



**St Aloysius College (Autonomous)**  
**Mangaluru**

**Re-accredited by NAAC “A” Grade**  
**Course structure and syllabus of**  
**B.Sc.**  
**ZOOLOGY**

**Under NEP Regulations, 2021**

ST ALOYSIUS COLLEGE (AUTONOMOUS)  
MANGALURU - 575 003  
Phone: 0824-2449700, 2449701  
Fax: 0824-2449705  
Email: principal@staloyisius.edu.in



ST ALOYSIUS COLLEGE(AUTONOMOUS)  
MANGALURU - 575 003  
Phone: 0824-2449700, 2449701  
Fax: 0824-2449705  
Email: principal@staloyisius.edu.in

Re-accredited by NAAC with 'A' Grade with CGPA 3.62/4

Recognised by UGC as "College with Potential for Excellence"

Conferred "College with "STAR STATUS" by DBT, Government of India.

Centre for Research Capacity Building under UGC-STRIDE

Date: 21-02-2022

## NOTIFICATION

Sub: Syllabus of **B.Sc. ZOOLOGY** under NEP Regulations, 2021.  
(As per Mangalore University guidelines)

Ref: 1. Decision of the Academic Council meeting held on 18-12-2021 vide  
Agenda No: 6 (2021-22)  
2. Office Notification dated 21-02-2022

Pursuant to the above, the Syllabus of **B.Sc. ZOOLOGY** under NEP Regulations, 2021 which was approved by the Academic Council at its meeting held on 18-12-2021 is hereby notified for implementation with effect from the academic year **2021-22**.

*Arumath*

PRINCIPAL



*mm*

REGISTRAR

To:

1. The Chairman/Dean/HOD
2. The Registrar Office
3. Library



BOS meeting of the Zoology department was held on **18 th November 2021**

### **BOARD OF STUDIES IN ZOOLOGY**

1. Chairperson : Dr. Hemachandra, Associate Professor
2. Members from the department: Mr. Hariprasad Shetty, Assistant Professor.  
Ms.Karen Trescilla D'Souza, Assistant Professor.  
Mr.Kiran Vati K, Lecturer.  
Dr.Rachana B Rai, Assistant Professor.  
Mr. Glavin Thomas Rodrigues, Lecturer.

3. External Members:

**Subject Experts** : Dr Siby Philip  
Head of Zoology, Nirmalagiri College, Kuthuparamba, Kannur,  
Kerala, 670701.  
Dr. Shamprasad Varija Raghu  
R amalingaswami Fellow/Associate Professor,  
Dept of Applied Zoology, Mangalore University.

**Vice-Chancellor Nominee:** Dr. Nagarathna K A  
Department of Zoology Mangalore University College,  
Mangaluru

**Representative from Industry / Corporate Sector/ Allied Area**

Conrad Charles I P ,  
Atlantis Aquaria, # 16-7-448, Muthu's Compound, Balmatta  
Mangaluru-575002

**Meritorious Alumnus:** Dr Sudeep Ghate, Post Doc fellow, NUCSER, Paneer ,Deralkatte.

## Scheme of credit based semester system for B.Sc.

### Optional subject: Zoology

#### I Semester

Paper	Instructions hours/ week		Duration of exam hours	Marks		Total Marks	Credits
	Theory	Practical		Exam	IA		
G 508 DC 1.1 ( Theory) Cytology, Genetics and Infectious Diseases	4	-	2	60	40	100	2
G 508. DC 1.1P (Practical) Cytology, Genetics and Infectious Diseases	-	4	4	40	10	50	1
<b>G 508 OE 1.1</b> <b>(Open Elective)</b> Economic Zoology	<b>3</b>	<b>-</b>	<b>2</b>	<b>40</b>	<b>10</b>	<b>50</b>	<b>1</b>

#### II Semester

Paper	Instructions hours/ week		Duration of exam hour	Marks		Total Marks	Credits
	Theory	Practical		Exam	IA		
G 508.DC 2.1 ( Theory) <b>Biochemistry and Physiology</b>	4	-	2	60	40	100	2
G 508.DC2.1 P (Practical) <b>Biochemistry and Physiology</b>	-	4	4	40	10	50	1
<b>G 508 OE 2.1E</b> <b>(Open Elective)</b> <b>Parasitology</b>	<b>3</b>	<b>-</b>	<b>2</b>	<b>40</b>	<b>10</b>	<b>50</b>	<b>1</b>

**Programme Outcomes (PO):**

By the end of the program, it is expected that the students will be benefited by the following:

PO 1	The Programme offers both classical as well as modern concepts of Zoology in higher education.
PO 2	It enables the students to study animal diversity in both local and global environments
PO 3	To make the study of animals more interesting and relevant to human studies more emphasis is given to branches like behavioural biology, evolutionary biology and economic zoology.
PO 4	More of upcoming areas in cell biology, genetics, molecular biology, biochemistry, genetic engineering and bioinformatics have been also included.
PO 5	The lab courses provide the students necessary skills required for their employability. Equal importance is given to practical learning and presentation skills of students.
PO 6	-Skill enhancement courses in classical and applied branches of Zoology enhance enterprising skills of students

**Programme Specific Outcomes (PSO):**

PSO 1	To recognize the relationships between structure and function at different levels of biological organization (e.g., molecules, cells, organs, organisms, populations, and species) for the major groups of animals.
PSO 2	Enable to understand how organisms function at the level of the gene, genome, cell, tissue, organ and organ-system. Drawing upon this knowledge, they are able to give specific examples of the physiological adaptations, development, reproduction and behaviour of different forms of life.
PSO 3	To understand the applied biological sciences or economic Zoology such as sericulture, apiculture, aquaculture, Industrial microbiology, rDNA technology and medicine for their career opportunities.

**Proposed Course content under New Education Policy Year 2021-22 for I Semester BSc  
Zoology**

**Course Title/Code: Cytology, Genetics and Infectious Diseases**

**Semester I- Zoology Core Course I Content:**

**Course Outcomes (COs):**

1. The structure and function of the cell organelles.
2. The chromatin structure and its location.
3. The basic principle of life, how a cell divides leading to the growth of an Organism and also reproduces to form a new organism.
5. How a cell communicates with its neighbouring cells.
6. The principles of inheritance, Mendel 's laws and the deviations.
7. How environment plays an important role by interacting with genetic factors.
8. Detect chromosomal aberrations in humans and study of pedigree analysis

<b>Content</b>	<b>Hours</b>
<b>Unit I</b>	<b>14</b>
<b>Chapter 1. Structure and Function of Cell Organelles I in Animal cell</b>	
<ul style="list-style-type: none"><li>● Cell and its components: Basic types of cells- prokaryotic and eukaryotic, nature and comparison, Cell theory.</li><li>● Plasma membrane: chemical structure (fluid mosaic model) and function</li><li>● Endomembrane system: protein targeting and sorting, transport, endocytosis and exocytosis</li></ul>	
<b>Chapter 2. Structure and Function of Cell Organelles II in Animal Cell</b>	
<ul style="list-style-type: none"><li>● Cytoskeleton: microtubules, microfilaments, intermediate filaments</li><li>● Mitochondria: Structure, oxidative phosphorylation; electron transport system</li><li>● Peroxisome and Ribosome: structure and function</li></ul>	
<b>Unit II</b>	<b>14</b>

### **Chapter 3. Nucleus and Chromatin Structure**

- Structure and function of nucleus in eukaryotes
- Chromatin - euchromatin and heterochromatin, nucleosomes, unit fiber, solenoid fiber, and higher order of organization, condensation and coiling. Chromosome - the structure of a typical metaphase chromosome; giant chromosomes- polytene chromosomes, lamp brush chromosomes; endomitosis.
- Structure of DNA & RNA – Forms of DNA, Types of RNA. Watson and Crick model of DNA

### **Chapter 4. Cell cycle, Cell Division and Cell Signaling**

- Cell division: mitosis and meiosis
- Introduction to Cell cycle and its regulation, apoptosis
- Signal transduction: intracellular signaling and cell surface receptors, via G-protein linked receptors
- Cell-cell interaction: cell adhesion molecules, cellular junctions

## **Unit III**

**14**

### **Chapter 5. Mendelism and Sex Determination**

- Basic principles of heredity: Mendel's laws- monohybrid cross and hybrid cross
- Complete and Incomplete Dominance
- Penetrance and expressivity
- Genetic Sex-Determining Systems, Environmental Sex Determination, Sex Determination and mechanism in *Drosophila melanogaster*.
- Sex-linked characteristics in humans and dosage compensation

### **Chapter 6. Extensions of Mendelism, Genes and Environment**

- Extensions of Mendelism: Multiple Alleles, Gene Interaction.
- The Interaction Between Sex and Heredity: Sex-Influenced and Sex-Limited Characteristics
- Cytoplasmic Inheritance, Genetic Maternal Effects.
- Interaction between Genes and Environment: Environmental Effects on Gene Expression, Inheritance of Continuous Characteristics.



**Chapter 7. Human Chromosomes and Patterns of Inheritance**

- Patterns of inheritance: autosomal dominance, autosomal recessive, X-linked recessive, X-linked dominant.
- Chromosomal anomalies: Structural and numerical aberrations with examples.
- Human karyotyping and Pedigree analysis.

**Chapter 8. Infectious Diseases**

- Introduction to pathogenic organisms: viruses, bacteria, fungi, protozoa and worms.
- Structure, life cycle, pathogenicity, including diseases, causes, symptoms and control of common parasites: *Trypanosoma*, *Giardia* and *Wuchereria*.

**Suggested Readings:**

1. Lodish et al: Molecular Cell Biology: Freeman & Co, USA (2004).
2. Alberts et al: Molecular Biology of the Cell: Garland (2002).
3. Cooper: Cell: A Molecular Approach: ASM Press (2000).
4. Karp: Cell and Molecular Biology: Wiley (2002). Pierce B. Genetics. Freeman (2004).
5. Lewin B. Genes VIII. Pearson (2004).
6. Watson et al. Molecular Biology of the Gene. Pearson (2004).
7. Thomas J. Kindt, Richard A. Goldsby, Barbara A. Osborne, Janis Kuby- Kuby Immunology. W H Freeman (2007).
8. Delves Peter J., Martin Seamus J., Burton Dennis R., Roitt Ivan M. Roitt's Essential Immunology, 13<sup>th</sup> Edition. Wiley Blackwell (2017).
9. Principles of Genetics by B. D. Singh
10. Cell-Biology by C. B. Pawar, Kalyani Publications
11. Economic Zoology by Shukla and Upadhyaya



## Zoology Core Lab Course Content

### Course Title: Cell Biology & Cytogenetics Lab

#### Lab Course Content

#### List of labs to be conducted

56 hrs.

1. Understanding of simple and compound microscopes.
2. To study different cell types such as buccal epithelial cells, neurons, striated muscle cells using 3. Methylene blue/any suitable stain (virtual/ slaughtered tissue).
3. Micrometry: Measurement of cell dimension using micrometry.
4. To study the different stages of Mitosis in root tip of *Allium cepa*.
5. To study the different stages of Meiosis in grasshopper testis (virtual).
6. To check the permeability of cells using salt solution of different concentrations.
7. Study of parasites in humans (e.g. Protozoans, Helminthes in compliance with examples being studied in theory) permanent microslides.
8. To learn the procedures of preparation of temporary and permanent stained slides, with available mounting material.
9. Study of mutant phenotypes of *Drosophila* sp. (from Cultures or Photographs).
10. Preparation of temporary stained mount to show the presence of Barr body in human female blood cells/ cheek cells.
11. Preparation of polytene chromosomes (Chironomus larva or *Drosophila* larva).
12. Preparation of human karyotype and study the chromosomal structural and numerical aberrations from the pictures provided. (Virtual/optional).
13. To prepare family pedigrees.
14. <https://www.vlab.co.in>
15. <https://zoologysan.blogspot.com>
16. [www.vlab.iitb.ac.in/vlab](http://www.vlab.iitb.ac.in/vlab)
17. [www.onlinelabs.in](http://www.onlinelabs.in)
18. [www.powershow.com](http://www.powershow.com)
19. <https://vlab.amrita.edu> <https://sites.dartmouth.edu/>

#### Suggested Readings:

1. Lodish et al: Molecular Cell Biology: Freeman & Co, USA(2004).
2. Alberts et al: Molecular Biology of the Cell: Garland(2002).
3. Cooper: Cell: A Molecular Approach: ASM Press(2000).
4. Karp: Cell and Molecular Biology: Wiley (2002). Pierce B. Genetics. Freeman(2004).
5. Thomas J. Kindt, Richard A. Goldsby, Barbara A. Osborne, Janis Kuby-Kuby Immunology. W H Freeman(2007).
6. Kesar, Saroj and Vasishta N.2007 Experimental Physiology: Comprehensive

Manual. Heritage Publishers, New Delhi.

## Open Elective Course Content

### Course Title: Economic Zoology

#### Course Outcomes (COs):

At the end of the course the student will be able to:

1. Gain knowledge about silkworms rearing and their products.
2. Gain knowledge in Bee keeping equipment and apiary management.
3. Acquaint knowledge on dairy animal management, the breeds and diseases of cattle and learn the testing of egg and milk quality.
4. Acquaint knowledge about the culture techniques of fish and poultry.
5. Acquaint the knowledge about basic procedure and methodology of vermiculture.
6. Learn various concepts of lac cultivation.
7. Students can start their own business i.e. self-employments.
8. Get employment in different applied sectors

#### Content

Hrs

#### Unit I

14

#### Chapter 1. Sericulture:

- History and present status of sericulture in India
- Mulberry and non-mulberry species in Karnataka and India
- Mulberry cultivation
- Morphology and life cycle of *Bombyx mori*
- Silkworm rearing techniques: Processing of cocoon, reeling
- Silkworm diseases and pest control

#### Chapter 2. Apiculture:

- Introduction and present status of apiculture
- Species of honey bees in India, life cycle of *Apis indica*
- Colony organization, division of labor and communication
- Bee keeping as an agro based industry; methods and equipment's: indigenous methods, extraction appliances, extraction of honey from the comb and processing

- Bee pasturage, honey and bees wax and their uses
- Pests and diseases of bees and their management

## Unit II

14

### Chapter 3. Live Stock Management:

- **Dairy:** Introduction to common dairy animals and techniques of dairy management
- Types, loose housing system and conventional barn system; advantages and limitations of dairy farming
- Establishment of dairy farm and choosing suitable dairy animals-cattle
- Cattle feeds, milk and milk products
- Cattle diseases
- **Poultry:** Types of breeds and their rearing methods
- Feed formulations for chicks
- Nutritive value of egg and meat
- Disease of poultry and control measures

### Chapter 4. Aquaculture:

- Aquaculture in India: An overview and present status and scope of aquaculture
- Types of aquaculture: Pond culture: Construction, maintenance and management; carp culture, shrimp culture, shellfish culture, composite fish culture and pearl culture

## Unit - 3

14

### Chapter 5. Fish culture:

- Common fishes used for culture.
- Fishing crafts and gears.
- Ornamental fish culture: Fresh water ornamental fishes- biology, breeding techniques
- Construction and maintenance of aquarium: Construction of home aquarium, materials used, setting up of freshwater aquaria, aquarium plants, ornamental objects, cleaning the aquarium, maintenance of water quality. control of snail and algal growth.
- Modern techniques of fish seed production

### **Chapter 6. Prawn culture:**

- Culture of fresh and marine water prawns.
- Preparation of farm.
- Preservation and processing of prawn, export of prawn.

### **Chapter 7. Vermiculture:**

- Scope of vermiculture.
- Types of earthworms.
- Habit categories - epigeic, endogeic and anecic; indigenous and exotic species.
- Methodology of vermicomposting: containers for culturing, raw materials required, preparation of bed, environmental pre-requisites, feeding, harvesting and storage of vermicompost.
- Advantages of vermicomposting.
- Diseases and pests of earthworms.

### **Chapter 8. Lac Culture:**

- History of lac and its organization, lac production in India.
- Life cycle, host plants and strains of lac insect.
- Lac cultivation: Local practice, improved practice, propagation of lac insect, inoculation period, harvesting of lac.
- Lac composition, processing, products, uses and their pests.

### **Text Books**

#### **Suggested Readings:**

1. Eikichi, H. (1999). Silkworm Breeding (Translated from Japanese). Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
2. Ganga, G. (2003). Comprehensive Sericulture Vol-II: Silkworm Rearing and Silk Reeling.
3. Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
4. Mahadevappa, D., Halliyal, V.G., Shankar, D.G. and Bhandiwad, R., (2000). Mulberry Silk
5. Reeling Technology Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.
6. Roger, M (1990). The ABC and Xyz of Bee Culture: An Encyclopedia of Beekeeping, Kindle Edition.
7. Shukla and Upadhyaya (2002). Economic Zoology, Rastogi Publishers

8. YadavManju (2003). Economic Zoology, Discovery Publishing House.
9. JabdePradip V (2005). Textbook of applied Zoology, Discovery Publishing House, New Delhi.
10. Cherian & Ramachandran Bee keeping in-South Indian Govt. Press, Madras.
11. Sathe, T.V. Vermiculture and Organic farming.
12. Bard. J (1986). Handbook of Tropical Aquaculture.
13. Santhanam, R. A. Manual of Aquaculture.
14. Zuka. R.1 and Hamiyn (1971). Aquarium fishes and plants
15. Jabde, P.V. (2005) Text Book of Applied Zoology: Vermiculture, Apiculture, Sericulture, Lac culture.
16. Animal Disease- Bairagi K. N. Anmol Publications Pvt.Ltd 2014
17. Economics Of Aquaculture - Singh(R.K.P) - Danika Publishing Company 2003
18. Applied and Economic Zoology (SWAYAM) web  
[https://swayam.gov.in/nd2\\_cec20\\_ge23/preview](https://swayam.gov.in/nd2_cec20_ge23/preview)

## For II Semester BSc Zoology Core Course Content

### Course Title: Biochemistry and Physiology

#### Course outcomes(CO):

The student at the completion of the course will learn:

1. To develop a deep understanding of structure of biomolecules like proteins, lipids and carbohydrates.
2. How simple molecules together form complex macromolecules.
3. To understand the thermodynamics of enzyme catalyzed reactions.
4. Mechanisms of energy production at cellular and molecular levels.
5. To understand various functional components of an organism.
6. To explore the complex network of these functional components.
7. To comprehend the regulatory mechanisms for maintenance of function in the body

#### Content

Hrs

#### Unit I

14

#### Chapter 1. Structure and Function of Biomolecules:

- Structure and Biological importance of carbohydrates (Monosaccharides, Disaccharides, Polysaccharides and Glycoconjugates).
- Lipids (saturated and unsaturated Fatty acids, Tri-acylglycerols, Phospho lipids, Glycolipids and Steroids)
- Structure, Classification and General Properties of  $\alpha$ -amino acids; Essential and non-essential amino acids, Levels of organization in proteins; Simple and conjugate proteins.

#### Chapter 2. Enzyme Action and Regulation

- Nomenclature and classification of enzymes; Cofactors; Specificity of enzyme action.
- Isozymes; Mechanism of enzyme action
- Enzyme kinetics; Factors affecting rate of enzyme-catalyzed reactions; Equation of Michaelis-Menton, Concept of  $K_m$  and  $V_{max}$ , Enzyme inhibition
- Allosteric enzymes and their kinetics; Regulation of enzyme action.

#### Unit 2

14



### **Chapter 3. Metabolism of Carbohydrates and Lipids**

- Metabolism of Carbohydrates: glycolysis, citric acid cycle, gluconeogenesis, phosphate pentose pathway Glycogenolysis and Glycogenesis Lipids- Biosynthesis of palmitic acid; Ketogenesis,
- $\beta$ -oxidation and omega -oxidation of saturated fatty acids with even and odd number of carbon atoms

### **Chapter 4. Metabolism of Proteins and Nucleotides**

- Catabolism of amino acids: Transamination, Deamination, Urea cycle, Nucleotides and vitamins
- Peptide linkages

## **Unit 3**

**14**

### **Chapter 5. Digestion and Respiration in humans**

- Structural organization and functions of gastrointestinal tract and associated glands.
- Mechanical and chemical digestion of food; Absorptions of carbohydrates, lipids, proteins, water, minerals and vitamins; Metabolic disorders - obesity, Kwashiorkor, Marasmus.
- Physiology of trachea and Lung.
- Mechanism of respiration, Pulmonary ventilation; Respiratory volumes and capacities; Transport of oxygen and carbon dioxide in blood, Respiratory pigments, Dissociation curves and the factors influencing it;
- Control of respiration. Respiratory disorders- asthma, pneumonia, occupation related lung diseases

### **Chapter 6. Circulation and Excretion in humans**

- Components of blood and their functions; hemopoiesis
- Blood clotting: Blood clotting system, Blood groups: Rh-factor, ABO and MN
- Structure of mammalian heart
- Cardiac cycle; Cardiac output and its regulation, Electrocardiogram,

Bloodpressure and its regulation. Circulatory disorders-Anaemia, atherosclerosis, myocardial infarction.

- Kidney and its functional unit; Mechanism of urine formation. Excretory disorders- Renal calculi, uremia, gout, nephritis, renal failure-acute and chronic.

## Unit IV

14

### Chapter 7. Nervous System and Endocrinology in humans

- Structure of neuron, resting membrane potential (RMP)
- n of action potential and its propagation across the myelinated and unmyelinated nerve fibers. Types of synapses. Neuro disorders- Parkinson's and Alzheimer's diseases.
- Endocrine glands - pineal, pituitary, thyroid, parathyroid, pancreas and adrenal; hormones secreted by them.
- identification of hormones; Mechanism of Hormone action. Hypo and hypersecretion of hormones and its effects

### Chapter 8. Muscular System in humans

- Histology of different types of muscle; Ultra structure of skeletal muscle; Molecular and chemical basis of muscle contraction; Characteristics of muscle twitch; Motor unit, summation and tetanus

### Suggested Readings:

1. Nelson & Cox: Leininger's Principles of Biochemistry: McMillan (2000)
2. Zubay et al: Principles of Biochemistry: WCB (1995)
3. Voet&Voet: Biochemistry Vols I & 2: Wiley (2004)
4. Murray et al: Harper's Illustrated Biochemistry: McGraw Hill (2003) Elliott and Elliott: Biochemistry and Molecular Biology: Oxford University Press
5. Guyton, A.C. & Hall, J.E. Textbook of Medical Physiology, XI Edition, Hecourt Asia PTE Ltd. /W.B.Saunders Company. (2006).
6. Tortora, G.J. & Grabowski, S. Principles of Anatomy & Physiology. XI Edition John

Wiley & sons (2006).

7. Christopher D. Moyes, Patricia M. Schulte. Principles of Animal Physiology. 3rd Edition, Pearson Education (2016).
8. Hill, Richard W., et al. Animal physiology. Vol. 2. Sunderland, MA: Sinauer Associates, (2004).
9. Chatterjee CC Human Physiology Volume 1 & 2, 11th edition, CBS Publishers (2016)

## **Zoology Semester II Core Course Lab Content**

Course Title/Code: **Biochemistry and Physiology**

### **Course Content**

<b>List of labs to be conducted</b>	<b>Hours</b>
1. Preparation of models of nitrogenous bases- nucleosides and nucleotides.	20
2. Preparation of models of amino acids and dipeptides.	
3. Preparation of models of DNA and RNA.	
4. Qualitative analysis of Carbohydrates, Proteins and Lipids.	15
5. Qualitative analysis of Nitrogenous wastes – Ammonia, Urea and Uric acid.	
6. Separation of amino acids or proteins by paper chromatography.	15
7. Determination of the activity of enzyme (Urease)-Effect of [S] and determination of Km and Vmax.	
8. Determination of the activity of enzyme (Urease) - Effect of temperature and time.	
9. Action of salivary amylase under optimum conditions.	
10. Quantitative estimation of Oxygen consumption by fresh water Crab.	
11. Quantitative estimation of salt gain and salt loss by fresh water.	
12. Estimation of Hemoglobin in human blood using Sahli's haemoglobinometer.	
13. Counting of RBC in blood using Hemocytometer.	
14. Counting of WBC in blood using Hemocytometer.	

15. Differential staining of human blood corpuscles using Leishman stain.

16. Recording of blood glucose level by using glucometer.

**Virtual Labs (Suggestive sites)**

06

<https://www.vlab.co.in>

<https://zoologysan.blogspot.com>

[www.vlab.iitb.ac.in/vlab](http://www.vlab.iitb.ac.in/vlab)

[www.onlinelabs.inwww.powershow.com](http://www.onlinelabs.inwww.powershow.com)

<https://vlab.amrita.edu>

<https://sites.dartmouth.edu>

## **Text Books**

1. Nelson & Cox: Leininger's Principles of Biochemistry: McMillan (2000)
2. Zubay et al: Principles of Biochemistry: WCB (1995)
3. Voet&Voet: Biochemistry Vols I & 2: Wiley (2004)
4. Murray et al: Harper's Illustrated Biochemistry: McGraw Hill (2003) Elliott and Elliott: Biochemistry and Molecular Biology: Oxford University Press
5. Guyton, A.C. & Hall, J.E. Textbook of Medical Physiology, XI Edition, Hecourt Asia PTE Ltd. /W.B.Saunders Company. (2006).
6. Tortora, G.J. & Grabowski, S. Principles of Anatomy & Physiology. XI Edition John Wiley & sons (2006).
7. Christopher D. Moyes, Patricia M. Schulte. Principles of Animal Physiology. 3rd Edition, Pearson Education (2016).
8. Hill, Richard W., et al. Animal physiology. Vol. 2. Sunderland, MA: Sinauer Associates, (2004).
9. Chatterjee CC Human Physiology Volume I & 2, 11th edition, CBS Publishers (2016).

## **Web References:**

- Mammalian Physiology- [www.biopac.com](http://www.biopac.com)

**Pedagogy: Lectures, Presentations, videos, Virtual Labs, Assignments, Tests, Individual or group Field oriented Project Report on or visit to a research institute.**

## **TOPICS RECOMMENDED FOR SEMINAR/PROJECT REPORT**

1. Biochemical pathways, their evolutionary background and regulation.
2. Blood groups and their importance.
3. Vital enzymes for human body.
4. Essential and nonessential amino acids.
5. Important body lipids.
6. Significance of animal proteins.
7. Role of carbohydrates in animal body.
8. Nature of proteins and nurture of animal body.
9. Role of lipids in structural and functional organization of body.

## Open Elective Course Content

Semester: **II Zoology**

Course Title: **Parasitology**

Course Outcomes (COs):

At the end of the course the students will be able to:

1. Know the stages of the life cycles of the parasites and infective stages.
2. Develop ecological model to know population dynamics of parasite, establishment of parasite population in host body, adaptive radiations and methods adopted by parasite to combat with the host immune system.
3. Develop skills and realize significance of diagnosis of parasitic infection and treatment.
4. Understand about diseases caused by Protozoa, Helminthes, Nematodes and Arthropods at molecular level.
5. Develop their future career in medical sciences and related administrative services.

Content	42Hrs
<b>Unit -1</b>	
<b>Chapter 1. General Concepts</b>	<b>14</b>
<ul style="list-style-type: none"><li>● Introduction, Parasites, parasitoids, host, zoonosis</li><li>● Origin and evolution of parasites</li><li>● Basic concept of Parasitism, symbiosis, phoresis, commensalisms and mutualism</li><li>● Host-parasite interactions and adaptations</li><li>● Life cycle of human parasites</li><li>● Occurance, mode of infection and prophylaxis</li></ul>	
<b>Chapter 2. Parasitic Platyhelminthes</b>	
<ul style="list-style-type: none"><li>● Study of morphology, life cycle, pathogenicity, prophylaxis and control measures of</li><li>● <i>Fasciolopsis buski</i></li><li>● <i>Schistosoma haematobium</i></li><li>● <i>Taenia solium</i></li><li>● <i>Hymenolepis nana</i></li></ul>	
<b>Chapter 3. Parasitic Protists</b>	

- Study of morphology, life cycle, pathogenicity, prophylaxis and control *measures* of
- *Entamoeba histolytica*
- *Giardia intestinalis*
- *Trypanosoma gambiense*
- *Plasmodium vivax*

## Unit – 2

14

### Chapter 4. Parasitic Nematodes

- Study of morphology, life cycle, pathogenicity, prophylaxis and control measures of
  - *Ascaris lumbricoides*
  - *Ancylostoma duodenale*
  - *Wuchereria bancrofti*
  - *Trichinella spiralis*
- Nematode plant interaction; Gall formation

### Chapter 5. Parasitic Arthropods

- Biology, importance and control of
  - Ticks (Soft tick *Ornithodoros*, Hard tick *Ixodes*)
  - Mites (*Sarcoptes*)
  - Lice (*Pediculus*)
  - Flea (*Xenopsylla*) Bug (*Cimex*)
- Parasitoid  
(Beetles)

### Chapter 6. Parasitic Vertebrates

- Cookicutter Shark
- Hood Mocking bird and

Vampire bat and their parasitic behavior and effect on host

## Unit – 3

14

## **Chapter 7. Molecular diagnosis & clinical parasitology**

- General concept of molecular diagnosis for parasitic infection
- Advantages and disadvantages of molecular diagnosis
- Fundamental techniques used in molecular diagnosis of endoparasites
- Immunoassay or serological techniques for laboratory diagnosis of endoparasites on the basis of marker molecules like *G. intestinalis*, *B. coli*, *E. histolytica*, *L. donovani*, Malarial parasite using
  - o ELISA, RIA
  - o Counter Current Immunoelectrophoresis (CCI)
  - o Complement Fixation Test (CFT) PCR, DNA, RNA probe

### **Suggested Readings:**

1. Arora, D. R and Arora, B. (2001) Medical Parasitology. II Edition. CBS Publications and Distributors.
2. E.R. Noble and G.A. Noble (1982) Parasitology: The biology of animal parasites. V Edition, Lea &Febiger.
3. Ahmed, N., Dawson, M., Smith, C. and Wood, Ed. (2007) Biology of Disease. Taylor and Francis Group.
4. Parija, S. C. Textbook of medical parasitology, protozoology & helminthology (Text and colour Atlas), II Edition, All India Publishers & Distributors, Medical Books Publishers, Chennai, Delhi.
5. Meyer, Olsen & Schmidt's Essentials of Parasitology, Murray, D. Dailey, W.C. Brown Publishers.
6. K. D. Chatterjee (2009). Parasitology: Protozoology and Helminthology. XIII Edition, CBS Publishers & Distributors (P) Ltd.
7. Gunn, A. and Pitt, S.J. (2012). Parasitology: an Integrated Approach. Wiley Blackwell.
8. Noble, E. R. and G.A.Noble (1982) Parasitology: The biology of animal parasites. V th Edition, Lea &Febiger.
9. Paniker, C.K.J., Ghosh, S. [Ed} (2013). Paniker's Text Book of Medical Parasitology. Jaypee, New Delhi.
10. Parija, S.C. Textbook of medical parasitology, protozoology & helminthology (Text and color Atlas), II Edition, All India Publishers & Distributors, Medical Books Publishers, Chennai, Delhi.
11. Roberts, L.S and Janovy, J. (2009). Smith & Robert's Foundation of Parasitology. 8th. Edn. McGraw Hill.
12. Bogitsh, B. J. and Cheng, T. C. (2000). Human Parasitology. 2nd Ed. Academic Press, New York.



13. Chandler, A. C. and Read. C. P. (1961). Introduction to Parasitology, 10th ed. John Wiley and Sons Inc.
14. Cheng, T. C. (1986). General Parasitology. 2nd ed. Academic Press, Inc. Orlando. U.S.A.
15. Schmidt, G. D. and Roberts, L. S. (2001). Foundation of Parasitology. 3rd ed. McGraw Hill Publishers.
16. Schmidt, G. D. (1989). Essentials of Parasitology. Wm. C. Brown Publishers (Indian print1990, Universal Book Stall).
17. John Hyde (1996) Molecular Parasitology Open University Press.
18. J Joseph Marr and Miklos Muller (1995) Biochemistry and Molecular Biology of Parasites 2 nd Edn Academic Press.

**Question Paper Pattern**

**Time : 2 hours**

**Max. Marks :60**

**Note:**

- 1. Answer any ten questions from Part -A -Assorted questions from all four units**
- 2. Answer any EIGHT questions from Part- B- Assorted questions from all four units**
- 3. Answer any four questions from Part- C -Assorted questions from all four units**

**Part-A**

**I. Answer any TEN OUT OF TWELVE questions of the following 2x10=20**

- a.
- b.
- c.
- d.
- e.
- f.
- g.
- h.
- i.
- j.
- k.
- l.

**Part B**

**II. Answer any FOUR OUT OF SIX questions - Assorted questions from all four units  
(5x4=20 )**

- a.
- b.
- c.
- d.
- e.
- f.

**Part- C**

**III. Answer any TWO OUT OF FOUR questions -Assorted questions from all four units  
10x 2=20 a.**

- b.
- c.
- d.

**\*\*\*\*\***