SEMESTER -III
DEPARTMENT OF ZOOLOGY
Category I

(B.Sc. Honours in Zoology in three years)

DISCIPLINE SPECIFIC CORE COURSE -7 –:
Diversity of Chordates
Zoo-DSC-7

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Diversity of Chordates Zoo-DSC-7	04	02	Nil	02	Passed Class XII	NIL

Learning Objectives

The learning objectives of this course are as follows:

- The course aims to impart in-depth knowledge about the diverse life forms from the taxonomic positions of Protochordates and Agnatha to Mammalia.
- It will help the students to identify the body plan types of complex chordates and their systematic organization based on evolutionary relationships, structural and functional affinities.
- The course will help the students to understand the characteristic morphological, adaptive and anatomical features of diverse animals.
- The course will help students to understand the economic and ecological significance of various animals in human life.
- The course will create interest among them to explore and appreciate the animal diversity in nature.

Learning Outcomes

By studying this course, students will be able to

- Correlate the importance of systematics, taxonomy, and structural organization of chordates.
- Recognize the diversity of chordates living in varied ecological habitats.
- critically analyse the organization, complexity and characteristic features of chordates.
- comprehend the economic importance of chordates, their interaction with the

environment and their role in the ecosystem.

- enhance collaborative learning and communication skills through practical sessions, teamwork, group discussions, assignments, and projects.

SYLLABUS OF DSC-7

UNIT-I: Introduction to Chordates **2 hrs**

General characteristics and outline classification.

UNIT-2: Protochordata **3hrs**

General characteristics of Hemichordata, Urochordata and Cephalochordata; Study of Tornaria and Ascidian larval forms in protochordates.

UNIT-3: Origin of Chordates **2 hrs**

Theories of Origin of chordates with detailed concept of Dipleurula and the Echinoderm theory.

UNIT-4: Agnatha **2 hrs**

General characteristics and classification of cyclostomes up to Class.

UNIT- 5: Pisces

3 hrs

General characteristics of Chondrichthyes and Osteichthyes; Classification up to order; Osmoregulation; Swimbladder in fishes

UNIT- 6: Amphibia

4 hrs

General characteristics and classification up to order; Origin of Tetrapods (Evolution of terrestrial ectotherms); Parental care in Amphibians.

UNIT-7: Reptilia

4 hrs

General characteristics and classification up to order; Affinities and evolutionary significance of *Sphenodon*; Poison apparatus and biting mechanism in snakes.

UNIT- 8: Aves

4 hrs

General characteristics and classification up to order; Flight adaptations; Migration in birds.

UNIT- 9: Mammalia **4 hrs**

General characteristics and classification up to order; Adaptive radiation with reference to locomotory appendages.

UNIT- 10: Zoogeography **2 hrs**

Zoogeographical realms, Platetectonics and Continental drift theory.

Practical **60 hrs**

(Laboratory periods: 15 classes of 4 hours each)

1. **Protochordata**: *Balanoglossus, Herdmania, Branchiostoma,* Colonial Urochordata, Sections of *Balanoglossus* through proboscis and branchio-genital regions, Sections of *Amphioxus* through pharyngeal, intestinal and caudal regions. Permanent slide of *Herdmania* spicules.
2. **Agnatha**: *Petromyzon, Myxine.*
3. **Pisces**: *Scoliodon, Sphyrna, Pristis, Torpedo, Chimaera, Mystus, Heteropneustes, Labeo, Exocoetus, Echeneis, Anguilla, Hippocampus, Tetrodon/Diodon, Anabas*, Flatfish. Permanent slides of Placoid and Cycloid Scales.
4. **Amphibia**: *Ichthyophis/Ureotyphlus, Necturus, Bufo, Hyla, Alytes, Salamandra.*
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. **Aves**: Study of six common birds from different orders. Types of beaks and claws.
7. **Mammalia**: *Sorex,* Bat (Insectivorous and Frugivorous), *Funambulus, Loris, Herpestes*, *Erinaceous.*
8. **Student Presentation**: Power point presentation on any two animals from two different classes.

**__Note__: Refer Young, J.Z. (2004) for the classification of Protochordates and Tetrapods, and Parker T.J. and Haswell W.A. (1972) for the classification of Agnatha and Pisces.*

Essential/recommended readings

1. Young, J.Z. (2004). **The Life of Vertebrates**. III Edition, Oxford University Press.

2. Parker T.J. and Haswell W.A. (1972).**Text book of Zoology Vertebrates**.VII Edition, Volume II.

Suggestive readings

1. Pough H. (2018). **Vertebrate Life**. X Edition, Pearson International.
2. Darlington P.J. (1966).**The Geographical Distribution of Animals**. R.E. Krieger Pub. Co.

NOTE: Examination scheme and mode shall be as prescribed by the Examination Branch, University of Delhi, from time to time.

DISCIPLINE SPECIFIC CORE COURSE -8 – :
Biochemistry: Metabolic Processes
Zoo-DSC-8

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Biochemistry: Metabolic Processes **Zoo-DSC-8**	**04**	**02**	**Nil**	**02**	Passed 12th Class	**NIL**

Learning Objectives

The learning objectives of this course are as follows:

- To provide fundamental and precise knowledge of the metabolic processes that play a crucial role in all processes of life and the development of diseases.
- To apprise the students of the various functions of the molecules like providing structural integrity to the tissue-engineered constructs.
- Through this course, the students would be able to understand myriads of health, potential treatments of diseases and solve several industrial problems
- The enzymatic study would enable them to understand the various metabolic pathways and physiological reactions.

Learning Outcomes

By studying this course, students will be able to

- Interpret the structure-functional relationships of carbohydrates, proteins, lipids and nucleic acids.
- Understand the clinical knowledge and importance of antioxidants.
- Understand the process of biological oxidation crucial to generation of energy for a living cell.
- Appreciate the action of various types of enzymes under variety of conditions.

Syllabus of DSC-8

UNIT- 1: Carbohydrate Metabolism **9 hrs**

Glycolysis, Citric acid cycle, Phosphate pentose pathway, Gluconeogenesis, Glycogenolysis and Glycogenesis.

UNIT- 2: Lipid Metabolism **7 hrs**

β-oxidation and omega-oxidation of saturated fatty acids with even number of carbon atoms; Biosynthesis of palmitic acid; Ketogenesis.

UNIT- 3: Protein Metabolism **4 hrs**

Catabolism of amino acids: Transamination, Deamination, Urea cycle.

UNIT- 4: Oxidative Phosphorylation **7 hrs**

Redox systems; review of mitochondrial respiratory chain: electron carriers, sites of ATP production, Oxidative phosphorylation; Chemiosmotic hypothesis, mitochondrial shuttle system.

UNIT- 5: Liver as a Major Metabolic Hub **3 hrs**

Inter-connection of glucose-6-phosphate, pyruvate and acetyl-CoA; fates of amino acids, fatty acids and glucose in liver cells; cascade of metabolic events in fasting and starvation.

Practical **60 hrs**

(Laboratory periods: 15 classes of 4 hours each)

1. Estimation of total protein in given solutions by Lowry's method.
2. Detection of SGOT and SGPT in serum/ tissue.
3. Estimation of GST and GSH in serum/ tissue.
4. To study the enzymatic activity of Lipase.
5. Study of biological oxidation (SDH) [goat liver].
6. To perform the Acid and Alkaline phosphatase assay from serum/ tissue.
7. Dry Lab: To trace the labelled 'C' atoms of Acetyl-CoA till they evolve as CO_2in the TCA cycle through models.

Essential/recommended readings

3. Nelson, D.L., Cox, M.M. (2017). Lehninger: Principles of Biochemistry (7th ed.). New York, WH: Freeman Company.
4. Murray, R.K., Bender, D.A., Botham, K.M., Kennelly, P.J., Rodwell, V.W. and Well, P.A. (2009). Harper's Illustrated Biochemistry. XXVIII Edition, International Edition, The McGraw- Hill Companies Inc.

Suggestive readings

1. Stryer, L., Berg, J., Tymoczko, J., Gatto, G. (2019). Biochemistry (9th ed.), NewYork,WH: Freeman.
2. Voet, D., Voet. J. G. (2013). Biochemistry (4th ed.). New Jersey, John Wiley & Sons Asia Pvt. Ltd.

DISCIPLINE SPECIFIC CORE COURSE– 9:
Human Physiology- Life Sustaining Systems
Zoo-DSC-9

CREDIT DISTRIBUTION, ELIGIBILITY AND PRE-REQUISITES OF THE COURSE

Course title & Code	Credits	Credit distribution of the course			Eligibility criteria	Pre-requisite of the course (if any)
		Lecture	Tutorial	Practical/ Practice		
Human Physiology- Life Sustaining Systems **Zoo-DSC-9**	**04**	**02**	**Nil**	**02**	Passed 12th Class	**NIL**

Learning Objectives

The learning objectives of this course are as follows:

- The course will provide a thorough understanding of the normal body function and helps to determine the cause of disease.
- It will enable the development of new and more effective treatments and guidelines for maintaining good health.
- It will equip the students with an ability to pursue career in medical and healthcare sector, pharmaceuticals and other related areas.
- It will help in understanding how these systems interact among themselves to maintain stability or homeostasis.

Learning Outcomes

By studying this course, students will be able to:

- Appreciate human physiology and have its enhanced knowledge.
- Recognize and identify principal and physiology of digestion.
- Understand the functions of important physiological systems including the digestive, circulatory, renal and respiratory system.
- Learn an integrative approach to understand how these separate systems interact to yield integrated physiological responses to maintain homeostasis in the body along with feedback mechanisms.
- Amalgamate ideas to make the connection between knowledge of physiology and real-world situations, including healthy lifestyle decisions and problems faced due to homeostatic imbalances.
- Perform, analyze and report on experiments and observations in physiology.
- Know the fundamentals and understand advanced concepts so as to develop a strong foundation that will help them to acquire skills and knowledge to pursue an advanced degree.

SYLLABUS OF DSC-9

UNIT- I Physiology of Digestion **7 hrs**

Overview of gastrointestinal tract and its associated glands; digestion; Absorption of carbohydrates, lipids, proteins; Hormonal control of secretion of enzymes in gastrointestinal tract.

UNIT- 2 Blood **4 hrs**

Structure and functions of haemoglobin; Blood clotting system, Fibrinolytic system.

UNIT- 3: Physiology of Heart **7 hrs**

Structure of heart; Coronary circulation; Origin and conduction of cardiac impulses; Cardiac cycle; Cardiac output and its regulation; nervous and chemical regulation of heart rate.

UNIT- 4: Physiology of Respiration **6 hrs**

Overview of respiratory system; Mechanism of respiration, Respiratory volumes and capacities; Transport of oxygen and carbon dioxide in blood; Dissociation curves and the factors influencing it; regulation of respiration.

UNIT- 5: Renal Physiology **6 hrs**

Structure of kidney and its functional unit; Mechanism of urine formation; Regulation of water balance; Regulation of acid-base balance.

Practical **60 hrs**

(Laboratory periods: 15 classes of 4 hours each)

1. To understand the components of blood, their functions and Hematopoiesis.
2. To study whole blood hemolysis with ammonium chloride solution.
3. Preparation of haemin and haemochromogen crystals.
4. Measurement and statistical analysis of variations observed in the student population in the class for the following parameters:
   a) White blood cells using haemocytometer
   b) Red blood cells using haemocytometer
   c) Hemoglobin
   d) Blood pressure
5. Examination of histological sections of mammalian oesophagus, stomach, duodenum, ileum, rectum, liver, trachea, lung, kidney.
6. Study of Electrocardiogram; Analysis of ECG records and calculation of heart rate.
7. Detection of abnormal constituents in urine and their physiological significance.

Essential/recommended readings

1. Tortora, G.J. and Derrickson, B.H. (2017). Principles of Anatomy and Physiology. XV Edition, John Wiley and Sons, Inc.
2. Ganong W.F. (2019). Review of Medical Physiology 26th ed. Mc Graw-Hill.
3. Widmaier E, Raff H and Strang K. (2013) Vander's Human Physiology: The Mechanism of Body Functions. XIII Edition, McGraw-Hill Education.
4. Guyton, A.C. and Hall, J.E. (2011) Textbook of Medical Physiology. XII Edition, Harcourt Asia Pvt. Ltd/ W.B. Saunders Company.
5. Eroschenko, Victor P. (2012) Di Fiore's Atlas of Histology with Functional Correlations; 12th edition, CBS Publishers and Distributors Pvt. Ltd.

Suggestive readings

1. Chatterjee, C.C. (2021) Human Physiology, 14th Edition, Volume 1 & Volume II, CBS Publishers and Distributors Pvt. Ltd.
2. Vander A, Sherman J, and Luciano D (2014). Vander's Human Physiology