIT-I
Aqueous solutions – properties of water – hydrogen ion concentration acids, bases and their concept-buffers and electrolytes and their functions-acidity, alkalinity and pH determination.

UNIT-II
Bioenergetics-energy and its forms-free energy-laws of thermodynamics-enthalpy and entropy-redox potential-redox coupling and ATP bioenergetics.

UNIT-III
Biochemistry of carbohydrates, lipids, protein (structural, catalytic)-primary, secondary, tertiary and quaternary structure and characteristics of proteins vitamins types-source & deficiency

UNIT-IV

UNIT-V
A brief account on the Biochemistry of Antibiotics & their mode of action. Fractionation of biological materials by chromatography (PC, TLC) electrophoresis (Principle & types) centrifugation (principle & types).
Reference:

4. Outline of Biochemistry, Corn & Stump.
ELECTIVE

2. BIO INSTRUMENTATION

Objective:
To acquire the knowledge of basic principles and applications of tools. To know the techniques for the measurement of physical, physiological, biochemical and biological factors in man and other living organism.

UNIT-I
Units of measurements – Metric system, conversion of units, Microscopy – principles & types (simple, light, phase contrast, polarizing darkfield & Electron) Autoclave – principle & applications and types

UNIT-II
Centrifuge – principles & types (clinical, ultra centrifuges) pH-Sorenson’s pH scale, pH meter-principle and applications. Manometry, Warburg manometer – principle & working

UNIT-III
Chromatrography – principles types (paper, Thinlayer, column) and applications; Electrophoresis-principles, types-paper & gel (AGE & PAGE) and applications.

UNIT-IV
Spectoscopy – principles & uses of colorimetry and NMR (Nuclear Magnetic Resonance) spectroscopy; Radio isotopic technique – Radio immuno assay, Biochemical applications of radio isotopes.
UNIT-V

Biosensors, principle, - types (Enzyme, Bacterial electrodes, Environmental Bio sensors & Bioreporters & applications) DNA & RNA sequencing methods, PCR – principle & application. DNA Micro array and its applications.

References:

ELECTIVE

3. NANOTECHNOLOGY IN LIFE SCIENCES

Objectives:

To impart current knowledge in Nanotechnology
To create Fundamental understanding of usage of Nanomaterial in Life Science.

UNIT-I

Scope—Fundamental understanding of Concepts and Methods of Nanotechnology.
Overview on Nanotechnology and Interdisciplinary field.

UNIT-II

Basic and Structural Nanotechnology. Molecular and Macromolecular levels — Nanoscales - devices and systems developed in Nanotechnology.

UNIT-III

Nanotechnology adopted in DNA computing, Molecular Nanotechnology, Quantum Nanotechnology, Optical and Particles used in Nanotechnology.

UNIT-IV

Use Carbon nanotubules, Better and Cheaper nanomaterials-Evaluation of nanomaterials and nanosystems by using conventional materials.

UNIT-V

Applications of nanotechnology in the fields of Agriculture, Medicine. Future perspectives of Nanotechnology in Life Sciences.
References:

3. Ratner, 2008: Nanotechnology — A Gentle Introduction to next big idea
   Tamilnadu Book House, Chennai-India
ELECTIVE

4. APPLIED ENTOMOLOGY

Objective:
To study the insect species causing damage to the crops in the field as well as under storage condition and the effective control measures against them.

UNIT-I
Types of pests – types of damage caused by pests in crops – causes for insects assuming pest status – outbreak of pests.

UNIT-II
Pests of agricultural importance, their bionomics, life cycle and control measures of paddy, ground nut, cotton, Tomato coffee & Banana

UNIT-III
Pests of stored products and their control-Household pests – cockroach and termites-and their control – pests in relation to public health-Rodents and their control

UNIT-IV
Pest control methods and applications: cultural, mechanical, Biological and chemical methods – classification of pesticides – LC 50 and LD 50 values – First Aid & precautions in handling pesticides – Pesticide spraying appliances.

UNIT-V
Pesticide industry – production and marketing – recent trends in pest control-pheromones, attractants, Repellants and Chemosterilants Integrated pest management, its importance & applications.
References:

ELECTIVE

5. HUMAN ENDOCRINOLOGY

Objective:
To learn about the hormonal regulations and their defects in Man.

UNIT-I
Classification and characteristic features of Hormones
Structure of Hypothalamus and pituitary Gland – Hormones of pituitary Gland
Adenohypophysis or Anterior Lobe of pituitary Gland
Pars Intermedia or Middle Lobe of pituitary Gland
Neurohypophysis or posterior Lobe of pituitary Gland
Hypothalamic Regulation for Release of pituitary Hormones.

UNIT-I
Structure of Thyroid Gland – Biosynthesis of Thyroid Hormones
Biological functions of Thyroxine, Regulation of Thyroid Secretion
Thyroid Dysfunction-parathyroid Glands
Biological Action of parathyroid Hormones – parathyroid Dysfunction.

UNIT-III
Structural features – Hormones of Adrenal Cortex
Biological Action of Adrenalilne and Noradrenaline – Emergency Hormones.
UNIT-IV
Islets of Langerhans – Insulin-Biosynthesis of Insulin-
Regulation of the secretion of Insulin-Biological Action of Insulin
Mechanism of Action of Insulin

UNIT-V
Male Reproductive system – Hormonal control of Testes
Chemistry and Biosynthesis of Testosterone — Functions of Testosterone
Female Reproductive system-Role of Hormones in Female Sexual cycle
Placental Hormones — parturition-Lactation.

References:
ELECTIVE

6. MICROBIOLOGY

Objectives:
To emphasize the importance of integrating new knowledge on Microorganisms.
To update the Technological innovations of Microbial Genetics and its Applications.

UNIT-I
The scope of Microbiology – Characterization, Classification and identification of Microorganisms.

UNIT-II
The World of Bacteria – General morphology and classification of Gram-positive and Gram-negative Bacteria.

UNIT-III
The World of other Microorganisms – General morphology of Fungi – Molds and Yeasts, Algae, Protozoa and Viruses.

UNIT-IV
Epidemiology of infectious diseases with reference of Human-such as Bacterial [Tuberculosis], Viral [Hepatitis], Protozoan [Amoebiasis] and Fungal [any one] diseases-Host. Microbe interactions-Immune Responses-Antibiotics and other Chemotherapeutic agents.
UNIT-V

Applied Microbiology in the fields of Food, Agriculture, Industry and Environment.

References:
5. Meenakumari, S. Microbial Physiology, MJP-Publ.-Chennai, India.
6. Purushotam Kaushik, 2005: Microbiology –S.Chand & Co. New Delhi, India
7. Vijaya Ramesh, 2005: Environmental Microbiology, MJP.Publ., Chennai, India
8. Vijaya Ramesh, 2007: Food Microbiology, MJP.Publ. Chennai, India
11. Purohit, S.S. 2007: Microbiology - Agrobios Publ. India
12. Trivedi, P.C.2008: Applied Microbiology - Agrobios Publ. India
13. Prescott, 2009: Industrial Microbiology - Agrobios Publ. India
16. Bohra, A. 2006: Food Microbiology, Agrobios Publ. India
SKILLED BASED ELECTIVE SUBJECT

1. PUBLIC HEALTH AND HYGIENE

Objectives:

To impart awareness on Public Health and Hygiene
To create knowledge on Health Education.

UNIT-I
Scope of Public health and Hygiene – nutrition and health – classification of foods – Nutritional deficiencies - Vitamin deficiencies.

UNIT-II
Environment and Health hazards – Environmental degradation – Pollution and associated health hazards.

UNIT-III
Communicable diseases and their control measures such as Measles, Polio, Chikungunya, Rabies, Plauge, Leprosy and AIDS.

UNIT-IV
Non-Communicable diseases and their preventive measures such as Hypertension, Coronary Heart diseases, Stroke, Diabetes, Obesity and Mental ill-health.

UNIT-V
Health Education in India – WHO Programmes – Government and Voluntary Organizations and their health services – Precautions, First Aid and awareness on sporadic diseases.
References:

SKILL BASED ELECTIVE SUBJECT

2. BIOFERTILLIZER PRODUCTION

Objectives:

To impart awareness on Bio fertilizer Technology
To create knowledge on Environmental degradation.

UNIT-I
Scope of Bio fertilizers — Types of soil — Physical and Chemical composition of Soil. Types of microorganisms in soil.

UNIT-II

UNIT-III
Isolation and identification of Endophytic nitrogen fixers. Rhizobium and Legume root nodulation and nitrification process.

UNIT-IV
Production of Micorrhizal bio fertilizer — Phosphate solublising microorganisms — VAM — Vesicular Arbuscular Mycorrhizal Fungi and its applications as bio fertilizers.

UNIT-V
References:
1. Singh, T. and Purohit, S.S. 2008: Bio fertilizer technology, Agrobio — India


3. Pandiyarajan, P. 2008: Techniques in Agricultural Microbiology—Agrobios-India


3. APICULTURE

Objective:
Entrepreneur motivation for practicing Apiculture as cottage Industry.

UNIT-I
History – Biology and classification of honey bee species of honey bees
Social organization of honey bee colony.

UNIT-II
Bee hive – Flora for apiculture – Selection of bees for apiculture, Method of bee
Keeping – Indigenous method of Extraction of honey

UNIT-III
Modern method of apiculture – Appliances for modern method
Diseases of Honey bee and control measures.

UNIT-IV
Products of bee keeping : Honey – Bee wax and Bee Yeman – Honey :
Production, Chemical composition – Economic importance of Honey bee wax.

UNIT-V
Bee enemies – Bee keeping industry – Recent efforts – Modern method in employing
honey bees for cross pollination in horticultural gardens.
References:
2. Sardar Singh, Bee keeping in India
SKILL BASED ELECTIVE SUBJECT

4. PISCICULTURE

Objective:
To introduce basic knowledge of Fish culturing methods and techniques.

UNIT-I
Scope of Aquaculture. Importance of cultivable fresh water, marine ornamental species.

UNIT-II
Fish farm Maintenance – Farm management technique, water quality, temperature and accessories in Farm management viz Aerator, Filter, paddler

UNIT-III
Fish culture technique, Monoculture, Polyculture and monosex culture, Induced fish breeding, Integrated fish farming

UNIT-IV
Fish nutrition and fish formulations live fish live fish transport.

UNIT-V
Prevention and control of fish diseases.

References:
1. Jhingran V.G. 1985, fish & Fisheries of India, Hindustan publishing co. New Delhi 666 pp
SKILL BASED ELECTIVE SUBJECT

5. INDUSTRIAL FISHERY MANAGEMENT

Objectives:
To introduce basic knowledge of Industrial fishery management & export practices.
To realize the need for augmenting food production from aquatic resources.

UNIT-I
Scope of fisheries, Export potential

UNIT-II
Preservation technique. Chilling, Freezing curing – Drying, Salting, smoking and canning.

UNIT-III
Fish spoilage – causes and remedy. Fish handling, hygiene & fish transport

UNIT-IV
Quality control & Bacterial count, pre requisites and inspection unit

UNIT-V
General Unit management – visit to a processing unit

References:
5. Proceedings of the seminar on small scale fisheries, 1981. CMFRI Bulletin No.30A.
SKILL BASED ELECTIVE SUBJECT

6. MEDICAL LAB TECHNIQUES

Objectives:
To impart awareness on Clinical Lab Technology
To create knowledge on Self-Employment Opportunity

UNIT-I
Scope of Medical Lab Technology — General procedures — Cleaning, Sterilization and Disposal of infected materials. First Aid in Laboratories.

UNIT-II

UNIT-III
Bacteria, Virus, Protozoa and Helminth pathogens — Clinical diagnosis of diseases such as Typhoid, Cholera, Tuberculous, Polio, Measles, Amoebiasis and Filarisis.

UNIT-IV
Estimation of Urea, Glucose, Bile salts and Bile pigments in Urine, Microscopic Examination and analysis of ova, cysts and occult blood in Stool.

UNIT-V
References:
SKILL BASED ELECTIVE SUBJECT

7. VEGETABLE MEAT CULTURE

Objectives:
To emphasize the importance of integrating new knowledge on Food Biotechnology.
To update the Technological innovations of edible Mushrooms and their applications in Nutrition.

UNIT – I
General Characters and Classification of Edible Mushrooms. Food Biotechnological innovations on Diets.

UNIT – II
Identification of Useful and Harmful Mushrooms. Preparations for Mushroom culture – Bed preparation – Nutrients preparation climatic conditions and parameters, Spawn preparation for Laboratory and Industrial Mushroom culture.

UNIT – III
Culture of Common Edible Mushrooms such as Agaricus comestris, Agaricus arvensis, Morechella esculanta, Volvaria terastius.

UNIT – IV
Culture and Common Cattle Mushrooms such as Amantia rubescenes Armillaria melea, Trhcholoma equesture

UNIT – V
Nutritive values of Edible Mushrooms – Chemical Compositions – Carbohydrate, Proteins, Lipids, Vitamins and Organic acids, contents to Edible Mushrooms - Nutrient supplements for Human consumption as Vegetable Meat.
References:
7. Suman, B.C. 2007 : Mushroom Cultivation, Processing and uses Agrobios-India
8. Dey, S.C. 2008 : Mushroom Growing – Agrobios-India
10. Sharma, V.P. 2006 : Diseases and Pests of Mushrooms Agrobios – India
SKILL BASED ELECTIVE SUBJECT

8. SINGLE CELL PROTEIN CULTURE

Objectives:
To emphasize the importance of integrating new knowledge on Food Biotechnology.

To update the Technological innovations of Microbial organisms and its Applications in Nutrition.

UNIT – I
The scope of Food Biotechnology – Characterization, Classification and Identification of Microorganisms employed in Single Cell Protein cultivation.

UNIT – II
Algal Sources of Single Cell Proteins – Culture and extraction of SCP from Spirulina maxima, chlorella species.

UNIT – III
Bacterial Sources of Single Cell Proteins – Culture and extraction of SCP from Bacillus species and Methylcoccus capsulatus.

UNIT – IV
Fungal Sources of Single Cell Proteins – Culture and extraction from Yeasts such as Candida species and Saccharomyces species. Extraction from Filamentous Fungi such as Agaricus species, Aspergillus species and Penicilium species.

UNIT – V
References:

1. Arumugam, N. 2006: Microbiology, Saras Publ. Nagercoil – India
NON-MAJOR ELECTIVE

1. VERMICULTURE

Objectives:
To impart training on Earthworm culture Technology
To create knowledge on Self -Employment Opportunity

UNIT-I

UNIT-II
Vermicomposting materials and their classification. Feeding habits and food for composting worms.

UNIT-III
Vermicomposting methods such as — Small scale and Large scale pit method, heap method, window method etc., Factors affecting vermicomposting such as pH,, Moisture, Temperature etc.

UNIT-IV

UNIT-V
Application of Vermicomposting in Agriculture and Horticultural practices. Advantages of Vermicomposting.
References:

NON-MAJOR ELECTIVE

2. SERICULTURE

Objectives:
To impart training on silk worm culture technology
To create knowledge on self employment opportunity

UNIT-I
Classification of commercial varieties of mulberry. Mulberry plantation establishment and cultivation practices.

UNIT-II
Diseases of mulberry — fungal, bacterial, viral and Nematode diseases, Deficiency diseases and their remedial measures.

UNIT-III
Silkworm rearing operations — Chawki rearing and Late age rearing techniques.

UNIT-IV
Physical and commercial characters of Cocoons. Reeling operations, Importance of by-products of Sericulture.

UNIT-V
Economics of Sericulture — Future and progress of Sericulture Industry in India. Prospects of Sericulture as Self-Employment venture.
References:
NON-MAJOR ELECTIVE

3. AQUARIUM FISH KEEPING

Objectives:
To impart training on Aquarium fish keeping technology
To create knowledge on self employment opportunity

UNIT – I
The potential scope of Aquarium Fish Industry as a Cottage Industry. Exotic and Endemic species of Aquarium Fishes.

UNIT – II
Common characters and sexual dimorphism of Fresh water and Marine Aquarium fishes such as Guppy, Molly, Sword tail, Gold fish, Angel fish, Blue morph, Anemone fish and Butterfly fish.

UNIT – III
Food and feeding of Aquarium fishes – Use of live fish feed organisms. Preparation and composition of formulated fish feeds.

UNIT – IV
Live fish transport - Fish handling, packing and forwarding techniques.

UNIT – V
General Aquarium maintenance – budget for setting up an Aquarium Fish Farm as a Cottage Industry.
References:

   New Delhi — India.
   Pathipagam — Chennai — India.
   India.
NON-MAJOR ELECTIVE

4. POULTRY FARMING

Objectives:
To impart training on Modern Poultry Farming technology
To create knowledge on self employment opportunity

UNIT – I
External morphology of variety of Fowls such as Plymouth Rock, Light Sussex, Minorca, Rhode Island, Red and White Leghorn.

UNIT – II
Classification of Fowls based on their use: Meat type such as Broilers, Egg type such as White Leghorn and Commercial layers, Dual purpose varieties, Game and Ornamental purpose varieties.

UNIT – III

UNIT – IV
Poultry diseases Viral, Bacterial, Fungal, Protozoan and Parasitic Lice etc., Prevention and precautions during vaccination.

UNIT–V
Management of a modern Poultry Farms – Progressive plans to promote Poultry as a Self-Employment venture.
References:

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