

SKBU Draft syllabus UG Zoology (Hons. + Gen)

Credit Distribution across Courses			
Course Type	Number of Courses	Theory(T) + Practical (P)	Theory + Tutorial(Tu)
Core Courses	14	14*4 =56 (T) 14*2 =28 (P)	14*5 =70 (T) 14*1=14 (Tu)
Discipline Specific Electives	4	4*4=16 (T) 4*2=8 (P)	4*5=20 (T) 4*1=4 (Tu)
Generic Electives	4	4*4=16 (T) 4*2=8 (P)	4*5=20 (T) 4*1=4 (Tu)
Ability Enhancement Language Courses	2	2*2=4 (T)	2*2=4 (T)
Skill Enhancement Courses	2	2*2=4 (T)	2*2=4 (T)
Totals	26	140	140

1. Core Courses

- 1.1 Core T1 – Non-chordates I: Protista to Pseudocoelomates
- 1.2 Core P1 – Non-Chordates I Lab
- 1.3 Core T2 – Perspectives in Ecology
- 1.4 Core P2 – Perspectives in Ecology Lab
- 1.5 Core T3 - Non-Chordates II
- 1.6 Core P3 – Non-Chordates II
- 1.7 Core T4 - Cell Biology
- 1.8 Core P4 – Cell Biology Lab
- 1.9 Core T5 - Diversity of Chordata
- 1.10 Core P5 – Diversity of Chordata Lab
- 1.11 Core T6 - Animal Physiology: Controlling & Coordinating Systems
- 1.12 Core P6 – Animal Physiology: Controlling & Coordinating Systems Lab
- 1.13 Core T7 - Fundamentals of Biochemistry
- 1.14 Core P7 –Fundamentals of Biochemistry Lab
- 1.15 Core T8 - Comparative Anatomy of Vertebrates
- 1.16 Core P8 – Comparative Anatomy of Vertebrates
- 1.17 Core T9 - Animal Physiology: Life Sustaining Systems
- 1.18 Core P9 – Animal Physiology: Life Sustaining Systems Lab
- 1.19 Core T10 - Immunology
- 1.20 Core P10 – Immunology Lab
- 1.21 Core T11 - Molecular Biology
- 1.22 Core P11 – Molecular Biology Lab
- 1.23 Core T12 - Principles of Genetics
- 1.24 Core P12 – Principles of Genetics Lab
- 1.25 Core T13 - Developmental Biology
- 1.26 Core P13 – Developmental Biology Lab
- 1.27 Core T14 – Evolutionary Biology
- 1.28 Core P14 – Evolutionary Biology Lab

2. Discipline Specific Elective Courses

- 2.1 DSE T1 - Animal Behaviour and Chronobiology
- 2.2 DSE P1 – Animal Behaviour and Chronobiology Lab
- 2.3 DSE T2 - Animal Biotechnology
- 2.4 DSE P2 – Animal Biotechnology Lab
- 2.5 DSE T3 - Fish and Fisheries
- 2.6 DSE P3 – Fish and Fisheries Lab
- 2.7 DSE T4 - Parasitology
- 2.8 DSE P4 – Parasitology Lab
- 2.9 DSE T5 – Wild Life Conservation and Management
- 2.10 DSE P5 – Wild Life Conservation and Management Lab

3. Skill Enhancement Courses

3.1 SEC T1 – Apiculture

3.2 SEC T2 - Aquarium Fish Keeping

3.3 SEC T3 – Sericulture

4. Generic Elective Courses (For Other departmental students)

4.1 GE T1- Animal Diversity

4.1 GE P1 – Animal Diversity Lab

4.2 GE T2 - Environment and Public Health

4.2 GE P2 – Environment and Public Health Lab

4.3 GE T3 - Food, Nutrition and Health

4.3 GE P3 – Food Nutrition and Health Lab

Syllabus

Core Subjects

1.1 Core T1 – Non-chordates I: Protista to Pseudocoelomates

Unit 1: Basics of Animal Classification

1. Definitions: Classification, Systematics and Taxonomy; Taxonomic Hierarchy, Taxonomic types
2. Codes of Zoological Nomenclature; Principle of priority; Synonymy and Homonymy; Six kingdom concept of classification (Carl Woese)

Unit 2: Protista and Metazoa

1. Protozoa
 - a. General characteristics and Classification up to phylum (according to Levine et. al., 1981) Locomotion in *Euglena*, *Paramecium* and *Amoeba*; Conjugation in *Paramecium*.
 - b. Life cycle and pathogenicity of *Plasmodium vivax* and *Entamoeba histolytica*
2. Metazoa
 - a. Evolution of symmetry and segmentation of Metazoa

Unit 3: Porifera

General characteristics and Classification up to classes; Canal system and spicules in sponges

Unit 4: Cnidaria

1. General characteristics and Classification up to classes Metagenesis in *Obelia* & *Aurelia*
2. Metagenesis in *Obelia*
3. Polymorphism in Cnidaria
4. Corals and coral reef diversity, function & conservation

Unit 5: Ctenophora

General characteristics

Unit 6: Platyhelminthes

1. General characteristics and Classification up to classes
2. Life cycle and pathogenicity and control measures of *Fasciola hepatica* and *Taenia solium*

Unit 7: Nematoda

1. General characteristics and Classification up to classes
2. Life cycle, and pathogenicity and control measures of *Ascaris lumbricoides* and *Wuchereria bancrofti*
3. Parasitic adaptations in helminthes

1.2 Core P1 – Non-Chordates I Lab :Protists to Pseudocoelomates

List of Practical

1. Study of whole mount of *Euglena*, *Amoeba* and *Paramecium*
2. Identification of *Amoeba*, *Euglena*, *Entamoeba*, *Opalina*, *Paramecium*, *Plasmodium vivax* and *Plasmodium falciparum* (from the prepared slides)
3. Identification of *Sycon*, Neptune's Cup, *Obelia*, *Physalia*, *Millepora*, *Aurelia*, *Tubipora*, *Corallium*, *Alcyonium*, *Gorgonia*, *Metridium*, *Pennatulula*, *Fungia*, *Meandrina*, *Madrepora*
4. Identification and significance of adult *Fasciola hepatica*, *Taenia solium* and *Ascaris lumbricoides*
5. Staining/mounting of any protozoa/helminth from gut of cockroach

1.3 Core T2 – Perspectives in Ecology

Unit 1: Introduction to Ecology

History of ecology, Autecology and synecology, Levels of organization, Laws of limiting factors, Study of Physical factors, The Biosphere.

Unit 2: Population

Unitary and Modular populations

Unique and group attributes of population: Demographic factors, life tables, fecundity tables, survivorship curves, dispersal and dispersion.

Geometric, exponential and logistic growth, equation and patterns, r and K strategies

Population regulation - density-dependent and independent factors

Population Interactions, Gause's Principle with laboratory and field examples, Lotka-Volterra equation for competition.

Unit 3: Community

Community characteristics: species diversity, abundance, , dominance, richness,

Vertical stratification, Ecotone and edge effect. Ecological succession with one example

Unit 4: Ecosystem

Types of ecosystem with an example in detail, Food chain: Detritus and grazing food chains, Linear and Y-shaped food chains, Food web, Energy flow through the ecosystem, Ecological pyramids and Ecological efficiencies

Nutrient and biogeochemical cycle with an example of Nitrogen cycle

Human modified ecosystem

Unit 5: Applied Ecology

Wildlife Conservation (in-situ and ex-situ conservation).

Management strategies for tiger conservation; Wild life protection act (1972)

1.4 Core P2 – Perspectives in Ecology Lab

List of Practical

1. Study of life tables and plotting of survivorship curves of different types from the hypothetical/real data provided
2. Determination of population density in a natural/hypothetical community by quadrat method and calculation of Shannon-Wiener diversity index for the same community
3. Study of an aquatic ecosystem: Phytoplankton and zooplankton, Measurement of area, temperature, turbidity/penetration of light, determination of pH, and Dissolved Oxygen content (Winkler's method), Chemical Oxygen Demand and free CO₂
4. Report on a visit to National Park/Biodiversity Park/Wild life sanctuary

1.5 Core T3 - Non-Chordates II : Coelomates

Unit 1: Introduction

Evolution of coelom and metamerism

Unit 2: Annelida

General characteristics and Classification up to classes

Excretion in Annelida through nephridia.

Metamerism in Annelida.

Unit 3: Arthropoda

1. General characteristics and Classification up to classes Vision in Insecta only.

2. Respiration in Arthropoda (Gills in prawn and trachea in cockroach)

3. Metamorphosis in Lepidopteran Insects.

4. Social life in termite

Unit 4: Onychophora

General characteristics and Evolutionary significance

Unit 5: Mollusca

1. General characteristics and Classification up to classes

2. Nervous system and torsion in Gastropoda

3. Feeding and respiration in *Pila* sp

Unit 6: Echinodermata

1. General characteristics and Classification up to classes

2. Water-vascular system in Asteroidea

3. Larval forms in Echinodermata

4. Affinities with Chordates

Unit 7: Hemichordata

General characteristics of phylum Hemichordata. Relationship with non-chordates and chordates.

1.6 Core P3 Non-Chordates II: Coelomates**List of Practical**

1. Study of following specimens:

a. Annelids - *Aphrodite*, *Nereis*, *Heteronereis*, *Sabella*, *Serpula*, *Chaetopterus*, *Pheretima*, *Hirudinaria*

b. Arthropods - *Limulus*, *Palamnaeus*, *Palaemon*, *Daphnia*, *Balanus*, *Sacculina*, *Cancer*, *Eupagurus*, *Scolopendra*, *Julus*, *Bombyx*, *Periplaneta*, termites and honey bees *Onychophora* - *Peripatus*

c. Molluscs - *Chiton*, *Dentalium*, *Pila*, *Doris*, *Helix*, *Unio*, *Ostrea*, *Pinctada* *Octopus*, *Nautilus*

d. Echinodermates - *Pentaceros*/*Asterias*, *Ophiura*, *Clypeaster*, *Echinus*, *Cucumaria* and e. *Antedon*

2. Study of digestive system, septal nephridia and pharyngeal nephridia of earthworm

3. T.S. through pharynx, gizzard, and typhlosolar intestine of earthworm

4. Mount of mouth parts and dissection of digestive system and nervous system of *Periplaneta**

5. To submit a Project Report on any related topic to larval forms (crustacea and echinoderm)

1.7 Core T4 - Cell Biology

Unit 1: Overview of Cells

Basic structure of Prokaryotic and Eukaryotic cells, Viruses, Viroid, Prion and Mycoplasma

Unit 2: Plasma Membrane

1. Ultra structure and composition of Plasma membrane: Fluid mosaic model
2. Transport across membrane: Active and Passive transport, Facilitated transport
3. Cell junctions: Tight junctions, Gap junctions, Desmosomes

Unit 3: Cytoplasmic organelles I

1. Structure and Functions: Endoplasmic Reticulum, Golgi Apparatus, Lysosomes
2. Protein sorting and mechanisms of vesicular transport

Unit 4: Cytoplasmic organelles II

1. Mitochondria: Structure, Semi-autonomous nature, Endosymbiotic hypothesis Mitochondrial Respiratory Chain, Chemo-osmotic hypothesis
2. Peroxisomes: Structure and Functions
3. Centrosome: Structure and Functions

Unit 5: Cytoskeleton

1. Type, structure and functions of cytoskeleton
2. Accessory proteins of microfilament & microtubule
3. A brief idea about molecular motors

Unit 6: Nucleus

1. Structure of Nucleus: Nuclear envelope, Nuclear pore complex, Nucleolus
2. Chromatin: Euchromatin and Heterochromatin and packaging (nucleosome)

Unit 7: Cell Division:

Cell cycle & its regulation. Cancer (concept of oncogenes and tumor suppressor genes with sp. ref. to p53. Retinoblastoma & Ras & APC. Mitosis And Meiosis. Basic process & their significance.

Unit 8:

1. Cell Signalling transduction pathways; types of signalling molecules and receptors.
2. GPCR and role of 2nd messenger (cAMP)
3. Extracellular matrix – cell interactions
4. Apoptosis & Necrosis

1.8 Core P4 – Cell Biology Lab

List of Practical

1. Preparation of temporary stained squash of onion root tip to study various stages of mitosis
2. Study of various stages of meiosis.
3. Preparation of permanent slide to show the presence of Barr body in human female blood cells/cheek cells.
4. Preparation of permanent slide to demonstrate:
 - a. DNA by Feulgen reaction
 - b. Cell viability study by Trypan Blue staining

1.9 Core T5 - Diversity of Chordata

Unit 1: Introduction to Chordates

General characteristics and outline classification of Phylum Chordata

Unit 2: Protochordata

General characteristics and classification of sub-phylum Urochordata and Cephalochordata up to Classes. Retrogressive metamorphosis in *Ascidia*. Chordate Features and Feeding in *Branchiostoma*

Unit 3: Origin of Chordata

1. Dipleurula concept and the Echinoderm theory of origin of chordates
2. Advanced features of vertebrates over Protochordata

Unit 4: Agnatha

General characteristics and classification of cyclostomes up to order

Unit 5: Pisces

1. General characteristics and classification of Chondrichthyes and Osteichthyes up to Subclasses
2. Accessory respiratory organ, migration and parental care in fishes
3. Swim bladder in fishes. Classification up to Sub-Classes

Unit 6: Amphibia

1. General characteristics and classification up to living Orders.
2. Metamorphosis and parental care in Amphibia

Unit 7: Reptilia

1. General characteristics and classification up to living Orders.
2. Poison apparatus and Biting mechanism in Snake

Unit 8: Aves

1. General characteristics and classification up to Sub-Classes
2. Exoskeleton and migration in Birds
3. Principles and aerodynamics of flight

Unit 9: Mammals

1. General characters and classification up to living orders
2. Affinities of Prototheria
3. Exoskeleton derivatives of mammals
4. Adaptive radiation in mammals with reference to locomotory appendages

5. Echolocation in Chiropterans and Cetaceans

Unit 10: Zoogeography

Zoogeographical realms, Plate tectonic and Continental drift theory, distribution of birds and mammals in different realms

Note: Classifications for Protochordata, Agnatha, Reptilia, Aves and Mammalia to be followed from Young (1981), for Pisces to be followed from Romer (1959), for Amphibia to be followed from Duellman and Trueb (1986).

1.10 Core P5 – Diversity of Chordata Lab

List of Practical

1. Protochordata

Balanoglossus, Herdmania, Branchiostoma

2. Agnatha

Petromyzon, Myxine

3. Fishes

Scoliodon, Sphyrna, Pristis, Torpedo, Chimaera, Mystus, Heteropneustes, Labeo, Exocoetus, Echeneis, Anguilla, Hippocampus, Tetodon/ Diodon, Anabas, Flat fish

4. Amphibia

Necturus, Bufo, Hyla, Alytes, Axolotl, Tylotriton

5. Reptilia

Chelone, Trionyx, Hemidactylus, Varanus, Uromastix, Chamaeleon, Ophiosaurus, Draco, Bungarus, Vipera, Naja, Hydrophis, Zamenis, Crocodylus. Key for Identification of poisonous and non-poisonous snakes

6. Mammalia: Bat (Insectivorous and Frugivorous), Funambulus

7. Pecten from Fowl head

8. Dissection of brain and pituitary of Tilapia

9. Power point presentation on study of any two animals from two different classes by students (may be included if dissections not given permission)

1.11 Core T6 - Animal Physiology: Controlling & Coordinating Systems

Unit 1: Tissues

Structure, location, classification and functions of epithelial tissue, connective tissue, muscular tissue and nervous tissue

Unit 2: Bone and Cartilage

Structure and types of bones and cartilages, Ossification

Unit 3: Nervous System

Structure of neuron, resting membrane potential, Origin of action potential and its propagation across the myelinated and unmyelinated nerve fibers; Types of synapse, Synaptic transmission and Neuromuscular junction; Reflex action and its types

Unit 4: Muscular system

Histology of different types of muscle; Ultra structure of skeletal muscle; Molecular and chemical basis of muscle contraction; Characteristics of muscle fibre

Unit 5: Reproductive System

Histology of testis and ovary
Physiology of Reproduction

Unit 6: Endocrine System

1. Histology and function of pituitary, thyroid, pancreas and adrenal
2. Classification of hormones; Mechanism of Hormone action
3. Signal transduction pathways for Steroidal and Non steroidal hormones
4. Hypothalamus (neuroendocrine gland) - principal nuclei involved in neuroendocrine control of anterior pituitary and endocrine system
5. Placental hormones

1.12 Core P6 – Animal Physiology: Controlling & Coordinating Systems Lab

List of Practical

1. Recording of simple muscle twitch with electrical stimulation (Virtual)
2. Demonstration of the unconditioned reflex action (Deep tendon reflex such as knee jerk reflex)
3. Preparation of temporary mounts: Squamous epithelium, Striated muscle fibres and nerve cells
4. Study of permanent slides of Mammalian skin, Cartilage, Bone, Spinal cord, Nerve cell, Pituitary, Pancreas, Testis, Ovary, Adrenal, Thyroid and Parathyroid
5. Microtomy: Preparation of permanent slide of any five mammalian (Goat/ Fish) tissues

1.13 Core T7 - Fundamentals of Biochemistry

Unit 1: Carbohydrates

1. Structure and Biological importance: Monosaccharides, Disaccharides, Polysaccharides; Derivatives of Monosaccharides
2. Carbohydrate metabolism: Glycolysis, Citric acid cycle, Pentose phosphate pathway, Gluconeogenesis

Unit 2: Lipids

1. Structure and Significance: Physiologically important saturated and unsaturated fatty acids, Tri-acylglycerols, Phospholipids, Sphingolipid, Glycolipids, Steroids, Eicosanoids and terpenoids.
2. Lipid metabolism: β -oxidation of fatty acids; Fatty acid biosynthesis

Unit 3: Proteins

1. Amino acids

Structure, Classification, General and Electro chemical properties of α -amino acids; Physiological importance of essential and non-essential amino acids

2. Proteins

Bonds stabilizing protein structure; Levels of organization

Protein metabolism: Transamination, Deamination, Urea cycle, Fate of C-skeleton of Glucogenic and Ketogenic amino acids

Unit 4: Nucleic Acids

1. Structure: Purines and pyrimidines, Nucleosides, Nucleotides, Nucleic acids
2. Types of DNA and RNA, Complementarity of DNA, Hypo-Hyperchromaticity of DNA
3. Basic concept of nucleotide metabolism

Unit 5: Enzymes

Nomenclature and classification; Cofactors; Specificity of enzyme action; Isozymes; Mechanism of enzyme action; Enzyme kinetics; Derivation of Michaelis-Menten equation, Lineweaver-Burk plot; Factors affecting rate of enzyme-catalyzed reactions; Enzyme inhibition; Allosteric enzymes and their kinetics; Strategy of enzyme action- Catalytic and Regulatory (Basic concept with one example each)

Unit 5: Oxidative Phosphorylation

Redox systems; Review of mitochondrial respiratory chain, Inhibitors and un-couplers of Electron Transport System

1.14 Core P7 –Fundamentals of Biochemistry Lab

List of Practical

1. Qualitative tests of functional groups in carbohydrates, proteins and lipids.
2. Paper chromatography of amino acids.
3. Quantitative estimation of Lowry Method
4. Demonstration of proteins separation by SDS-PAGE.
5. To study the enzymatic activity of Trypsin and Amylase.
6. Preparation of Normal, molar and standard solutions, Phosphate Buffers, Serial dilutions

1.15 Core T8 - Comparative Anatomy of Vertebrates

Unit 1: Integumentary System

Structure, function and derivatives of integument in amphibian, birds and mammals

Unit 2: Skeletal System

Overview of axial and appendicular skeleton; Jaw suspension; Visceral arches.

Unit 3: Digestive System

Comparative anatomy of stomach; dentition in mammals

Unit 4: Respiratory System

Respiratory organs in fish, amphibian, birds and mammals

Unit 5: Circulatory System

General plan of circulation, Comparative account of heart and aortic arches

Unit 6: Urinogenital System

Succession of kidney, Evolution of urinogenital ducts, Types of mammalian uteri

Unit 7: Nervous System

Comparative account of brain, Cranial nerves in mammals

Unit 8: Sense Organs

Classification of receptors, Brief account of auditory receptors in vertebrate

1.16 Core P8 – Comparative Anatomy of Vertebrates

List of Practical

1. Study of placoid, cycloid and ctenoid scales through permanent slides/photographs
2. Study of disarticulated skeleton of Toad, Pigeon and Guinea pig
3. Demonstration of Carapace and plastron of turtle
4. Identification of mammalian skulls: One herbivorous (Guinea pig) and one carnivorous (Dog) animal
5. Dissection of Tilapia: Digestive system, Brain, pituitary, urinogenital system

1.17 Core T9 - Animal Physiology: Life Sustaining Systems

Unit 1: Physiology of Digestion

Structural organisation and functions of Gastrointestinal tract and Associated glands; Mechanical and chemical digestion of food, absorption of Carbohydrates, Lipids, Proteins and Nucleic Acids; Digestive enzymes

Unit 2: Physiology of Respiration

Mechanism of Respiration, Respiratory volumes and capacities, transport of Carbon dioxide in blood, Dissociation curves and the factors influencing it, r

pigments; Carbon monoxide poisoning

Unit 3: Physiology of Circulation

1. Components of Blood and their functions; Structure and functions of haemoglobin
2. Haemostasis; Blood clotting system, Fibrinolytic system
3. Haemopoiesis; Basic steps and its regulation
4. Blood groups; ABO and Rh factor

Unit 4: Physiology of Heart

1. Structure of mammalian heart, Coronary Circulation, Structure and working of conducting myocardial fibres, Origin and conduction of cardiac impulses
2. Cardiac Cycle and cardiac output
3. Blood pressure and its regulation

Unit 5: Thermoregulation & Osmoregulation

1. Physiological classification based on thermal biology.
2. Thermal biology of endotherms
3. Osmoregulation in aquatic vertebrates
4. Extrarenal osmoregulatory organs in vertebrates

Unit 6: Renal Physiology

Structure of Kidney and its functional unit, Mechanism of urine formation, Regulation of acid-base balance

1.18 Core P9 – Animal Physiology: Life Sustaining Systems Lab

List of Practical

1. Enumeration of red blood cells and white blood cells using haemocytometer
2. Estimation of haemoglobin using Sahli's haemoglobinometer
3. Preparation of haemin and haemochromogen crystals
4. Recording of blood pressure using a sphygmomanometer

1.19 Core T10 - Immunology

Unit 1: Overview of Immune System

Basic concepts of health and diseases, Historical perspective of Immunology, Cells and organs of the Immune system

Unit 2: Innate and Adaptive Immunity

Anatomical barriers, Inflammation, Cell and molecules involved in innate immunity, Adaptive immunity (Cell mediated and humoral).

Unit 3: Antigens

Antigenicity and immunogenicity, Immunogens, Adjuvants and haptens, Factors influencing immunogenicity, B and T-Cell epitopes

Unit 4: Immunoglobulins

Structure and functions of different classes of immunoglobulins, Antigen- antibody interactions, Immunoassays (ELISA and RIA), Hybridoma technology, Monoclonal antibody production

Unit 5: Major Histocompatibility Complex

Structure and functions of MHC molecules.
Structure of T cell Receptor and its signalling, T cell development & selection

Unit 6: Cytokines

Types, properties and functions of cytokines.

Unit 7: Complement System

Components and pathways of complement activation.

Unit 8: Hypersensitivity

Gell and Coombs' classification and brief description of various types of hypersensitivities.

Unit 9: Immunology of diseases

Malaria, Filariasis, Dengue and Tuberculosis

Unit 10: Vaccines

Various types of vaccines. Active & passive immunization (Artificial and natural).

1.20 Core P10 – Immunology Lab

List of Practical

1. Demonstration of lymphoid organs (Virtual).
2. Histological study of spleen, thymus and lymph nodes through slides/ photographs
3. Preparation of stained blood film to study various types of blood cells.
4. ABO blood group determination.
5. Demonstration of ELISA

The experiments can be performed depending upon usage of animals in UG courses.

1.21 Core T11 - Molecular Biology

Unit 1: Nucleic Acids

Salient features of DNA and RNA

Watson and Crick Model of DNA

Unit 2: DNA Replication

Mechanism of DNA Replication in Prokaryotes, Semi-conservative, bidirectional and discontinuous Replication, RNA priming, Replication of telomeres

Unit 3: Transcription

Mechanism of Transcription in prokaryotes and eukaryotes, Transcription factors, Difference between prokaryotic and eukaryotic transcription.

Unit 4: Translation

Mechanism of protein synthesis in prokaryotes, Ribosome structure and assembly in prokaryotes, fidelity of protein synthesis, aminoacyl tRNA synthetases and charging of tRNA; Proteins involved in initiation, elongation and termination of polypeptide chain; Genetic code, Degeneracy of the genetic code and Wobble Hypothesis; Inhibitors of protein synthesis; Difference between prokaryotic and eukaryotic translation

Unit 5: Post Transcriptional Modifications and Processing of Eukaryotic RNA

Capping and Poly A tail formation in mRNA; Split genes: concept of introns and exons, splicing mechanism, alternative splicing, exon shuffling, and RNA editing, Processing of tRNA

Unit 6: Gene Regulation

Regulation of Transcription in prokaryotes: *lac* operon and *trp* operon;

Regulation of Transcription in eukaryotes: Activators, enhancers, silencer, repressors,

miRNA mediated gene silencing, Genetic imprinting

Unit 7: DNA Repair Mechanisms

Types of DNA repair mechanisms, RecBCD model in prokaryotes, nucleotide and base excision repair, SOS repair

Unit 8: Molecular Techniques

PCR, Western and Southern blot, Northern Blot, Sanger DNA sequencing

1.22 Core P11 – Molecular Biology Lab

List of Practical

1. Demonstration of polytene and lampbrush chromosome from photograph
2. Isolation and quantification of genomic DNA using spectrophotometer (A260 measurement)
3. Agarose gel electrophoresis for DNA

1.23 Core T12 - Principles of Genetics

Unit 1: Mendelian Genetics and its Extension

1. Principles of inheritance, Incomplete dominance and co-dominance, Epistasis Multiple alleles, Lethal alleles, Pleiotropy,
2. Sex-linked, sex- influenced and sex-limited inheritance, Polygenic Inheritance.

Unit 2: Linkage, Crossing Over and Chromosomal Mapping

Linkage and Crossing Over, molecular basis of crossing over, Measuring Recombination frequency and linkage intensity using three factor crosses, Interference and coincidence

Unit 3: Mutations

Types of gene mutations (Classification), Types of chromosomal aberrations (Classification with one suitable example of each), Non-disjunction and variation in chromosome number; Molecular basis of mutations in relation to UV light and chemical mutagens

Unit 4: Sex Determination

1. Mechanisms of sex determination in Drosophila
2. Sex determination in mammals
3. Dosage compensation in Drosophila & Human

Unit 5: Extra-chromosomal Inheritance

1. Criteria for extra chromosomal inheritance, Antibiotic resistance in Chlamydomonas,
2. Kappa particle in Paramecium
3. Shell spiralling in snail

Unit 6: Recombination in Bacteria and Viruses

Conjugation, Transformation, Transduction, Complementation test in Bacteriophage

Unit 7: Transposable Genetic Elements

Transposons in bacteria, Ac-Ds elements in maize and P elements in Drosophila, LINE, SINE, Alu elements in humans

1.24 Core P12 – Principles of Genetics Lab

List of Practical

1. Chi-square analyses
2. Linkage maps based on conjugation
3. Identification of chromosomal aberration in Drosophila and man from photograph
4. Pedigree analysis of some human inherited traits

1.25 Core T13 - Developmental Biology

Unit 1: Introduction

Basic concepts: Phases of Development, Cell cell interaction, Differentiation and growth, Differential gene expression

Unit 2: Early Embryonic Development

Gametogenesis, Spermatogenesis, Oogenesis; Types of eggs, Egg membranes; Fertilization (External and Internal); Changes in gametes, Blocks to polyspermy; Planes and patterns of cleavage; Types of Blastula; Fate maps (including Techniques); Early development of frog and chick up to gastrulation; Embryonic induction and organizers

Unit 3: Late Embryonic Development

Fate of Germ Layers; Extra-embryonic membranes in birds; Implantation of embryo in humans, Placenta (Structure, types and functions of placenta)

Unit 4: Post Embryonic Development

Development of brain and Eye in Vertebrate
Regeneration: Modes of regeneration, epimorphosis, morphallaxis and compensatory regeneration (with one example each)

Unit 5: Implications of Developmental Biology

1.26 Core P13 - Developmental Biology Lab

List of Practical

1. Study of whole mounts of developmental stages of chick through permanent slides: Primitive streak (13 and 18 hours), 21, 24, 28, 33, 36, 48, 72, and 96 hours of incubation (Hamilton and Hamburger stages)
2. Study of the developmental stages and life cycle of *Drosophila* from stock culture
3. Study of different sections of placenta (photomicrograph/ slides)
4. Project report on *Drosophila* culture/chick embryo development

1.27 Core T14 – Evolutionary Biology

Unit 1

Life's Beginnings: Chemogeny, RNA world, Biogeny, Origin of photosynthesis, Evolution of eukaryotes

Unit 2

Historical review of Evolutionary concepts, Lamarkism, Darwinism and Neo Darwinism

Unit 3

1. Geological time scale, Fossil records of Hominids (from *Australopithecus* to *Homo sapiens*), evolution of horse
2. Neutral theory of molecular evolution, Molecular clock

Unit 4

Sources of variations: Heritable variations and their role in evolution

Unit 5

1. Population genetics: Hardy-Weinberg Law (statement and derivation of equation, application of law to biallelic Population); Evolutionary forces upsetting H-W equilibrium; Natural selection (concept of fitness, types of selection, selection coefficient, mode of selection heterozygous superiority).
2. Genetic Drift mechanism (founder's effect, bottleneck phenomenon)
3. Role of Migration and Mutation in changing allele frequencies.

Unit 6

Species concept, Isolating mechanisms, modes of speciation
Adaptive radiation/macroevolution (exemplified by Galapagos finches)

Unit 7

Extinctions, Background and mass extinctions (causes and effects), detailed example of K-T extinction

Unit 8

1. Origin and Evolution of Man, Unique Hominin characteristics contrasted with primate characteristic
2. Molecular analysis of human origin

Unit 9

Phylogenetic trees, Construction & interpretation of Phylogenetic tree using parsimony, Convergent & Divergent evolution.

1.28 Core P14 – Evolutionary Biology Lab

List of Practical

1. Study of fossils from models/ pictures
2. Study of homology and analogy from suitable specimens
3. Study and verification of Hardy-Weinberg Law by chi square analysis
4. Graphical representation and interpretation of data of height/ weight of a sample of 100 humans in relation to their age and sex.

2. Department /Discipline Specific Elective Subjects Syllabus

2.1 DSE T1 - Animal Behaviour and Chronobiology

Unit 1: Introduction to Animal Behaviour

Origin and history of Ethology, Brief profiles of Karl Von Frish, Ivan Pavlov, Konrad Lorenz, Niko Tinbergen Proximate and ultimate causes of behaviour, Methods and recording of a behaviour

Unit 2: Patterns of Behaviour

Stereotyped Behaviours (Orientation, Reflexes); Individual Behavioural patterns; Instinct vs. Learnt Behaviour; Associative learning, classical and operant conditioning, Habituation, Imprinting.

Unit 3: Social and Sexual Behaviour

Social Behaviour: Concept of Society; Communication and the senses
Altruism; Insects' society with Honey bee as example; Foraging in honey bee and advantages of the waggle dance.

Sexual Behaviour: Asymmetry of sex, Sexual dimorphism, Mate choice, Intra-sexual selection (male rivalry), Inter-sexual selection (female choice), Sexual conflict in parental care.

Unit 4: Introduction to Chronobiology

Historical developments in chronobiology; Biological oscillation: the concept of Average, amplitude, phase and period
Adaptive significance of biological clocks

Unit 5: Biological Rhythm

Types and characteristics of biological rhythms: Short- and Long- term rhythms; Circadian rhythms; Tidal rhythms and Lunar rhythms; Concept of synchronization and masking; Photic and non-photic zeitgebers; Circannual rhythms; Photoperiod and regulation of seasonal reproduction of vertebrates; Role of melatonin.

2.2 DSE P1 – Animal Behaviour and Chronobiology Lab

List of Practical

1. To study nests and nesting habits of the birds and social insects.
2. To study the behavioural responses of wood lice to dry and humid conditions.
3. To study geotaxis behaviour in earthworm.
4. To study the phototaxis behaviour in insect larvae.
5. Visit to Forest/ Wild life Sanctuary/Biodiversity Park/Zoological Park to study behavioural activities of animals and prepare a short report.
6. Study and actogram construction of locomotor activity of suitable animal models.
7. Study of circadian functions in humans (daily eating, sleep and temperature patterns).

2.3 DSE T2 - Animal Biotechnology

Unit 1: Introduction

Organization of prokaryotic and eukaryotic genome, Concept of genomics

Unit 2: Molecular Techniques in Gene manipulation

1. Cloning vectors: Plasmids, Cosmids, Phagemids, Lambda Bacteriophage, M13, BAC, YAC, MAC and Expression vectors (characteristics). Restriction enzymes: Nomenclature, detailed study of Type II. Transformation techniques: Calcium chloride method and electroporation. Construction of genomic and cDNA libraries and screening by colony and plaque hybridization
2. Southern, Northern and Western blotting
3. DNA sequencing: Sanger method
4. Polymerase Chain Reaction, DNA Finger Printing and DNA micro array

Unit 3: Genetically Modified Organisms

1. Production of cloned and transgenic animals: Nuclear Transplantation, Retroviral Method, DNA microinjection.
2. Applications of transgenic animals: Production of pharmaceuticals, production of donor organs, knock out mice.

Unit 4: Culture Techniques and Applications

Animal cell culture, Expressing cloned genes in mammalian cells, Molecular diagnosis of genetic diseases (Cystic fibrosis, Sickle cell anemia)

2.4 DSE P2 Animal Biotechnology Lab:

List of Practical

1. Genomic DNA isolation from *E. coli*
2. Plasmid DNA isolation (pUC 18/19) from *E. coli*
3. Restriction digestion of plasmid DNA.
4. Construction of circular and linear restriction map from the data provided.
5. Calculation of transformation efficiency from the data provided.

6. To study following techniques through photographs
 - a. Southern Blotting
 - b. Northern Blotting
 - c. Western Blotting
 - d. DNA Sequencing (Sanger's Method)
 - e. PCR
 - f. DNA fingerprinting
7. Project report on animal cell culture

2.5 DSE T3 - Fish and Fisheries

Unit 1: Introduction and Classification

1. General description of fish
2. Feeding habit, habitat and manner of reproduction
3. Classification of fish (up to Subclasses)

Unit 2: Morphology and Physiology

Types of fins and their modifications; Locomotion in fish; Hydrodynamics; Types of Scales, Use of scales in Classification and determination of age of fish; Gills and their structure and exchange; Swim Bladder: Types and role in Respiration, buoyancy; Osmoregulation in fish; Elasmobranchs; Reproductive strategies (special reference to Indian fish); Electroluminescence

Unit 3: Fisheries

Inland Fisheries; Marine Fisheries; Environmental factors influencing the seasonal variations in fish catches in the Arabian Sea and the Bay of Bengal; Fishing crafts and gears; Depletion of fisheries resources; Application of remote sensing and GIS in fisheries; Fisheries law and regulations

Unit 4: Aquaculture

Sustainable Aquaculture; Extensive, semi-intensive and intensive culture of fish; Cage culture; Polyculture; Composite fish culture; Brood stock management; Incubation and breeding of fish; Management of finfish hatcheries; Preparation and maintenance of 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 5: Fish in research

Transgenic fish
Sex reversal

Note: Classification to be followed from: Romar A. S. (1959)

2.6 DSE P3 – Fish and Fisheries Lab

List of Practical

1. Morphometric and meristic characters of fishes
2. Study of *Petromyzon*, *Myxine*, *Pristis*, *Chimaera*, *Exocoetus*, *Hippocampus*, *Gambusia*, *Labeo*, *Heteropneustes*, *Anabas*
3. Study of different types of scales (through permanent slides/ photographs).
4. Study of crafts and gears used in Fisheries
5. Water quality criteria for Aquaculture: Assessment of pH, conductivity, Total dissolved solids, salinity
6. Study of air breathing organs in *Channa*, *Heteropneustes*, *Anabas* and *Clarias*
7. Project Report on a visit to any fish farm/ pisciculture unit

2.7 DSE T4 - Parasitology

Unit 1: Introduction to Parasitology

Brief introduction of Parasitism, Parasite, Parasitoid and Vectors (mechanical and biological vector) Host parasite relationship

Unit 2: Parasitic Protists

Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of *Giardia intestinalis*, *Trypanosoma gambiense*, *Leishmania donovani*

Unit 3: Parasitic Platyhelminthes

Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of *Schistosoma haematobium*, *Taenia saginata*

Unit 4: Parasitic Nematodes

Study of Morphology, Life Cycle, Prevalence, Epidemiology, Pathogenicity, Diagnosis, Prophylaxis and Treatment of *Ascaris lumbricoides*, *Ancylostoma duodenale*, *Wuchereria bancrofti* and *Trichinella spiralis*, *Brugia malayi*; Nematode plant interaction; Gall formation

Unit 5: Parasitic Arthropods

Biology, importance and control of ticks (Soft tick *Ornithodoros*, Hard tick *Ixodes*), mites (*Sarcoptes*), Lice (*Pediculus*), Flea (*Xenopsylla*) and Bug (*Cimex*)

Unit 5: Parasite Vertebrates

Brief account of Cookicutter Shark, Hood Mocking bird, Vampire bat

2.8 DSE P4 – Parasitology Lab

List of Practicals

1. Study of life stages of *Giardia intestinalis*, *Trypanosoma gambiense*, *Leishmania donovani* through permanent slides/micro photographs
2. Study of adult and life stages of *Schistosoma haematobium*, *Taenia saginata* through permanent slides/micro photographs
3. Study of adult and life stages of *Ancylostoma duodenale*, *Brugia malayi* and *Trichinella spiralis* through permanent slides/micro photographs
4. Study of plant parasitic root knot nematode, *Meloidogyne* from the soil sample
5. Study of *Pediculus humanus*, *Xenopsylla cheopis* and *Cimex lectularius* through permanent slides/ photographs
6. Study of monogenea from the gills of fresh/marine fish [Gills can be procured from fish market as by product of the industry]
7. Study of nematode/cestode parasites from the intestines of Poultry bird [Intestine can be procured from poultry/market as a by-product]

Submission of a brief report on parasitic vertebrates

2.9 DSE T5 – Wild Life Conservation and Management

Unit 1: Introduction to Wild Life

Values of wild life - positive and negative; Conservation ethics; Importance of conservation; Causes of depletion; World conservation strategies.

Unit 2: Evaluation and management of wild life

Habitat analysis, Physical parameters: Topography, Geology, Soil and water
Biological Parameters: food, cover, forage, browse and cover estimation
Standard evaluation procedures: remote sensing and GIS.

Unit 3: Management of habitats

Setting back succession; Grazing logging; Mechanical treatment; Advancing the successional process; Cover construction; Preservation of general genetic diversity
Restoration of degraded habitats

Unit 4: Population estimation

Population density, Natality, Birth rate, Mortality, fertility schedules and sex ratio computation; Faecal analysis of ungulates and carnivores; Pug marks and census method.

Unit 5: Aims and objectives of wildlife conservation

Wildlife conservation in India – through ages; different approaches of wildlife conservation; modes of conservation; in-situ conservation and ex-situ conservation: necessity for wildlife conservation

Unit 6: Management planning of wild life in protected areas

Estimation of carrying capacity; Eco tourism / wild life tourism in forests; Concept of climax persistence; Ecology of perturbation.

Unit 7: Man and Wildlife

Causes and consequences of human-wildlife conflicts; mitigation of conflict – an overview; Management of excess population

Unit 8: Protected areas

National parks & sanctuaries, Community reserve; Important features of protected areas in India; Tiger conservation - Tiger reserves in India; Management challenges in Tiger reserve.

2.10 DSE P5 – Wild Life Conservation and Management Lab

List of Practical

1. Identification of flora, mammalian fauna, avian fauna, herpeto-fauna
2. Demonstration of basic equipment needed in wildlife studies use, care and maintenance (Compass, Binoculars, Spotting scope, Range Finders, 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
5. PCQ, ten tree method, Circular, Square & rectangular plots, Parker's 2 Step and other methods for ground cover assessment, Tree canopy cover assessment, Shrub cover assessment.
6. Trail / transect monitoring for abundance and diversity estimation of mammals and bird (direct and indirect evidences)

3. Skill Enhancement Course

3.1 SEC T1 – Apiculture

Unit 1: Biology of Bees

1. History, Classification and Biology of Honey Bees
2. Social Organization of Bee Colony

Unit 2: Rearing of Bees

1. Artificial Bee rearing (Apiary), Beehives – Newton and Langstroth
2. Bee Pasturage
3. Selection of Bee Species for Apiculture
4. Bee Keeping Equipment
5. Methods of Extraction of Honey (Indigenous and Modern)

Unit 3: Diseases and Enemies

1. Bee Diseases and Enemies
2. Control and Preventive measures

Unit 4: Bee Economy

Products of Apiculture Industry and its Uses (Honey, Bees Wax, Propolis), Pollen etc

Unit 5: Entrepreneurship in Apiculture

Bee Keeping Industry – Recent Efforts, Modern Methods in employing artificial Beehives for cross pollination in horticultural gardens

3.2 SEC T2 - Aquarium Fish Keeping

Unit 1: Introduction to Aquarium Fish Keeping

The potential scope of Aquarium Fish Industry as a Cottage Industry, Exotic and Endemic species of Aquarium Fishes

Unit 2: Biology of Aquarium Fishes

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 3: Food and feeding of Aquarium fishes

Use of live fish feed organisms. Preparation and composition of formulated fish feeds, Aquarium fish as larval predator

Unit 4: Fish Transportation

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

Unit 5: Maintenance of Aquarium

General Aquarium maintenance – budget for setting up an Aquarium Fish Farm as a Cottage Industry

3.3 SEC T3 – Sericulture

Unit 1: Introduction

1. Sericulture: Definition, history and present status; Silk route
2. Types of silkworms, Distribution and Races
3. Exotic and indigenous races
4. Mulberry and non-mulberry Sericulture

Unit 2: Biology of Silkworm

1. Life cycle of *Bombyx mori*
2. Structure of silk gland and secretion of silk

Unit 3: Rearing of Silkworms

1. Selection of mulberry variety and establishment of mulberry garden
2. Rearing house and rearing appliances.
3. Disinfectants: Formalin, bleaching powder, RKO
4. Silkworm rearing technology: Early age and Late age rearing
5. Types of mountages
6. Spinning, harvesting and storage of cocoons

Unit 4: Pests and Diseases

1. Pests of silkworm: Uzi fly, dermestid beetles and vertebrates
2. Pathogenesis of silkworm diseases: Protozoan, viral, fungal and bacterial
3. Control and prevention of pests and diseases

Unit 5: Entrepreneurship in Sericulture

1. Prospectus of Sericulture in India: Sericulture industry in different states, employment, potential in mulberry and non-mulberry sericulture
2. Visit to various sericulture centres.

4. General Elective

4.1 GE T1- Animal Diversity

Unit 1: Protista

1. Protozoa
2. General characters of Protozoa; Life cycle of Plasmodium

Unit 2: Porifera

General characters and canal system in Porifera

Unit 3: Radiata

General characters of Cnidarians and polymorphism

Unit 4: Aceolomates

General characters of Helminthes

Unit 5: Pseudocoelomates

1. General characters of Nematoda
2. Parasitic adaptations

Unit 6: Annelida

1. General characters of Annelida
2. Metamerism

Unit 7: Arthropoda

1. General characters
2. Social life in insects.

Unit 8: Mollusca

1. General characters of mollusc
2. Pearl Formation

Unit 9: Echinodermata

1. General characters of Echinodermata
2. Water Vascular system in Starfish

Unit 10: Protochordata

Salient features

Unit 11: Pisces

1. General Characters
2. Osmoregulation, Migration of Fish

Unit 12: Amphibia

General characters, Adaptations for terrestrial life, Parental care

Unit 13: Reptilia

1. General Characters
2. Amniotes; Origin of reptiles. Terrestrial adaptations in reptiles.

Unit 14: Aves

1. General Characters
2. The origin of birds; Flight adaptations

Unit 15: Mammalia

1. General Characters
2. Early evolution of mammals; Primates; Dentition in mammals.

4.1 GE P1 – Animal Diversity Lab

List of Practical

1. Study of following specimens:
 - a. Non Chordates: Euglena, Noctiluca, Paramecium, Sycon, , Physalia, Tubipora, Metridium, Taenia, Ascaris, Nereis, Aphrodite, Leech, Peripatus, Limulus, Hermitcrab, Daphnia, Millipede, Centipede, Beetle, Chiton, Dentalium, Octopus, Asterias, and Antedon.
 - b. Chordates: Balanoglossus, Amphioxus, Petromyzon, Pristis, Hippocampus, Labeo, Ichthyophis/Uraeotyphlus, Salamander, Rhacophorus, Draco, Uromastix, Naja, Viper, model of Archaeopteryx, any three common birds-(Crow, duck, Owl), Squirrel and Bat.
2. Study of following Permanent Slides:

Cross section of Sycon, Sea anemone and Ascaris (male and female). T. S. of Earthworm passing through pharynx, gizzard, and typhlosolar intestine. Bipinnaria and Pluteus larva.
3. Temporary mounts of:
 - a. Septal & pharyngeal nephridia of earthworm.
 - b. Unstained mounts of Placoid, cycloid and ctenoid scales.
4. Dissections of:
 - a. Digestive and nervous system of Cockroach
 - b. Urinogenital system of Rat

4.2 GE T2 - Environment and Public Health

Unit 1: Introduction

Sources of Environmental hazards, Hazard identification and accounting, Fate of toxic and persistent substances in the environment, Dose response evaluation, Exposure assessment.

Unit 2: Climate Change

Greenhouse gases and global warming, Acid rain, Ozone layer destruction, Effect of climate change on public health

Unit 3: Pollution

Air, water, noise pollution sources and effects, Pollution control

Unit 4: Waste Management Technologies

Sources of waste, types and characteristics, Sewage disposal and its management, Solid waste disposal, Biomedical waste handling and disposal, Nuclear waste handling and disposal, Waste from thermal power plants.

Unit 5: Diseases

Causes, symptoms and control of tuberculosis, Asthma, Cholera, Minamata disease, typhoid, filariasis

4.2 GE P2 – Environment and Public Health Lab

List of Practical

1. To determine pH, Cl, SO₄, NO₃ in soil and water samples from different locations

4.3 GE T3 - Food, Nutrition and Health

Unit 1: Basic concept of food and nutrition

1. Food Components and food-nutrients
2. Concept of a balanced diet, nutrient needs and dietary pattern for various groups- adults, pregnant and lactating mothers, infants, school children, adolescents and elderly

Unit 2: Nutritional Biochemistry

1. Carbohydrates, Lipids, Proteins- Definition, Classification, their dietary source and role
2. Vitamins- Fat-soluble and Water-soluble vitamins- their dietary source and importance
3. Minerals- Iron, calcium, phosphorus, iodine, selenium and zinc: their biological functions

Unit 3: Health

1. Introduction to health- Definition, concept of health and disease
2. Major nutritional Deficiency diseases- Protein Energy Malnutrition (kwashiorkor and marasmus), Vitamin A deficiency disorders, Iron deficiency disorders, Iodine deficiency disorders- their causes, symptoms, treatment, prevention and government programmes, if any.
3. Life style related diseases- hypertension, diabetes mellitus, and obesity- their causes and prevention through dietary and lifestyle modifications
4. Social health problems- smoking, alcoholism, drug dependence and Acquired Immuno Deficiency Syndrome (AIDS) - their causes, treatment and prevention
5. Common ailments- cold, cough, and fevers, their causes and treatment
6. Concepts of Nutrigenomics and health informatics

Unit 4: Food hygiene and Community health

1. Potable water- sources and methods of purification at domestic level
2. Food and Water borne infections: Bacterial infection: cholera, typhoid fever, dysentery; Viral infection: hepatitis, poliomyelitis, Protozoan infection: Amoebiasis, Giardiasis; Helminths infection: Taeniasis, Ascariasis, Vector borne diseases: Malaria and Dengue, their transmission, causative agent, sources of infection, symptoms and prevention
2. Brief account of food spoilage: Causes of food spoilage and their preventive measures

4.3 GE P3 – Food Nutrition and Health Lab

List of Practical

1. To detect adulteration in a) Ghee b) Sugars c) Tea leaves and d) Turmeric
2. Lactose and calcium estimation in food by titrimetry
3. Methylene Blue Reductase Test (MBRT) of milk. Gram staining of bacteria.
4. Study of the stored grain pests and mosquito vectors (*Anopheles*, *Culex* and *Aedes*) from slides/ photograph (*Sitophilus oryzae*, *Trogoderma granarium*, identification, habitat and food sources, damage caused and control. Preparation of temporary mounts of the above stored grain pests.
5. Project- Undertake computer aided diet analysis and Anthropometric nutritional assessment for different age groups.

OR

Identify nutrient rich sources of foods (fruits and vegetables), their seasonal availability and price

OR

6. Study of nutrition labelling on selected foods