K.B.COLLEGE,BERMO.

V.B.University, Hazaribagh.

Department of Zoology

"LECTURE PLAN"

(2017–18)

Teacher- Sri. S.P.Singh (Asstt. Professor)

Semester I Core Course C-1

Systematics and Diversity of Non Chordate

(Credit 4) **Hours of teaching =60 hrs (72 Periods)** **FM: 60**

Core Course –(C-1):Systematics and Diversity of Non Chordate

Group-A

UNIT-1 Systematics (18 PERIODS)

1.1 Binomial & Trinomial nomenclature,
1.2 New trends in animal Taxonomy (Chemotaxonomy, Cyto-taxonomy & Molecular Taxonomy
1.3 Species and Speciation
1.4 Linnaean hierarchy

UNIT-2 Non–Chordates: Characters & Classification (18 PERIODS)

General characters and classification of different phyla of Non Chordates up to classes with examples showing distinctive / adaptive features

Group-B

UNIT-3 Non Chordata : Protists to Pseudocolmates (18 PERIODS)

3.1	Phylum Protozoa:	General account of locomotion, Nutrition and reproduction
3.2	Phyla Porifera:	Canal system in Porifera
3.3	Coelentrate:	Obelia Life cycle and metagenesis, Polymorphisms in Siphonophora ;Coral Reefs –types, formation and distribution
3.4	Platyhelminthes:	Planaria (General organization)

UNIT-4 Non Chordate: Coelomates (18 PERIODS)

4.1 Annelida:	Segmental organs (Coelomo-ducts & meta-nephridia) in annelid
4.2 Arthropoda:	Larval form of Crustacea
4.3Mollusca:	Torsion and Detorsion in Gastropods
4.4 Echinoderm:	Water vascular System and locomotion in Asterias, Larval forms of echinoderms

Semester -1 Core Course (C-2)

Principle of Ecology

(Credit 4) Hours of teaching:4X15=60 hrs (72 PERIODS) FM:60

Core Course-(C-2) :Principle of Ecology

Group-A

UNIT- 1. General concepts (18 PERIODS)

1.1 Introduction to environmental biology
1.2 Components of ecosystem
1.3 Major ecosystems in world
1.4 Energy flow in ecosystem
1.5 Productivity, food chain and food web, Food Pyramid
1.6 Bio- Geochemical cycle
- 1.6.1 Water Cycle
- 1.6.2 Gaseous Cycles- Carbon and Nitrogen
- 1.6.3 Sedimentary Cycle- Phosphorous and sulphur

UNIT - 2. Population and communities (18 PERIODS)

2.1 Population characteristics: Density, Natality, Mortality, Age pyramid and growth curve
2.2 Nature, Structure and attributes of biological communities
2.3 Ecological succession and concept of climax

Group-B

UNIT- 3. Pollution (18 PERIODS)

3.1 Sources and impact of environmental pollutants- air, water ,soil and Noise
3.2 Global environmental changes- green house gases and their effects
3.3 Acid rains

UNIT- 4. Natural resources (18 PERIODS)

4.1 Soil, water, mineral resources and their conservation
4.2 Biodiversity- benefits, hotspots, threats and conservation
4.3 Human impact on mineral resources
4.4 Renewable and Non Renewable Source of Energy

P-1: Practical Based on C-1 & C-2

SYSTEMATICS AND DIVERSITYOF NONCHORDATES & PRINCIPLE OF NON CHORDATES

(Credit 4) Hours of teaching: 4X15=60 hrs (72 PERIODS)

Part A: Systematics and Diversity of Non Chordates

Semester I Practical Full Marks-40

Suggested Practicals

1. Study of Available Museum Specimens of animals (15 PERIODS)

- Sycon (As an example of parazoa), Hydra (as an example of diplo-blastic animal), Fasciola (as an example of triplo-blastic acoelomate animal), Ascaris (as an example of triplo-blastic pseudo-coelomate animal), Hirudinaria (as an example of triploblastic schizocoelomate animal), Hermit Crab, Scorpion, Unio, Sepia, Aplysia, Loligo, Sea Urchin , Ophiothrix (Brittle star) (Example of Triplo-blastic coelomate)

2. Study of the following through permanent slides (10 PERIODS)

1. Paramecium Slide (WM) 2. Gemmules of sponges 3. Conjugation in Paramecium, 4. Sporocyst of Fasciola with developing Redia, Cercaria and Metacercaria larvae 5.Nauplius ,Metanauplius, Cypris, Megalopa and Zoea larvae of Crustacea 6. Bipinnaria

3. Dissection: **(20 PERIODS)**

1. Dissection of Digestive and nervous system of Earthworm
2. Dissection of digestive system of *Palaemon* and Nervous system of *Palaemon*
3. Dissection of Nervous system of Pila

4. Monunting (12 PERIODS)

Mounting of Nephridia & ovary of earth worm, statocyst of Palaemon, heart , trachea and salivary gland of *Periplaneta americana* , Radula of Pila, Cephalic appendages of Palaemon

B. Ecology (15 PERIODS)

1. Collection & Identification of different biotic component of pond Ecosystem
2. Estimation of dissolved oxygen.
3. Estimation of carbon dioxide
4. Estimation of Total alkalinity

B.Sc. (Hons.) Zoology Semester II
Core Course C-3

C-3 Cell Biology Credit-4 Hours of teaching 4X15=60 (72 PERIODS)

Core Course (C-3): Cell Biology

Group-A

UNIT-1. The Cell and its Organization (25 PERIODS)

1.1 Introduction to cell theory

1.2 Comparison of a generalized pro- and eukaryotic cell

1.3 Methods in cell biology: Elementary idea of microscopy (Light, Electron and Phase contrast Microscope) and cell fractionation

1.4 Structure and function of plasma membrane and cell junctions

1.5 Introduction to endo-membrane system (Endoplasmic reticulum, Golgi complex, Lysosome

1.6 Structure and functions of cytoskeleton

1.7 Structure and function of mitochondria

UNIT-2.Nucleus **(11 PERIODS)**

2.1 Nuclear envelope

2.2 Chromosome: Structure & function

2.3 Introduction to polytene and lampbrush chromosomes

Group-B

UNIT - 3. Cell Division **(28 PERIODS)**

3.1 Basic feature of Cell cycle

3.2 Mitosis & Meiosis and their significance

3.3 Elementary idea of cancer

UNIT-4. Elementary idea of Apoptosis & Necrosis **(08 PERIODS)**

4.1 Poisonous & Non-poisonous Snakes of India, Poison's Apparatus and biting Mechanisms

4.2 Flight Adaptation and mechanisms of flight

4.3 Comparative anatomy of heart, integument, Aortic Arches and kidney in vertebrates

B.Sc. Semester-II

C-4: Diversity of Chordates **Credit -4** **Hours of teaching: 4X15=60hrs**

Core course (C-4): Diversity of Chordates

Group-A

UNIT-1. Hemichordates & Protochordates **(18 PERIODS)**

1.1 General characters and Affinities of hemichordates

UNIT-2 Chordates: General characters and classification of the following up to order with examples **(28 PERIODS)**

2.1 Cyclostomes

2.2 Fishes

2.3 Amphibians

2.4 Reptiles

2.5 Birds

2.6 Mammals

2.7 Affinities of Prototheria & Metatheria

Group-B

UNIT- 3. Proto-chordates, Cyclostome, Fish & Amphibians (18 PERIODS)

3.1 Retrogressive metamorphosis in Herdmania
3.2 Comparative account of Petromyzon and Myxine
3.4 Accessory Respiratory organ in fishes
3.5 Pedogenesis and neoteny with special reference to Axolotl larvae
3.5 Origin and evolution of Amphibia

UNIT-4. Reptiles, Birds & Mammals (18 PERIODS)

4.1 Poisonous & Non-poisonous Snakes of India, Poison's Apparatus and biting Mechanisms
4.2 Flight Adaptation and mechanisms of flight
4.3 Comparative anatomy of heart, integument, Aortic Arches and kidney in vertebrates

B.Sc. Semester-II

P-2 Practical based on C-3 & C-4

Credit-4 Working hours -60 (72 PERIODS)

Suggested Practicals

Cell biology (32 PERIODS)

1. Study of slides of prokaryotic cell-Bacteria
2. Study of slides of Unicellular Eukaryotic cell –Amoeba, Parameceium
3. Study of various stages of cell division through permanent slides Mitosis and Meiosis
4. Preparation of mitotic slides from onion root tips.
5. Study of Blood cells through slide preparation
6. Study of barr body through slide preparation from hair follicle /cheek cells of female.

Chordate Diversity (40 PERIODS)

7. Pisces: Rohu, *Exocoetus*, Hippocampus, Torpedo (Electric Ray)
8. Amphibia: Hyla, Alytes, Salamander
9. Reptiles: Draco, Hydrophis, Bungara, Pit Viper, Naja, Python
10. Aves :Ostrich model
11. Prototheria Models of Duck bill platypus ,spiny ant eater
12. Bones of Amphibia and Mammal
13. Study of histological slides : Skin ,Bone ,Lung, Stomach, Intetine, Liver, Kidney of mammals
14. Dissection of local bony fishes ; Afferent and efferent and nervous system
15. Mounting of Scale
16. Mounting of rectrices

B.Sc. Semester III

C-5 MammalianPhysiology	**Credit -4(T) + 2(P)**
C-6 Endocrinology	**Credit -4(T) + 2(P)**
C-7 Developmental Biology	**Credit -4(T) + 2(P)**

C-5 : Mammalian Physiology

Total teaching hrs: 60 (72 PERIODS) **FM:60**

Core course (C-5): Mammalian Physiology

Group-A

UNIT_1. Nutrition and Digestion (15 PERIODS)

1.1 Balanced diet
1.2 Digestion and absorption of carbohydrates, proteins and fats

UNIT-2. Respiration and Circulation (20 PERIODS)

2.1 Mechanism and regulation of breathing
2.2 Transport of oxygen and carbon dioxide
2.3 Respiratory quotient
2.4 O_2 and CO_2 dissociation curve, Bohr and Haldane effect, chloride shift
2.5 Composition of blood
2.6 Blood groups and Blood clotting
2.7 Cardiac cycle and its regulation

Group-B

UNIT3. Urino- Genital Physiology (20 PERIODS)

3.1 Nephron
3.2 Urine formation
3.3 Hormonal control of renal function
3.4. Anatomy of Human reproductive organs
3.5. Menstrual Cycle in Humans

UNIT-4. Nerve physiology (17 PERIODS)

4.1 Myelinated and non- myelinated nerve fibers
4.2 Resting and action potential
4.3 Initiation and conduction of nerve impulse through myelinated nerve
4.4 Synapse & Synaptic Transmission

B.Sc. Semester III

C-6 BIOCHEMISTRY Credit 4(T) Teaching Hrs.60 (72 PERIODS)

Core Course(C-6): BIOCHEMISTRY

Group-A

F M:60

UNIT-1. Biomolecules (20 PERIODS)

1.1 **Amino acids :** Properties, Structure and classification
1.2 **Proteins :** Classification**,** Structural organisation &conformation
1.3 **Carbohydrates:** Structure, Classification & biological significance
1.4 Lipids: Structure, Classification & biological significance

UNIT-2. Enzymes (18 PERIODS)

2.1. General properties
2.2. Major classes of enzymes
2.3. Mechanism of enzyme action

Group-B

UNIT-3. Nucleic acids (14 PERIODS)

3.1. DNA structure: DNA double helix (Watson and Crick model)
3.2. Types of RNA

UNIT-4. Metabolic path way (20 PERIODS)

4.1 Glycolysis
4.2 kreb's cycle
4.3 Beta oxidation

B.Sc. Semester III

C-6 Endocrinology Credit 4(T) Teaching: 60hrs (72 PERIODS)

Core Course (C-6): Endocrinology

Group-A

FM:60

UNIT-1. Classification of chemical messengers (22 PERIODS)

1.1 Hormones and its classification
1.2 Neurohormones and neurotransmitters
1.3 Pheromones
1.4. General mechanism of hormone action

UNIT-2. Gastrointestinal hormones (gastrin, CCK, secretin and motilin) (10 PERIODS)

Group-B

UNIT -3. Structures and functions of endocrine organs (25 PERIODS)

2.1 Pituitary
2.2 Thyroid
2.2 Adrenal
2.3 Endocrine pancreas
2.4 Pineal

UNIT-4. Hormones, Drugs and Human health- production of hormones as pharmaceuticals (15 PERIODS)

P-3 Practical based on C-5, C-6 & C-7

Credits 2+2+2=6 Total Practical hours -90 (108 PERIODS)

Suggested Practicals

Mammalian Physiology (36 PERIODS)

1. Preparation of Haemin Crystal
2. RBC count by using haemocytometer
3. Estimation of Haemoglobin using Sahil's method
4. Record of blood pressure by Sphygnomanometer

Biochemistry (36 PERIODS)

1. 1.Detection of biomolecules in the unknown sample –
    a. Glucose
    b. Amino acids
    c. Proteins
    d. Lipids
    e. Citric Acids (Antioxidants)

2. Quantitative estimation of glucose
2. Separation of Chlorophyll by chromatography
3. Test for salivary amylase action

Endocrinology (36 PERIODS)

1. Study of permanent slide of Endocrines gland: Thyroid, Islets of Langerhans , Adrenal, Testes and Ovary

B.Sc. Semester IV

C-8 Genetics	**Credit -4(T) + 2(P)**
C-9 Evolution	**Credit -4(T) + 2(P)**
C-10Animal Behaviour	**Credit -4(T) + 2(P)**

SEC-2 Vermi culture & Composting credit – 2

C-8 : Genetics Credit-4 Total teaching hrs: 90 (72 PERIODS)

Core Course (C-8) : Genetics

Group-A FM:60

UNIT-1. Elements of heredity and variation (12 PERIODS)

1.1 Mendel an d his experiments

1.2 Principles of segregation and independent assortment and their chromosomal basis

UNIT-2. Extension of Mendelism (30 PERIODS)

2.1 Dominance relationships (Complete dominance incomplete dominance and co-dominance)

2.2 multiple allelism

2.3 Lethal alleles

2.4 Pleiotropy

2.5 Epistasis

2.6 Polygenic inheritance

2.7cytoplasmic inheritance

2.8 Linkage and crossing over

2.9 sex- linkage

Group-B

UNIT-3 Sex Determination (20 PERIODS)

3.1 sex chromosomes systems and sex determination : XX/XO, XX/XY, ZZ/ZW and haploidy/ diploidy types

3.2 dosage compensation

3.3 Sex limited and sex influenced traits

UNIT-4. Mutation (10 PERIODS)

4..1 Structural and numerical alterations of chromosomes and related disorder

4.2 Single gene disorder

4.3 Genetic counselling

C-9 Evolution Credit 4(T) +2(P) Teaching Hrs.60 (72 PERIODS)

Core Course (C-9): Evolution

Group-A FM:60

UNIT-1 History & Evidence of Evolution (22 PERIODS)

1.1. Geological Time Scale And Geological Era
1.2. Zoogeographical regions and Animal Disrtibution
1.3 Fossil as direct evidence
1.4 Types of Fossil
1.5 Dating of fossil
1.6 Phylogeny of Horse
1.7 Chronological order of fossils of man

UNIT -2 Introduction to source of evolution & evolutionary Theories (20 PERIODS)

2.1 Lamarkism
2.2 Dawarnism
2.3 Neo Darwinism
2.4. Source of Variation : Mutation & Recombination
2.5 Sexual Isolation
2.6 Natural Selection in action (Industrial Melanism)

Group-B

UNIT-3 .Hardy Weinberg law of Equillibrium **(20 PERIODS)**

3.1 Principle and attributes
3.2 Genetic Drift
3.3 Founder effect
3.4 Bottle Neck Effect

UNIT-4 Level of Evolution (10 PERIODS)

4.1 Micro- evolution
4.2 Macro-evolution
4.3 Mega- Evolution

C-10 Animal Behaviour Credit 4(T) Teaching Hrs.60 (72 PERIODS)

Core Course(C-10): Animal Behaviour

Group-A FM:60

UNIT-1. **Concepts and pattern of Behaviour (16 PERIODS)**

1.1 Innate /Instinct Behaviour

1.2 Acquired/ learned behavior

UNIT-2. Control of Behaviour **(16 PERIODS)**

4.1 Neural control

4.2 hormonal control

Group-B

UNIT-3 Social organization **(10 PERIODS)**

3.1 Social organization in honey bee and Termites

3.2 Communication in animals

UNIT-4 Miscellaneous **(30 PERIODS)**

. 4.1 Migration in Fishes and Birds

4.2. Biological Rhythms

4.3.Parental Care in fishes and Amphibia

P-4 Practical based on C-8, C-9 & C-10

Credit: Working Hrs:90 (108 PERIODS)

Suggested Practicals

Genetics **(38 PERIODS)**

1. Experimental verification of principles of segregation and independent assortment using coloured beads and chi-square test.

2. Study of pattern of inheritance in human population of the traits Rolling of tongue and Mid digital hair, hypertrichosis, widow's peak.

3. Study of mutants in *Drosophila*

4. Genotype analysis in the pedigree chart of the Victorian family affected with haemophilia

5.Study of Colour blind by Isihara test

Evolution **(40 PERIODS)**

1. Genotypic analysis of Taster and Non Taster for PTC in human population to estimate allele frequencies by Hardy -Weinberg equation

2. Fossils study:, Trilobites,

3. Models of Chordate fossils – *Brontosaurus, Dimetrodon, Archaeopteryx, Dinoceras.*

4. Evolution of Horse – through models

5.Study of Serial homology exhibited by teeth and appendages

6.Study of Homologus and Analogus organ

Animal Behaviour **(30 PERIODS)**

.1. Study of geo-taxis, photo -taxis , hygro- taxis in animals

2 Locomotory behaviour of dipteran larvae (Housefly/blowfly/fruitfly):

3. Locomotion on different types of substrata (writing paper, plastic sheet and sand paper

5. Study of individual and behavioural patterns of dog

5. Study of inter-specific association between cattle and crow

6. Study of bee hive and mound of termites

B.Sc. Zoology Hons .Semester V

Semester V

C-11	**Microbiology & Immunology**	Credits 4 (T) +2 (P)
C-12	**Environmental biology & toxicology**	Credits 4 (T) +2 (P)
DSE-1	**Economic Zoology**	Credits 4 (T) +2 (P)
DSE-2	**Biostatistics**	Credits 4 (T) +2 (P)

C-11 Immunology

Credit- 4 (T) +2 (P) Teaching Hours 60 (72 PERIODS)

Core Course (C-11):Immunology

Group-A FM:60

UNIT-1 . Introduction to Immunity (07 PERIODS)

UNIT-2. Cell and organs of immune system (15 PERIODS)

2.1 Types of immune cells, lymphoid and myeloid

2.2 Primary and secondary lymphoid organs and lymphatic system

Group-B

UNIT-3. Humoral immunity (25 PERIODS)

3.1 Antigen

3.2 Immunoglobulins: types, structure and function

3.3 Generation and diversity of antibodies

3.4 Function of B cell

3.4 Complement System

UNIT-4. Cell mediated immunity (25 PERIODS)

4.1 Structural organization of MHC complex

4.2 Antigen processing and presentation

4.3 Function of T-Cells

4.4 Monoclonal Antibody

4.5 ELISA

Core Course (C-12): Developmental Biology Teaching Hours 60 (72 PERIODS)

Core Course (C-12): Developmental Biology

Group-A

UNIT-1 Early embryonic development (20 PERIODS)

1.1 Spermatogenesis
1.2 Oogenesis
1.3 Ultra structure of sperm and ovum
1.4 Pre fertilization Events: Attraction of gamets,Fertlizin –Antifertlizi Interaction, capacitation , Acrosomal Reaction , Amphimixis
1.5 Post fertilization events: Prevention of Polyspermy , Cortical reaction
1.6 Types of cleavage
1.7 Role of yolk in cleavage
1.8 construction of fate map

UNIT_2 Late embryonic Development (18 PERIODS)

2.1. Extra embryonic membranes in chick
2.2 Placenta: Structure, Type and function

Group-B

UNIT-3, Post Embryonic Development (14 PERIODS)

3.1 Metamorphosis in Insect
3.3 Regeneration
3.5 Concepts of Ageing

UNIT-4 Embryo transfer technology (72 PERIODS)

4.1. Principles of collections of Umblical cord, gametes and embryos
4.2 Cryopreservation of gamets
4.3.Superovulation and embryo transfer technology
4.4 Teratogen and their effects on Embryonic development , Amniocentesis

Practical -P5

Based on C-11 & C-12

Suggested Practicals

Immunology

1.Study of different Immune cells by blood film preparation
2.Demonstration of agglutination by blood group test on slide
3.Study of Different antibody structure through model
4.demonstration of Immuno diffusion technique
5.Demonstation of ELISA
6.Study of T.s of Bone, Thymus spleen as lymphoid organs

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Developmental biology

1.study of embryonic slides of frog
2.study of embryonic slides of chick:WM of 18 hrs, 21 hrs,24hrs,36 hrs ,48 hrs and 72 hrs
3. Window preparation in chick egg

DSE-1 Economic Zoology Credit-4(T) +2(P)

Teaching Hrs -60 (72 PERIODS) FM:60

DSE-1:Economic Zoology

Group-A

Unit 1: Bee-keeping and Bee Economy (Apiculture) (16 PERIODS)

Varieties of honey bees, stingless honey bee and Bee pasturage; Setting up an apiary Rearing equipments, handling of bees, artificial diet; Diseases of honey bee, , and their management; Honey extraction techniques; Physico-chemical analysis of honey; Other beneficial products from bee.

Unit 2: Silk and Silk Production (Sericulture) (14 PERIODS)

Different types of silk and silkworms in India; Rearing of *Bombyx mori* – Rearing racks and trays, disinfectants, rearing appliances, black boxing, Chawki rearing, bed cleaning, mountages, harvesting of cocoons; Silkworm diseases: Pebrine, Flacherie, Grasserie, Muscardine and Aspergillosis, and their management; Silkworm pests and parasites: Uzi fly, Dermestid beetles, and their management; Silk reeling techniques; Quality assessment of silk fibers.

Group-B

Unit 3: Aquaculture (14 PERIODS)

Brood stock management; Induced breeding of fish and prawn; Management of hatchery of fish; Management of nursery, rearing and stocking ponds; Preparation and maintenance of fish aquarium; Preparation of compound diets for fish; Role of water quality in aquaculture; Fish diseases: Bacterial, viral and parasitic; Preservation and processing of harvested fish; Fishery by-products

Unit 4: Dairy/Poultry Farming **(14 PERIODS)**

Introduction; Indigenous and exotic breeds; Rearing, housing, feed and rationing; Commercial importance of dairy and poultry farming; Varietal improvement techniques; Diseases and their management; Dairy/poultry farm management and business plan; Visit to any Dairy farm/Poultry farm

Unit-5 Lac Culture **(14 PERIODS)**

* Submission of report on any one field visits mentioned above

DSE-2 Biostatistics Credit-4(T) +2(P)

Teaching Hrs -60 (72 PERIODS) **FM;60**

Group-A

UNIT-1 Sampling (Data collection) **(12 PERIODS)**

1.1 primary Data
1.2 Secondary data
1.3 Frequency distribution and tally marks

UNIT-2 Classification & Tabulation **(10 PERIODS)**

UNIT-3Representation of data **(08 PERIODS)**

3.1 Diagramatic Representation: Histogram & Pie Diagram
3.2 **Graphical representation of Data**

Group-B

UNIT-4. Measurement of central tendency **(12 PERIODS)**

4.1 Mean
4.2 median
4.3 mode

UNIT-5 Measurment of Variation **(18 PERIODS)**

5.1 standard deviation
5.2 standard error
5.4 Coefficient of variation

UNIT-6 Test of Significance **(08 PERIODS)**

6.1 Chi square test

UNIT-7 Correlation and regression **(04 PERIODS)**

P-6 Practical based on DSE-1 & DSE-2

Suggested Practicals

Practical DSE-1 Economic Zoology (40 PERIODS)

1. Report on field Visit to sight of sericulture, Apiculture, Lac Culture and Aquaculture
2. Study of Infested Lac stick, Cocoon, honey comb, Infested fishes
3. Study of Paddy pests, Pest of Sugar cane
4. Study of some economically Important fishes

Practical DSE-2 Biostatistics (32 PERIODS)

1. Determination of mean, median & mode
2. Determination of Deviation
3. Diagrammatic representation of statistical data

B.Sc .Semester VI

C-13 Molecular Biology & Biotechnology Credits 4 (T) +2 (P)
C-14 Medical Zoology Credits 4 (T) +2 (P)
DSE-3 Wild Life Conservation & management Credits 4 (T) +2 (P)
DSE-4 Agro chemical & pest management Credits 4 (T) +2 (P)

Molecular Biology & Biotechnology Credidt 4 (T) +2 (P) Teaching Hours 60 hrs (T)+30hrs (P) (72 PERIODS)

Core Course (C-13): Molecular Biology & Biotechnology

FM:60

Group-A

UNIT-1. Nucleic Acids (18 PERIODS)

1.1 Mechanism of DNA replication in prokaryote
1.3 Mechanism of transcription in prokaryote
1.4 Mechanism of translation in Prokaryote

UNIT 2. Gene Regulation (18 PERIODS)

2.1 Concepts of operon (Positive& Negative; Inducible & Repressible)
2.3 Lac operon,
2.4 trp operon,

Group-B

UNIT 3. Elementary idea of Repetitive DNA damage & DNA repair mechanism (18 PERIODS)

3.1 transposable genetic elements,
3.2 DNA damage by Mutagen
3.3 Mismatch repair
3.4 Thymine Dimer Repair

UNIT-4 Biotechnology (18 PERIODS)

4.1 Tools: Restriction enzymes, Cloning Vectors
4.2 Construction of recombinant DNA
4.3 Transgenic animals, a concept
4.4 DNA fingerprinting

Core Course (C-14): -Medical zoology (72 PERIODS)

FM:60

Group-A

UNIT-1 Life Cycle, Pathogenicity , clinical features, prophylaxis and control of pathogenic protozoan (15 PERIODS)

1.1 Plasmodium
1.2 Entamoeba histolytica
1.3 Leishmania donovani
1.4 Giardia
1.5 Trichomona
1.6 Trypanosoma

UNIT-2 Pathogenic Helminthes parasites ,clinical Features ,Control and prophylaxis

(15 PERIODS)

2.1 Fasciola sp.
2.2 Taenia
2.3 schistosoma
2.4 Wuchereria
2.5 Ascaries

Group-B

UNIT-3 Vector Biology (15 PERIODS)

a. Mosquito (Anopheles Female), Yellow Fever ,Dengue Fever,(Aedes)Filariasis (Culex Female)Japanese B encephalitis

b. Plague

c. Epidimic typhus ticks (pediculus)

UNIT-4 Non Vector Diseases **(15 PERIODS)**

4.1Typhoid
4.2 Cholera
4.3 Small pox
4.4 HIV
4.5 Swine Flu

UNIT-5 General Account of Vaccine & Vaccination , Eradication Programme , drug Therapy and drug resistance **(12 PERIODS)**

P-7 Practical based on C-13 & C-14

Suggested Practicals

WORKING Hrs. 60 (72 PERIODS)

Molecular biology & Biotechnology **(36 PERIODS)**

1. Demonstration of DNA separation on Gel
2. Use of micropipette
3. Protein estimation by Colorimeter
4. study of transposition through Maize specimens /Photographs
5. study of Cloned animal through photographs
6 . study of transgenic animals through photographs

Medical Zoology **(36 PERIODS)**

1.Physical examination of urine
2.Blood film preparation
3.Determination of Bleeding and clotting time
4.Glucose presence in Urine and serum
5.Slides / museum specimens of parasites

DISCIPLINE CENTRIC ELECTIVE (DSE-3)
WILD LIFE CONSERVATION AND MANAGEMENT
(CREDITS: THEORY-4, PRACTICALS- 2)

THEORY

Teaching Hrs: 60(**72 PERIODS**)

Group-A

Unit 1: Wild Life- Values of wild life- positive and negative; conservation ethics; Importance of conservation; causes of depletion **(12 PERIODS)**

Unit 2: Habitat analysis, Evaluation and management of wild life- Physical parameters; topography, Geology, Soil and water; Biological parameters: food, cover, forage, browse and cover ;**Remote sensing and GIS.** **(12 PERIODS)**

Unit 3: Population estimation: Population density, Natality, Birth Rate, Mortality, fertility, Faecal analysis of ungulates and carnivores; Faecal samples, slide preparation, Hair identification, Pug marks and census method. **(12 PERIODS)**

Group-B

Unit 4: National Organisations involved in wild life conservation; wild life Legislation- Wild protection act 1972, its amendments and implementation, Eco-tourism/ Wild life tourism in forests. **(12 PERIODS)**

Unit 5: Management of excess population and translocation; bio-telemetry; Care of injured and diseased animal; Quarantine; common diseases of wild animal. **(12 PERIODS)**

Unit 6: Protected areas National parks and sanctuaries, community reserve; Important features of protected areas in India; Tiger conservation- Tiger reserves in India; Management challenges in Tiger reserve. **(12 PERIODS)**

DISCIPLINE CENTRE ELECTIVE (DSE-4)
AGROCHEMICAL & PEST MANAGEMENT
(CREDITS: THEORY-4, PRACTICALS- 2)
THEORY
Teaching Hrs: 60(**72 PERIODS**)

Group-A **FM:60**

UNIT-1 Fundamentals of Pest management **(17 PERIODS)**

Pest : Definition ,types of pest according to damage (sub-economic, Occassional, perennial , economic threshold

UNIT-2 Practical approach to pest management **(15 PERIODS)**

General morphology of different types of insect, biting and chewing type, Piercing & sucking type of mouth parts , integrated pest management : Cultural, biological, chemical, genetic control

Group-B

UNIT-3 Agrochemical: common pesticides and insecticides , Nomenclature , Mode of action , tools & techniques for pesticide application , measurement of insecticides Toxicity by LD_{50} **(15 PERIODS)**

UNIT-4 Study of Pest in laboratory and field **(25 PERIODS)**

Visit to agriculture field to study biology, damage and management practices of pests of agriculture crops

Rearing of stored grain pests and study of different stages

P-8 Practicals Based on DES-3 &DSE-4

DSE-3 PRACTICALS (36 PERIODS)

1. Identification of flora, mammalian fauna, avian fauna,
2. Demonstration of basic equipment needed in wildlife studies use, care and maintenance (Binoculars, GPS (Global Positioning System , various types of cameras and lenses)
3. Familiarization and study of animal evidences in the field, identification of animals through pug marks, hoof marks, scats, pellet groups, nest antlers etc.
4. Demonstration of different field techniques for flora and fauna

Practicals DSE-4 (36 PERIODS)

1. Trip to ICAR governing field of your locality / FCI
2. Collection preservation and slide preparation of pest
3 Study of infested plants / parts
4. Study of instrument used in pest management (IPM)
5. Determination of LD 50 from the generated data.

B.Sc. Honours

Under CBCS

Generic Elective: Zoology

B.Sc. First Year -Semester I

GE-1 Animal Classification & Diversity

Teaching Hours: 4X15 =60 hrs(72 PERIODS) FM:60 (T)

UNIT-1 General characters and classification (up to classes) of the following phyla (08 PERIODS)

Protozoa, Porifera, Coelenterate, Platyhelminthes, Aschelminthes, Annelida, Mollusca, Arthropoda, Echinodermata and Hemichordate

UNIT-2 Non Chordate: Form & Function (28 PERIODS)

a. Protozoa: Reproduction in *Parameceium ,* life cycle, Pathogenecity, treatment and prevention of *Entamoeba hystolytica, Leishmania donovani, Plasmodium*

b. Porifera: Canal System

c. Coelenterata: *Obelia* -life cycle & Metagenesis *P*

d. Platyhelminthes: F*asciola hepatica & Taenia solium* life cycle and their Pathognecity

e. Aschelminthes: *Ascaris*- Life Cycle and Pathogenecity

f. Annelida: *Pheretima* - General organisation

g. Arthropoda: *Palaemon*- General morphology, Digestive , Respiratory and Excretory system, Statocyst

h. Mollusca; *Pila*- Internal Anatomy, Respiratory system, Organ of Bojanus

i. Echinodermata: *Asterias*-Water Vascular System

j. Hemochordates*: Balanoglossus-General Organisation & affinities*

UNIT-3 General characters and classification of living chordates of the following groups : Cephalochordates, Cyclosotmata , Pisces , Amphibia, Reptilia Aves and Mammals **(16 PERIODS)**

UNIT-4 **Protochordate & Chordate: Form & Function** **(20 PERIODS)**

1. Urochordata: Retrogressive metamorphosis in ***Herdmania***

2. Cephalochordate: Digestive System and Filter feeding Mechanism of Amphioxus
3. Pisces: Digestive , Respiratory and Excretory System in S***coliodon***
4. Reptilia: Biting mechanism of snake, Venom
5. Aves: Respiratory system and Reproductive system of ***Columba***
6. Mammals: Characters, distribution and affinities of Prototheria and Metatheria
7. Comparative account of Skin and Heart in mammals

Practical GE-1

Practical GEP-1

Time: 1 and half hour **Credit-2**

Hrs of working -30(32 PERIODS) **FM-25 (Internal 05 & External 20)**

List of suggested Practicals

1. **Disssection- Palaemon**- Nervous system and Digestive system **(10 PERIODS)**

2. **Mounting:** Spicules of Porifera; Obelia colony; Setae, Septal nephridia & spermatheca of *Pheretima*; radula of *Pila*; *Daphnia*; Trachea and salivary gland of cockroach **(08 PERIODS)**

3. **Museum Specimens:** Sycon, Euspongia, Aurelia,Grogonia, Porpita, Vallela, Metridium, Fungia, Tubipora, Pennatula, Meandrina,Tape worm, Fasciola, Ascaris, Pheretima, Hirudinaria, Neries,Pila, Unio, Doris, Loligo, Sepia, Octopus, Hermit crab, Prawn,, Asterias, Sea Urchin, Brittle star **(10 PERIODS)**

4. **Permanent slide:** Paramecium (WM), Conjugation in Paramecium), L.S of Sycon, Obelia colony , Medusa, *Fasciola* (WM), Proglottids of Tape worm, T.S of *Phertima* through different regions, T.S of male and female *Ascaris,* larva form of Arthropods, mouth part of insects **(08 PERIODS)**

B.Sc. First Year –Semester- II

Generic Elective -GE-2

Cell Biology, Genetics & Evolution

Teaching Hours: 4X15=60 hrs(72 PERIODS) **FM:60**

UNIT-1 Cell Structure and Functions (20 PERIODS)

1.1 Structure of typical Prokaryotic cell and Animal cell
1.2 Study of structure & function of Plasma membrane
1.3 Study of Cell Organaelle: Mitochondria, Ribosomes, Lysomes, Endoplasmic reticulum
1.4 Nucleus and Chromosomes
1.5 Cell Division: Mitosis and Meiosis

UNIT-2 Principle of Genetics (16 PERIODS)

2.1 Mendel's Law of Inheritance

2.2 Linkage and Crossing Over

2.3 Mutation : Chromosomal & Gene mutation

UNIT-3 **Concept of gene Expression**: **(18 PERIODS)**

3.1 Transcription in Prokaryotes

3.2 Translation in Eukaryotes

UNIT- 4 **Evolution** **(18 PERIODS)**

4.1 Sources of hereditary variations and their role in evolution

4.2 Theory of organic evolution; Lamarkism's theory of inheritance of acquired characters

4.3 Darwin's theory of natural selection

4.4 Reproductive Isolation and its role

Practical - GEP-2

GEP-2 **(END SEM ESTER)** **Time: 1 and half hour**

FM: 20

S/N	List of Suggested Practicals	NO. OF PERIODS
1.	Preparation of stained Squash of onion root tip to demonstrate mitosis	6
2.	Preparation of bacterial slide for study of prokaryote	6
3.	Study of permanent slides of cell division	6
4.	Study sex liked characters : Heamophilia and Colour blindness through Pedigree	6
5.	Study of homologous and analogous organ	6
6.	Study of some fossils /extinct models: Dianosaurs , Archeopteryx	6

B.Sc. (H) Second Year

Semester –III Generic Elective -3

Biochemistry, Physiology & Developmental biology

Teaching Hours: 4X15=60 hrs(72 PERIODS **FM:60 (T)**

Biochemistry **(18 PERIODS)**

UNIT-1 Structure and classification of biomolecules

1.1 Protein,

1.2 Carbohydrate
1.3 Lipids
1.4 Nucleic Acids

UNIT-2 Metabolism **(18 PERIODS)**

2.1 Glycolysis
2.2 Kreb Cycle

Physiology **(20 PERIODS)**

UNIT-1 Blood composition,blood coagulation
UNIT-2 Transport of gases O_2 and CO_2
UNIT-3 Digestion of food : Protein carbohydrate and lipid
UNIT-4 Excretion: Nephron & Urine formation
UNIT-5 Neuron and Nerve conduction
UNIT-6 Histo-physiology of Pituitary, Thyroid, Pancreas, Adrenal, Testis and Ovary
UNIT-7 Reproductive Physiology : Gametogenesis and Menstrual cycle

Developmental Biology **(16 PERIODS)**

UNIT-1 Structure of gametes: Sperm and ovum
UNIT-2 Ferilization
UNIT 3 Cleavage and Gastrulation in frog
UNIT4 Fate of three gem layers and Fate map
UNIT-5 Placenta and their functions

Practical-:GEP-3

Biochemistry, Physiology and Developmental Biology

GEP-3 **(END SEM ESTER)** **Time: 1 and half hour**

List of Suggested Practicals

Biochemistry **(09 PERIODS)**

1. Biochemical test for Protein, carbohydrate (Starch & Glucose) & Lipids

Physiology **(09 PERIODS)**

2. Determination of bleeding and clotting time
3. Determination of Hb %
4. Record of blood pressure in normal and after exercise.
5. Study of slides of Reproductive organ: testes , Ovary, Uterus

6. Study of Permanent slides of Endocrine glands-Thyroid, Islets of Langerhans, adrenal , testes and Ovary

Developmental Biology **(09 PERIODS)**

1. Study of Permanent slides of Frog embryo (Egg, Two celled Cleavage Stage, Tadepole Larva (WM)

2. Study of Slides of Chick embryo (WM): 18hrs, 24 hrs, 36 hrs and 72 hrs

Endocrinology **(09 PERIODS)**

1. Study of Permanent Slide of T.S of Endocrine glands

Semester –IV Generic Elective -4 (GE-4)

Ecology & Economic Zoology Credit -4 (T) Hours of teaching 4X15=60 hrs FM=60

UNIT- 1. General concepts **(18 PERIODS)**

1.1 Components of ecosystem
1.2 Energy flow in ecosystem
1.3 food chain and food web, Food Pyramid
1.4 Bio- Geochemical cycle
1.4.1 Water Cycle
1.4.2 Gaseous Cycles- Carbon and Nitrogen

UNIT - 2. Population and communities **(14 PERIODS)**

2.1 Population characteristics: Density, Natality, Mortality
2.2 Nature, Structure and attributes of biological communities
2.3 Ecological succession and concept of climax

UNIT- 3. Pollution **(10 PERIODS)**

3.1 Sources and impact of environmental pollutants- air, water and soil
3.2 Global environmental changes- green house gases and their effects
3.3 Acid rains

UNIT- 4. Natural resources **(12 PERIODS)**

4.1 Soil, water, mineral resources and their conservation

4.2 Biodiversity- benefits, hotspots, threats and conservation
4.3 Human impact on mineral resources
4.4 Renewable and Non Renewable Source of Energy

Economic Zoology **(18 PERIODS)**

UNIT-1. Api culture
UNIT-2 Sericulture
UNIT-3 Lac Culture
UNIT-4 Pisci ulture
UNIT-5 Common Pests of paddy and sugar cane and their control

Practical-: GEP-4

Ecology and Economic Zoology

Credit-2 **Hrs of working -30** **(36 PERIODS)**

List of Suggested Practicals

Ecology **(16 PERIODS)**

1. Estimation of dissolved oxygen
2. Estimation of free carbon dioxide
3. Study of Food chain through Model

Economic Zoology- **(20 PERIODS)**

1. **Slides of** Mouth part of C*ulex*, A*nopheles, Plasmodium* (Signet ring)
2. Common paddy and sugar cane pest,
3. Life cycle of Honey bee,
4. Cocoon of silk worm
5. Lac infestation on stick
6. Study of common fishes