DEPARTMENT OF ZOOLOGY

U.G. PROGRAMME

SYLLABUS

Effective from the Academic Year 2003-04

LOYOLA COLLEGE

Autonomous
College Conferred with Potential for Excellence by UGC
Accredited at Five Star Level by NAAC
Chennai - 600 034

AZ 1500 / ZO 1500 - INVERTEBRATA

Semester : I		**Credit**	: **3**
Category : MC		**No. of Hours / Week**	: **4**

OBJECTIVES: To impart a special knowledge on invertebrate animals and their phylogenetic relationship.

UNIT I : PROTOZOA TO ANNELIDA

- Structural organization of Paramecium, Ascon sponge, Obelia, Ascaris, Nereis and Leech.

UNIT II: ARTHROPODA TO ECHINODERMATA

- Structural organisation of Penaeus, Cockroach, Pila, Sepia, Scorpion and Starfish.

UNIT III: CLASSIFICATION

- Diagnostic characters and classification of each phylum upto class level with examples.

UNIT IV: COMPARATIVE STUDY

- Parasitic protozoans
- Canal system in sponges
- Coral and coral reefs
- Nematode parasites of man

UNIT V: PHYLOGENY

- Affinities of Peripatus
- Metamerism & Coelom
- Mouth parts in insects.
- Larval forms of Echinoderms

TEXT BOOKS:

1. Ekambaranatha Ayyar and T.N.Ananthakrishnan, 1995 A manual of Zoology Vol.I (Part 1,2) S.Viswanathan, Chennai.
2. Barnes, 1995 Invertebrate Zoology, W.B.Saunders.

AZ 1501 / ZO 1501 - INVERTEBRATA LAB COURSE

Semester : I **Credit : 1**
Category : MC **No. of Hours / Week : 2**

OBJECTIVES: To observe the anatomy and structural modifications in invertebrates, and to develop dissection skill.

UNIT I : MAJOR DISSECTION:

Cockroach :

- Digestive system
- Nervous system
- Reproductive system

Leech/Earthworm :

- Nervous System
- Reproductive system

UNIT II : MINOR DISSECTION

Earthworm :

- Viscera
- Lateral hearts

Pila :

- Digestive system

UNIT III : MOUNTING

Earthworm :

- Body setae;
- Pineal setae

Cockroach :

- Salivary apparatus
- Mouth parts

Pila :

- Radula

UNIT IV : SPOTTERS

- Representatives from each phylum based on structural organisation and phylogeny.

UNIT V : RECORD

TEXT BOOKS:

1. Ekambaranatha Ayyar and T.N.Ananthakrishnan, 1995 A manual of Zoology Vol.I (Part 1,2) S.Viswanathan, Chennai.
2. Barnes, 1995 Invertebrate Zoology, W.B.Saunders.

AZ 2500 / ZO 2500 - CHORDATA

Semester : I		**Credit**	: **3**
Category : MC		**No. of Hours / Week**	: **4**

OBJECTIVES: To understand the organisation and taxonomical position of chordates.

UNIT I :

- Chordate characteristics
- Systematic position of Cephalochordata and Urochordata.

UNIT II :

- Characteristics of Subphylum Vertebrata
- Classification of vertebrata upto class level
- Agnatha
- Pisces : Organisation of shark
- Importance of fishes and their biological significance
- Amphibia : Classification - Parental care.

UNIT III :

- Impact of Terrestrialisation
- Arcade and fossae of reptilian skull in classification of reptiles
- Identification of poisonous snakes
- Snakes of South India
- Poison apparatus, biting mechanism and snake venom.

UNIT IV :

- Organisation of Pigeon
- Flighless birds
- Migration in birds
- Organisation of rat
- Classification of living mammals upto order level
- Dentition
- Aquatic and Flying mammals.

UNIT V :

- Fate of aortic arches in chordates
- Jaw suspension among vertebrates
- Fate of urinogenital organs in vertebrates.

TEXT BOOKS:

1. Ekambaranatha Ayyar and T.N. Ananthakrishnan, 1998 A manual of Zoology Vol II, Part I and II,S.Viswanathan, Chennai.

REFERENCE BOOKS.

1. Young, J,Z1972. The life of vertebrates. Oxford Uni., London.
2. Newman,H.h.1956, The Phylum Chordata, MacMillan, London.

AZ 2501 / Z0 2501 - CHORDATA LAB COURSE

Semester : I		**Credit**	**: 3**
Category : MC		**No. of Hours / Week**	**: 2**

OBJECTIVES: To understand the adaptive modifications, evolutionary significance of chordates and to develop the dissection skill.

UNIT I : MAJOR DISSECTIONS

Frog :
- Arterial system
- Venous system
- Cranial nerves-V,IXand X

Rat :
- Arterial system
- Venous system

UNIT II : MINOR DISSECTIONS

Shark : · Placoid scales
Frog : · Hyoid apparatus
· Brain.

UNIT III : SPOTTERS

Adaptive modification and evolutionary significance

- Prochordates
- Fishes
- Amphibian
- Reptiles
- Birds and Mammals
- Skeletal structures of frog, calotes and rat.

UNIT IV : EMBRYOLOGY

- Amphioxus
- Frog
- Chick
- Placenta in shark and mammals.

UNIT V : RECORD

TEXT BOOKS:

1. Ekambaranatha Ayyar and T.N. Ananthakrishnan, 1998 A manual of Zoology Vol II, Part I and II,S.Viswanathan, Chennai.

REFERENCE BOOKS.

1. Young, J,Z1972. The life of vertebrates. Oxford Uni., London.
2. Newman,H.h.1956, The Phylum Chordata, MacMillan, London.

ZO 3020 - COMPUTER SCIENCE FOR ZOOLOGY

Semester : III **Credit : 1**
Catogory : CL **No. of Hours / Week : 3**

OBJECTIVES: To impart knowledge and techniques of computers to the students of Zoology & Biotechnology

UNIT I : INFORMATION TECHNOLOGY - AN INTRODUCTION

- Introduction - Information systems - Software , Hardware & Data
- Information Technology in Industry, Medicine, Education, Research and Training, Entertainment & Arts, Science & Engineering - IT in Global Positioning Systems (GPS).

UNIT II: COMPUTER BASICS

- Types of computers - Mainframe, Desktop, Notebook
- The anatomy of a computer - Foundations of Modern Information Technology - Binary numbers (Bits & Bytes) - CPU - Memory RAM & ROM - Input/ Output Devices - Inputting Text, Direct Input Devices
- Foundations of Modern Output - Display Screens, Resolution printers - Laser & Color Printers - Secondary Storage Devices (Floppy, Hard Disk , Compact Disk, Optical Disk, CD - ROM).

UNIT III : OPERATING SYSTEMS

- Types of operating systems - Introduction to DOS & MS-WINDOWS
- File Management Utilities - Internal & External Commands - Graphical User Interface (GUI) based operating systems, Database on Biological Science.

UNIT IV : OFFICE AUTOMATION TOOLS

- MS - Word, MS - Excel, MS - PowerPoint , C, C++ and their uses in the field of Biology (Preparation of Manuscript and Graphs), FTP, Telnet

UNIT V : STATISTICAL TOOLS

- Introduction : Statistical package - STATISTICA, SPSS package - Use of this in the field of Research.

UNIT VI : INTERNET & NETWORKING

- Introduction - LAN & WAN - The World Wide Web (WWW) - Browsing the Web Search Engine - Websites related to the field of Biology , Retrieval of Information from Internet - Multimedia in Biology , Applications of Network - E-mail, Browsing, Chatting (demonstration). Internet (demonstration).

REFERENCE BOOKS

1. Trevor Ardert,Information Technology, Pitman Publishing
2. Alexis Leon and Mathews Leon, Fundamentals of Computer Science and communication engineering, Leon Tech World
3. Chanchal Mittal, Fundamentals of Information Technology, Pragati Prakasam, Meerut

ZO 3500 - PHYSIOLOGY

Semester : III		**Credit**	: **3**
Category : MC		**No. of Hours / Week**	: **4**

OBJECTIVES: To enlighten the functional aspects of organ systems in the body of animal and man towards internal equilibrium/ homeostasis.

Scope of animal physiology, cellular, general and comparative animal physiology.

UNIT I : NUTRITION

Nutritive types :

- Carbon and nitrogen requirements : carbohydrates, lipids and proteins
- Vitamins
- Feeding mechanisms
- Enzymes and digestion
- Absorption
- Metabolism
- Energy production from carbohydrates
- Proteins and lipids
- Basal metabolism
- Respiratory organs
- Respiratory pigments
- Transport of gases
- Control of respiration

UNIT II : CIRCULATION & EXCRETION

- Types of transport system

- Neurogenic & myogenic hearts
- Composition and functions of blood
- Haemodynamics
- Electrical activity of the heart.
- Excretory organs
- Synthesis and occurrence of excretory products - viz.
- Ammonia
- Urea and uric acid
- Urine formation and its elimination in mammals.

UNIT III : OSMOTIC AND IONIC REGULATION

- Osmotic conformers
- Mechanisms of ionic regulation
- adaptations related to habitats
- Thermoregualtion
- Circadian rhythm & Biological clocks

UNIT IV : CO-ORDINATION

- Neuromuscular and neuroendocrine
- Co-ordination
- Transmission of nerve impulses
- Reflexes
- Sense organs
- Muscle proteins and
- Energetics of contraction.

UNIT V : SENSE ORGANS REPRODUCTION AND HORMONAL REGULATION

- Hormones and neurohormones
- Feedback mechanisms
- Endocrine regulation in Insecta
- Hormones in vertebrate reproduction sense organs

REFERENCE BOOKS

1. Prosser, O.L. & F.A. Brown 1961 : Comparative animal physiology, W.B. Saunders, London.
2. Wood, D.W. 1968: Prinicples of Animal physiology. Edward Arnold, London.
3. Schmidt Nelson : Animal physiology, Prentice Hall.

TEXT BOOKS

1. Hoar, S.W. 1976 : General and comparative physiology, Prentice Hall.
2. Prameswaran, Ananthakrishnan, Ananthasubramaniam 1975. Outlines of Animal Physiology, S. Viswanathan (Printers & Publishers) Pvt. Ltd. Madras.

ZO 3501 - PHYSIOLOGY LAB COURSE

Semester : III		**Credit**	**: 1**
Category : MC		**No. of Hours / Week**	**: 2**

UNIT I :

- Survey of digestive enzymes in cockroach.
- Ptyalin activity in relation to temperature and pH in human saliva.

UNIT II :

- Estimation of oxygen consumption in an aquatic and a terrestial animal.

UNIT III :

- Qualitative detection of excretory products.
- Influence of temperature on the ciliary activity of freshwater mussel gill and calculation of Q 10.

UNIT IV :

- Blood - total and differential counts (Demonstration only)
- Recording of heart beat, muscle twitch and reflexes in frog (demonstration only).

UNIT V : RECORD

REFERENCE BOOKS

1. Prosser, O.L. & F.A. Brown 1961 : Comparative animal physiology, W.B. Saunders, London.
2. Wood, D.W. 1968: Prinicples of Animal physiology. Edward Arnold, London.
3. Schmidt Nelson : Animal physiology, Prentice Hall.

TEXT BOOKS

1. Hoar, S.W. 1976 : General and comparative physiology, Prentice Hall.
2. Prameswaran, Ananthakrishnan, Ananthasubramaniam 1975. Outlines of Animal Physiology, S. Viswanathan (Printers & Publishers) Pvt. Ltd. Madras.

ZO 4500 - EMBRYOLOGY AND EVOLUTION

Semester : IV **Credit : 4**
Category : MC **No. of Hours / Week : 6**

PART A : EMBRYOLOGY

OBJECTIVES: To understand the ontogeny of animals.

UNIT I : INTRODUCTION

- History of developmental biology
- Oogenesis & Spermatogenesis
- Types of eggs
- Fertilization & Theories of fertilization
- Cleavage & Theories of cleavage.

UNIT II : GASTRULATION AND FATE MAPS

- Morphogenetic changes
- Organizers,
- Organogenesis in :
  - Amphioxus
  - Frog
  - Chick
- Development of Foetal membranes
- Placentation in mammals.

UNIT III :

- Development in sponges and starfish
- Metamorphosis of frog and insect
- Nuclear transplantation
- Embryo transplantation techniques
- Test tube babies
- Artificial insemination
- Infertility
- Rh factor
- Microinjection
- Transgenic animals.

REFERENCE

1. Verma, P.S., Agarwal, V.K and Tyagi B.S. 1981 Chordate embryology, S.Chand, New Delhi.
2. Berril, N.J. 1971 Developmental Biology, Mc Graw Hill, New York.
3. Balinsky, B.I. (1970). An introduction to Emvryology Philadelphia & London.
4. Mc Ewen, R.S (1989) Vertenrate Embryology, Oxford & IBH publication, New Delhi.

PART B : EVOLUTION

OBJECTIVES: To understand the basic concepts of organic evolution and derive modern approaches based on varies fields of biology.

UNIT I : HISTORY OF EVOLUTIONARY THOUGHT

- Lamarckism & Neo Lamarckism
- Darwinism & Neo Darwinism
- Mutation theory
- Mutation and their role in evolution
- Animal colouration and Mimicry

UNIT II : LAW OF ADAPTIVE RADIATION

- Isolating mechanisms
- Modes of speciation.
- Adaptive radiation in reptiles and mammals
- Convergence and parallelism
- Evolutionary constancy
- Origin of Prokaryotes and Eukaryotes.

UNIT III:

- Morphological, physiological and biochemical, embryological and geographical evidences
- Nature of fossils
- Dating of fossils
- Significance of fossils
- Geological time scale
- Fossil records of man and horse.

REFERENCE

1. Dodson, E.O. 1968 Evolution process and products, Eastwest press New Delhi.
2. Lull RS 1984 Organic evolution, Seema publication Delhi.

3. Moody P.A 1962 Introduction of evolution, Harper and Brothers, New Delhi.
4. Dobzhansky T. Ayala F.I.T. Stebeinns G.L. Valentini J.W. 1973 Evolution - Surjeet publication - New Delhi.

ZO 4501 - ENVIRONMENTAL BIOLOGY

Semester : IV		**Credit**	**: 3**
Category : MC		**No. of Hours / Week**	**: 4**

OBJECTIVES: To provide a basic information on importance of environment, its protection and conservation

UNIT I : SCOPE AND LIMITS OF ECOLOGY

- Autecology and Synecology
- Abiotic factors of environment : - temperature - light-pressure
- Medium
- Substratum - soil as a substratum
- Biogeochemical cycles- Nitrogen : Carbon, Water and Sulphur.

UNIT II : BIOTIC FACTORS OF THE ENVIRONMENT

- Intraspecific animal relationships-(aggregation - social integration and division of labour)
- Interspecific animal relationships (antagonism, mutualism; commensalism, antibiosis and neutralism).
- Animal population: attributes(natality, mortality, population growth, population density, growth curves and notations used in population study).

UNIT III : ANIMAL COMMUNITY

- Stratification-community succession - biome-ecotone - edge effect - ecological niche. Ecosystem: components of ecosystem
- Energy flow
- Ecological pyramids
- Food chain
- Food web.

UNIT IV : HABITAT ECOLOGY

- Adaptations of animal inhabiting different habitats (pelagic, deep sea, inter-tidal, rocky, muddy, sandy, estuary and desert)

UNIT V : ELEMENTS OF APPLIED ECOLOGY

- Natural resources management
- Renewable and non-renewable resources
- Afforestation- Wild life management (Sanctuaries, National parks) social foresry.

UNITVI : ENVIRONMENTAL DEGRADATION

- Green house gases
- Global warming and ozone layer
- Pollution - air, water, soil - space ecology.

REFERENCE BOOKS

1. Elton, C 1971 Animal ecology, Metheun company.
2. Odum, E.P. 1983 Basic ecology, Saunders, Philadelphia.
3. Verma, P.S. and V.K. Agarwal 1987 Animal ecology S.Chand, New Delhi.

ZO 4502 - ENVIRONMENTAL BIOLOGY LAB COURSE

Semester : IV		**Credit**	**: 1**
Category : MC		**No. of Hours / Week**	**: 3**

UNIT I :

- Estimation of dissolved oxygen.
- Determination of alkalinity of water samples.
- Determination of salinity in water samples.
- Determination of hardness of different water samples.

UNIT II :

- Study of different soil microarthorpods.
- Collection and observation of marine and freshwater planktons.

UNIT III :

- Study of sandy shore fauna.
- Study of rocky shore fauna
- Study of intertidal fauna.

UNIT IV :

- Study of pond as an ecosystem.

UNIT V :

Record

REFERENCE:

APHA 1989 Standard methods for the examination of water and waste water APHA/AWWA/WPCF, Washington.

ZO 5400 - REPRODUCTIVE PHYSIOLOGY

Semester : V		**Credit**	**: 2**
Category : ES		**No. of Hours / Week**	**: 3**

OBJECTIVES: To create an awareness on the principles of reproductive physiology and population control strategies.

UNIT I : INTRODUCTION

- Primary and secondary sexual characters
- Male and female reproductive systems
- Physiology of reproduction.

UNIT II : FERTILIZATION AND PARTURITION

- Significance of placenta
- Physiological role of hormones.

UNIT III : REPRODUCTION / GESTATION/ CONSANGUINITY

- Major components of reproductive health including women's health
- Safe motherhood and Development
- Management of unwanted pregnancy and abortion.
- Impact of closely related marriages
- Genetic counselling
- Eugenics, Euthenics & Euphenics.

UNIT IV : REPRODUCTIVE PROCESS

- Factors, and Impacts of abortions
- Contraceptives on fertility rates
- Closed birth intervals
- Physiological basis of contraceptives.

UNITV : BIOTECHNOLOGY AND HUMAN FERTILITY CONTROL

- Human reproductive physiology and birth control
- Research and development for better contraceptives and future directions.

TEXT BOOKS

1. Sengupta, J. and D. Ghosh, Perspectives in Reproductive health New Age International Publishers

REFERENCES

1. Gosh, 1995 Population Reports - Opportunities of women through Reproductive choice. Special topics.
2. Macey, R.I., Human Physiology.
3. Winton, F. R. and L. E. Bayliss, Human Physiology.

ZO 5401 - IMMUNOLOGY

Semester : V		**Credit**	: **2**
Nature	: **ES**	**No. of Hours / Week**	: **3**

OBJECTIVES: To emphasise the importance of immune system in protecting the body from pathogenic organism or abiotic factors.

UNIT I : SCOPE OF IMMUNOLOGY AND INTERNAL IMMUNE SYSTEM

- Self / Non – self recognition
- Innate, acquired, cellular and humoral immunity.
- Lymphoid organs - location, structure and role : bone marrow, thymus and bursa of Fabricius, lymph node, spleen, Payer's patches and Kupffer cells, Head and kidney in fish.

UNIT II : STEM CELL

- Differentiation of stem cells into immunologically competent cells
- Basic structure and their role in immunity.

UNIT III : IMMUNE COMPONENTS AND THEIR FUNCTIONS

- Cellular components (B & T lymphocytes, macrophages / monocytes, neutrophils, eosinophils, killer and natural killer cells)
- Humoral components (antibodies, complements system, cytokines, interferons, and interleukins).

UNIT IV : IMMUNITY AGAINST INFECTIONS

- Immunity against viral, bacterial and parasitic infections
- Immunological basis of hypersensitivity
- Graft rejections.

UNIT V : CLINICAL IMMUNOLOGY

- Vaccines : Types and uses
- Immunization schedule for children
- Prevention of post natal diseases : tetanus, diptheria, whooping cough, cholera, yellow fever, measles and AIDS.

TEXT BOOKS

1. Fatima, D. and Arumugam, 1994, Immunology, Saras, Nagercoil, India.
2. Ranganathan. T.K. and S. Karunakaran, Immunology – Prints and proofs.

REFERENCES

1. Roitt, I.M. 2000 Essentials of Immunology, Blackwell Scientific, London.

ZO 5500 - CELL BIOLOGY

Semester : V		**Credit**	: **3**
Category : MC		**No. of Hours / Week**	: **4**

OBJECTIVES: To emphasise that cell is the structural and functional unit of the living system.

UNIT I :

- History of cell biology
- Cell theory
- Magnification and Resolving power of microscopes
- Light, Phase contrast, Dark field, X-ray, Fluorescence, Interference, Polarizing and Electron (TEM and SEM) microscopes
- Measurement of cells
- Camera lucida.

UNIT II :

- Study of living and dead cells
- Fundamentals of micrortechniques (fixation – stains and staining methods – vital staining)

- Cell fractionation and Centrifugation
- Isolation of cellular components
- Comparison of cell structure of prokaryotes and eukaryotes

UNIT III :

- Cellular components and their structure, composition and functions
- Membrane models, permeability and Transport mechanisms
- Cytoplasmic matrix & vacuolar system
- Endoplasmic reticulum
- Golgi complex
- Ribosome : Ultra structure and functions
- Lysosomes : Functions and intracellular digestion
- Mitochondria : Organization and function, oxidative phosphorylation and biogeneis.
- Microsomes, peroxisomes, glyoxisomes & spherosomes
- Centrioles and microtubules; Cilia and flagella

UNIT IV :

- Nucleus : Interphase nucleus, nucleoplasm, nuclear membrane, nucleolus, Chromatin
- Chromosomes : Ultrastructure, kinds **(G**iant chromosomes)
- Nucleic acids
- DNA structure and Replication
- DNA transcription and Protein synthesis
- Structure and kinds of RNA

UNIT V :

- Cell cycle
- Cell division : Mitosis – role of mitotic apparatus
- Meiosis, Differences between mitosis and meiosis
- Cytology of cancer.

TEXT BOOKS

1. De Robertis, Nowinski, D. P. W. & Sal , F.A., Cell Biology
2. Verma, P.S. & Agarwal, V.K., 1995 Cell and Molecular Biology, S. Chand, New Delhi.

REFERENCES

1. Ambrose, E.J. and Dorothy, M.E., 1970 Cell Biology, Thomas Nelson & Sons.
2. Cohn,N.S., 1979 Elements of Cytology, Freeman, New Delhi.
4. Bruce, A. et al., Molecular Biology of the cell, Garland Publishing Inc.

ZO 5501 - GENETICS

Semester : V **Credit : 3**
Category : MC **No. of Hours / Week : 4**

OBJECTIVES -To impart broad knowledge of heriditary mechanisms and variations.

UNIT I : Mendelian principles :

- Segregation, Independent Assortement of genes
- Multiple alleles and genetics of ABO, Rh blood groups in human
- Sex linked, limited and influenced genes
- Linkage and crossing over
- Localization of DNA in chromosomes and gene mapping.
- Extranuclear DNA : DNA in mitochondria and plastid
- Maternal effects and cytoplasmic inheritence.

UNIT II : Concept of gene :

- Cistron, recon and muton
- DNA the genetic mateial
- Regulation of gene action : Operon
- Gene mutations, Chromosomal aberrations (numerical and structural)
- Inherited genetic disorders in man.
- Genetic, chromosomal and metabolic disorders

UNIT III : Microbial genetics :

- Virus, Bacteria and phages
- Lytic and lysogenic life cycles
- Conjugation
- Transformation
- Transduction and bacterial recombination

UNIT IV : Genes in population

- Hardy Weinberg law
- Gene frequencies and changes

- Inbreeding and outbreeding
- Application of genetic principles to plant and animal breeding

UNIT V : Genetic counseling and planned genotypes

- Germ cell storage and artificial insemination
- Amniocentesis
- Human genome project
- Ethical implications of biotechnology
- Principles of bioinformatics

REFERENCES

1. Winchester, A. M. 1996 Genetics: A survey of the principles of heredity. Oxford & India Book house, . New Delhi.
2. Buns, G.W. 1980 Science of Genetics: An introduction to heredity, Macmillan, New York.
3. Sinnott, E. M. Dunn, L.C. & Dobzhansky, T 1985. : Principles of Genetics, Tata Mc Graw, Delhi.
4. Strickberger, M.W. 1976 : Genetics, Macmillan, New York.
5. Dharmarajan, N 1989 : Genetic Engineering, S. Viswanathan, Madras.
6. Srb. A.M. Owen, R.D. & R.S Edgar 1970 : General Genetics., Rurasia Pub. House, New Delhi, .

ZO 5502 - BIOTECHNOLOGY

Semester : V		**Credit**	**: 3**
Category : MC		**No. of Hours / Week**	**: 4**

OBJECTIVES - To enlighten the integration of DNA technology biological through microbes and eventual production resources for welfare human beings.

UNIT I : PRINCIPLES OF BIOTECHNOLOGY:

- Applications in the areas of agriculture
- Health care and environment
- Global and Indian scenario of biotechnology
- Biotechnology and its challenges
- Social and moral implications of biotechnology and genetic engineering
- International safety guide lines
- Patent law and intellectual property rights.

UNIT II : FUNDAMENTALS OF r-DNA TECHNOLOGY RESTRICTION AND MODIFICATION SYSTEM IN BACTERIA

- Restriction enzymes – classification
- Nomenclature and activity
- Restriction mapping of DNA
- Molecular cloning construction of genomic libraries
- Indirect cloning c-DNA preparation and uses of DNA probes.

UNIT III : PRINCIPAL OF MICROBIOLOGY:

- Tissue culture and biotechnology
- Principal of Microbiology
- Pure culture technique
- Industrial microbes products
- Plant tissue culture and its industrial usage
- Animal tissue culture and its technological applications.

UNIT IV : BIOCHEMICALS ENGINEERING

- Basic concepts of fermentation
- Fermentor design
- Operation of fermentors and computer controls
- Biosensors
- Biochips,
- Upstream processing and Down stream processing.

UNIT V : AQUACULTURE BIOTECHNOLOGY:

- Improved Diagnosis Reagents
- Hormone and feeds
- Genetic manipulation
- Cell culture and Nuclear Transplantation
- Cytopreservation
- Transgenic Fish

GENETIC ENGINEERING AND BIOTECHNOLOGY:

- Plasmids and transposons
- Restriction enzyme.
- Gene cloning
- Gene therapy

TEXT BOOKS

1. Ignacimuthu,S., Basic Biotechnology.
2. Trehan, K. Fundamental of Biotechnology.

REFERENCE

1. Manialis et al, Molecular Cloning
2. Glober, D. Gene Cloning
3. Eugine, T. Fundamentals of Biotechnology.

ZO 5503 - CYTOGENETICS & BIOTECHNOLOGY LAB COURSE

Semester : V		**Credit**	**: 3**
Category : MC		**No. of Hours / Week**	**: 6**

Objective: To ensure the fine structure / cellular organization of different cells / tissues and correlate functional significance and inter dependence of Cytogenetics.

UNIT I : CELL BIOLOGY

- Light microscopy, Micrometry and Camera Lucida.
- Blood smear: Human & different types of cell types.
- Mounting of buccal epithelial cells using chromosomal staining and Barr body.
- Squash preparation on onion root tip for mitotic grasshopper testis for meiotic stages.

UNIT II : GENETICS

- Observation on Drosophilla using culture & lifecycle.
- Observation on mutant forms of Drosophilla.
- Mounting of the giant chromosomes of chironomous larva (salivary gland) .
- Human ABO blood grouping & Rh typing.
- Simple Mendelian trats in human – survey of any 3 characters.

REFERENCES:

1. Edward Gasque, 1992; A manual of laboratory experiments in cell biology University of Wisconsin, Brown publishers.
2. Durairaj G. 1998 Laboratory manual in genetics, Emarald publishers.
3. Venkatesan P. Essential of medical laboratory techniques.

UNIT III : BOITECHNOLOGY

- Cleaning of glassware
- Preparation of media
- Sterilization – demonstration
- Isolation of pure culture of bacteria.
- Bacterial staining techniques
- Gel electrophoresis and southern blotting

UNIT IV : BOITECHNOLOGY : SPOTTERS

- SEM of hybriodoma cells
- Production of Monoclonal antibodies
- Growth curve of cell line
- Animal cell culture
- Tray fermenter
- System suitable for anchorage dependent cell culture
- Types of bioreactors
- Orbital shaker
- Microfuge

Unit V : RECORD

REFERENCE

1. Trehan, k. Applications Of Biotechnology
2. Old and Primerose, Gene Manipulation techniques
3. Ignacimuthu S., Basic Biotechnology

ZO 5504 - ECONOMIC ENTOMOLOGY

Semester : V		**Credit**	**: 3**
Category : MC		**No. of Hours / Week**	**: 4**

OBJECTIVE: To study the economic importance of insects and insect pest management.

UNIT I :

- Outline Classification of the Class Insecta
- Causes for Insects Assuming Pest Status

UNIT II :

- Most common Insect Pests and their Control of economically important plants : Paddy; Sugarcane; Cotton; Coconut; Groundnut; Mango; Citrus; Coffee; Tea; Tobacco.

UNIT III :

- Insect pests of Stored Products, their Preventive and Curative methods
- Internal feeders; External feeders; Secondary pests and Scavengers
- Insect pests of household materials and their control : Ant; Termite; Furniture beetle; Silver fish; Cockroach; Carpet beetle; Cloth moth.

UNIT IV :

- Insects in relation to public health and their control : Mosquito; House fly; Eye fly; Sand fly; Black fly; Bed bug; Assassin bug; Flea; Human body louse & head louse
- Insect pests of domestic animals and their control :

  Cattle : Horsefly, Stablefly, Cattlefly, Blowfly and Ox warblefly.

  Fowl : Shaft louse, Body louse and Chicken flea.

  Sheep and Goats : Head maggot and Sheep ked,

Unit V :

- Apiculture,
- Bee culture
- Sericulture
- Pest Management
- Elementary knowledge of insecticides.
- Biological control of Insect pests
- Integrated Pest Management.

REFERENCE:

1. Ramakrishnan Ayyar T.V., Hand book of Economic Entomology for South India Government press, Chennai, 1963.

2. Metcalf C.L. and W.P. Flint, Destructive and Useful Insects : Their Habits and Control Tata-McGraw Hill, New Delhi, 1967.
3. Nayar K.K., T.N. Ananthakrishnan and B.V. David, General and Applied Entomology Tata-McGraw Hill, New Delhi. 1976.
4. Ministry of Agriculture, Manual on Integrated Pest Management in Rice, Cotton, Government of India, 1995.
5. John William S.(Ed), Management of Natural Wealth, Loyola College Publications, Chennai, 1997.
6. Vasantharaj David B., Elements of Economic Entomology Popular Book Depot. Chennai, 2000.

ZO 5505 - ECONOMIC ENTOMOLOGY LAB COURSE

Semester : V | **Credit : 1**
Category : MC | **No. of Hours / Week : 2**

OBJECTIVE: To study the economic importance of insects and insect Pest management.

UNIT I :

- Methods of collection, preservation and mounting of insects.
- Survey and identification of economically important pests of paddy, sugarcane, cotton, groundnut and coconut.

UNIT II :

- Study of life cycle of Hemimetabolous and Holometabolous insects (at least one example each).
- Study of parasitic and predatory insects (one in each) in relation to biological control.

UNIT III :

- Demonstration of silkworm rearing and Bee keeping.
- Insecticide formulation and handling of plant protection appliances.
- Study of IPM approaches.

UNIT IV :

- Field trip of Institution – Agriculture, Veterinary and Public health importance.

UNIT V :

- Record.

REFERENCE:

1. Ramakrishn Ayyar T.V., Handbook of Economic Entomology for South India Government press, Chennai, 1963.
2. Metacalf C.L. and W.P.Flint, Destructive and useful Insects: Their habits and control Tata- Mc Graw Hill, New Delhi, 1967.
3. Nayar K.K., T. N. Ananthakrishnan and B.V. David, General and applied entomology Tata- Mc Graw Hill, New Delhi, 1976.
4. Ministry of Agriculture,Manual on Integrated Pest Management in Rice, Cotton Government of India, 1995.
5. John William S., Management of Natural Wealth, Loyola College Publications, Chennai, 1995.
6. Vasantharaj David B.,Elements of Economic Entomology Popular Book Depot, Chennai, 2000.

ZO 6600 - ENVIRONMENTAL MANAGEMENT AND ECOLOGICAL METHODS

Semester : VI	**Credit**	**:**	**4**
Category : MS	**No. of Hours / Week**	**:**	**6**

Objectives: The course aims at enlightening the importance of environmental management and the various ecological methods to be employed for proper management and sustenance of the environment

UNIT I :

- Ecosystem
- Human impact on the natural environment.
- Degradation of environment.
- Pollution; Air, Water, Land, Noise, Radioactivity and Thermal.

UNIT II : Conservation of natural resources :

- Inexhaustible; wind power, precipitation, tidal power, atomic energy (immutable), solar power, atmosphere, ocean, flowing streams (mutable)
- Exhaustible; water, soil, fertility, fossil fuel

UNIT III :

- Sustainable development

- Global environmental issues
- GATT
- Patents
- Green house effect
- Acid rain
- Global warming
- Ozone depletion / Thinning
- Desertification & Deforestation
- Adverse effects of insecticides & pesticides

UNIT IV : Ecological Methods :

- Types of sampling
- Mechanical methods of extraction
- Capture – Lincoln Index
- Dry sieving
- Soil washing (Wet Sieving)
- Elutriation

UNIT V : Relative methods – traps or direct field measurements

- Elimination of emigration
- Use of quadrant counts of unmarked individuals
- Rate of colonization of a new habitat
- Direction of migration flight traps
- Attractants light and visual traps
- Catch pursuit effort
- Visual observation
- Population estimates from transects
- Observation by random
- Actual detection
- Exposure by plough nets etc.

REFERENCES

1. Saxena H. M., Environmental management
2. Southwood T.R.E., Ecological methods

ZO 6601 - WILDLIFE MANAGEMENT AND BIODIVERSITY

Semester : VI		**Credit**	**: 4**
Category : MS		**No. of Hours / Week**	**: 6**

Objectives: To enlighten the importance of wildlife and its management to the students of Zoology. This course also provides different types of conservation measures to be taken to protect our Wildlife.

UNIT I :

- Introduction
- Distribution of wildlife in India
- Wildlife Management : concepts and awareness
- Chipko movement
- Wildlife database.
- Wildlife protection, legislations and acts
- Stockholm declaration of wildlife
- Wildlife (Protection) Act – 1972 with amendments- with rules, 1973 & 1994.
- Wildlife – transaction and taxidermy – rules 1973.

UNIT II :

- Products of wildlife & exploitation : skin, horn, bones and other derivatives – Trade and legislations.
- Use of Biotechnology in conservation
- Inbreeding & out breeding: artificial insemination
- Prevention and protection of wildlife from poachers
- Over exploitation of animal resources
- Special projects for the conservation of wildlife – Project Tiger, Elephant, Himalayan musk deer, Crocodile and other Reptiles.

UNIT III :

- Conservation of biological diversity
- Assessing existing National documents
- International issues & Biodiversity

- Micro-organism diversity
- Aquatic ecosystem
- Natural terrestrial ecosystem
- Domesticated biodiversity wild life (plants & animals) biodiversity

UNIT IV :

- Domesticated species and varieties
- Species of crops & livestock (cattle poultry)
- Captive breeding : fish, pets, microorganisms in ex –situ collections
- Genetic variations
- Conservation of biodiversity species genetic levels.

UNIT V :

- Ethical, cultural, scientific, economic dimensions
- National Biodiversity Stratergy
- Biodiversity – social and ecological perspectives.

REFERENCE BOOKS:

1. Saharia V.B., 1982 Wildlife in India. Nataraj Publications.
2. Dhyani S.N., 1994 Wildlife management. Rawat Publications, Jaipur and New Delhi
3. The Wildlife (protection) Act 1972 as amended upto 1994
4. Publications of DoEn. Govt. of India.

ZO 6602 - ECOLOGICAL METHODS LAB COURSE

Semester : VI		**Credit**	**: 2**
Category : MS		**No. of Hours / Week**	**: 4**

UNIT I :

- Plankton (Fresh water and marine) : collection methods; quantitative and qualitative analysis
- Soil arthropod collection (qualitative and quantitative) :

  Tullgren method

  Wet method

UNIT II :

- Marking Methods – Capture and recapture methods
- Estimation of trees in a forest biome by using quadrant method

UNIT III :

- Field Work :
  One week compulsory activities in Zoo
  Case study : Environmentally polluted areas in the city

UNIT IV :

- Industrial visits : observation of effluent discharges and trewatment plants :
  Petroproducts
  Tannery
  Distillery

UNIT V : Field report and record.

ZO 6650 - POULTRY & DAIRY SCIENCE

Semester : VI		**Credit**	**: 10**
Category : SK		**No. of Hours / Week**	**: 13**

Objective: To study the importance and application of poultry and dairy for the betterment of human livelihood, and to provide practical knowledge on poultry and dairy farming.

UNIT I :

- Poultry industry in India
- World poultry population and egg and meat production
- Commercial poultry farming
- Nutritive value of egg and meat
- Poultry housing and equipment
- Location of poultry farm
- Systems of rearing

UNIT II :

- Broiler management (Definition; Housing and equipment; Brooding, feeding and health cover of broilers; Record keeping; Broiler integration)
- Layer management (Brooder; Grower and layer management; Culling of layers; Marketing of eggs and meat)
- Quail and Turkey management (Management; Feeding; Health cover; Marketing Strategy)
- Common poultry diseases and their control including biosecurity

UNIT III :

PRACTICALS :

- Identification of the common breeds of fowl.
- Poultry housing and equipment
- Incubation : Collection and storage of hatching eggs – Incubation period – Operational requirement – Fumigation – Hatchery sanitaion – Causes of low hatchability and sexing
- Debeaking, Deworming and Delicing
- Vaccination and medication programme for broilers and layers.
- Culling of layers
- Biosecurity and disease management
- Internship programme at Poultry Research Station, Nandanam.
- Project
- Record

REFERENCES

1. Gopalakrishnan C.A. and G.Murley Mohan Lal. Livestock and Poultry enterprises for rural development, Viskash, New Delhi, 1997.
2. Gnaanamani M.R., Modern aspects of commercial poultry keeping, Giri, 1998.
3. Banerjee G.C. ,Poultry, Oxford and IBH, New Delhi. 1992.
4. Chauhan H.V.S. and S. Roy, Poultry diseases, diagnosis and treatment New Age International, 1996.
5. John William S.(Ed),Management of Natural Resources for Sustainable Development, Loyola Publication, Chennai, 2002.

UNIT IV :

- Breeds of dairy cattles and buffaloes (breeds description – exotic – indigenous)
- Artificial insemination programme.
- Dairy cattle management (general principles – housing – water supply – care during pregnancy – care of new born calf)
- Dairy cattle nutrition - feeds and fodders - feeding standards.
- Disease of dairy cattle : bacterial, viral, fungal and metabolic diseases – prevention and control

UNIT V :

- Dairy Technology (Composition of milk – Testing the milk for adulteration – Processing of milk- Low temperature long time (LTLT), High temperature short time (HTST) – Preparation of milk products: cream – butter – ghee – ice cream – khoa – butter milk)
- Milk Hygiene (Standards – Bis and PFA standards for milk and milk products – Cleaning of dairy utensils – Public health importance of milk.)

UNIT VI :

PRACTICALS :

- Judging of dairy cattle and buffaloes
- Modern dairy farm
- Diseases of dairy cattle
- Types of feed and fodders
- Determination of fat in milk
- Determination of specific gravity
- Preparation of cream
- Determination of solids and fat in milk
- Project
- Record

REFERENCE BOOKS:

1. ICAR, Handbook of Animal Husbandary – The Indian Council of Agricultural Research, New Delhi
2. Jeergenson E.M. and W.P.Mortenson, Approved practices in Dairying
3. Sukumar, D.E. Outline of Dairy Technology
4. Revives P.M. and Henderson, Dairy Cattle Feeding and Management
5. Eckles C.H. and E.L. Anthony, Dairy Cattle and milk production
6. Ling, Dairy Chemistry
7. Yadav, Dairy Microbiology