

Semester 1

Multidisciplinary Course 1 (MDC-1)

Course Title	Credit	Credit Distribution	
		Theory	Practical
Diversity of Non-Chordata	3	2	1

Course outcomes: After completion of the course, students should be able to:

CO-1: Learn about the importance of systematics, taxonomy, and structural organization of non-chordates.

CO-2: Critically analyse the organization, complexity and characteristic features of non chordates.

CO-3: Recognize the life functions and the ecological roles of the animals belonging to different phyla.

MDC-1: Diversity of Non-Chordata (Theory: 2credits) 20 hrs		
Unit	Topics to be covered	No. of Lectures
1	1. Introduction to Non-chordates General characteristics and classification (up to order) of the following Phyla: Protozoa, Porifera, Cnidaria, Ctenophora, Platyhelminthes and Nematelminths, Annelida, Arthropoda, Mollusca, Echinodermata.	5
2	2 Structure and life history of:- (i) Protozoa - Paramecium (ii) Porifera - Sycon	4
3	3. Structure and life history of:- (iii) Cnidaria - Obelia (iv) Platyhelminthes - Fasciola (v) Aschelminthes - Ascaris	5
4	4. Study of coelomates: (vi) Annelida - Pharetima (vii) Arthropoda - Palaemon (viii) Mollusca - Pila (ix) Echinodermata - Asteries (x) Hemichordata - Balanoglossus	6
TOTAL		20

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Semester 2
Multidisciplinary Course 2 (MDC-2)

Course Title	Credit	Credit Distribution	
		Theory	Practical
Diversity of Chordates	3	2	1

Course Outcomes: After completion of the course, the students will be able to:

- CO-1:** To understand the General Characteristics and Classification of Hemichordata, Urochordata and Cephalochordata, the Larval forms of Protochordata and Retrogressive Metamorphosis in Urochordata
- CO-2:** To acquire knowledge about the General Characters and Classification of Agnatha, Pisces and Amphibia.
- CO-3:** To understand the General Characteristics and Classification of Reptilia, Aves and Mammals, Biting Mechanism in Snakes, Flight Adaptations in Birds and Migration in Birds.

MDC-2: Diversity of Chordates (Theory: 2credits) 20 hrs		
Unit	Topics to be covered	No. of Lectures
1	1.General characteristics and classification (upto Order): Cephalochordata, Urochordata, Pisces, Amphibia, Reptilia, Aves, Mammals, Cyclostomata.	5
2	2.Cephalochordata: Amphioxus. 3. Urochordata: Herdmania (including retrogressive metamorphosis).	4
3	4.Pisces: Scoliodon. 5. Reptilia: Biting and feeding mechanism in snakes.	5
4	6.Aves: Flight adaptations, Elementary idea of migration. 7. Mammals: Characters, distribution and affinities of Prototheria & Metatheria.	6
	TOTAL	20

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MDC-2: Diversity of Chordates (Practical) 10 hrs (1 credit)

Practical

1. Amphioxus: Section through pharyngeal, intestinal, and caudal regions.
2. Herdmania: Whole mount, Spicules
2. Cyclostomata: Petromyzon, Myxine
3. Fish: Scoliodon, Torpedo, Chimaera, Labeo, Exocoetus, Echinops, Hippocampus; Scales of fishes
4. Amphibia: Ichthyophis, Bufo, Hyla, Alytes, Salamandra, Axolotl larva
5. Reptilia: Chelone, Hemidactylus, Varanus, Vipera, Naja, Bungarus, Uromastix, Chamaeleon, Draco, Calotes, Heloderma; Key for Identification of poisonous and non-poisonous snakes
6. Aves: Types of beaks and claws, Study of pecten from fowl head and brain of fowl.
7. Mammalia: *Sorex*, Bat (Insectivorous and Frugivorous), *Funambulus*, *Loris*, *Herpestes*, *Erinaceus*, *Macropus*, *Echidna*

Suggested Books :

1. Young, J. Z. (2004). *The Life of Vertebrates*. III Edition. Oxford university press.
2. Pough H. *Vertebrate life*, VIII Edition, Pearson International.
3. Darlington P.J. *The Geographical Distribution of Animals*, R.E. Krieger Pub Co.
4. Hall B.K. and Hallgrimsson B. (2008). *Strickberger's Evolution*. IV Edition. Jones and Bartlett Publishers Inc.
5. Classification from Young, J. Z. (2004) to be followed.
6. S.S.Lal, Practical Zoology Vertebrates.

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MIC-3: Physiology (Practical: 1 Credit)		10 hrs
End Semester Examination		
Time – 3 hours		Full Marks-70
Sl. No.	Name of Practicals/Experiments	Marks
1	Enumeration of red blood cells and white blood cells using haemocytometer,	10
2	Determination of erythrocyte sedimentation rate.	10
3	Estimation of haemoglobin.	10
4	Examination of histological sections of mammalian oesophagus, stomach, duodenum, ileum, rectum, trachea, lung, Testis and Ovary.	20
5	Practical Records/Charts/Models.	10
6	Viva- voce.	10

Suggested Books:

- Tortora, G.J.& Grabowski, S (2006) Principles of Anatomy & Physiology, XI edition. John Wiley & Sons
- Vander A, Sherman J, and Luciano D (2014). Vander's Human Physiology: The mechanism of Body Function. XIII Edition, Mc Graw Hills.
- Guyton, A.C & Hall, J.E. (2006). Textbook of Medical Physiology, XI Edition. Hercourt Asia PTE Ltd/W.B. Saunders Company

Online Tools and Web Resources:

- e portals like SWAYAM
<http://nsdl.niscair.res.in>

Multidisciplinary Course 3 (MDC-3)

Course Title	Credit	Credit Distribution	
		Theory	Practical
Physiology	3	2	1

Course Outcomes:

Upon completion of the course, students will be able to:

- Know the principles of normal biological function in human body.
- Outline basic human physiology and correlate with histological structures.
- Comprehend and analyse problem-based questions on physiological aspects.

- Recognize and explain how all physiological systems work in unison to maintain homeostasis in the body; and use of feedback loops to control the same.
- Learn an integrative approach to understand the interactions of various organ systems resulting in the complex overall functioning of the body.

MDC-3: Physiology (Theory: 2 credits) 20 hrs		
Unit	Topics to be covered	No. of lectures
1	1.1. Structure and function of digestive system, 1.2. Digestion and absorption of food.	3
2	2.1. Structure of neuron and propagation of nerve impulse. 2.2. Structure of skeletal muscle and mechanism of muscle contraction.	4
3	3.1. Structure of respiratory organs, pulmonary ventilation. 3.2. Transport of gases in blood.	4
4	4.1. Structure of excretory organs. 4.2. Mechanism of urine formation.	2
5	5.1. Structure and function of heart. 5.2. Cardiac cycle.	2
6	6.1. Structure and function of endocrine glands. 6.2. Spermatogenesis and oogenesis.	5
	Total	20

MDC-3: Physiology (Practical: 1 Credit)		10 hrs
End Semester Examination		
Time – 3 hours		Full Marks- 70
Sl. No.	Name of Practicals/Experiments	Marks
1	Enumeration of red blood cells and white blood cells using haemocytometer,	10
2	Determination of erythrocyte sedimentation rate.	10
3	Estimation of haemoglobin.	10
4	Examination of histological sections of mammalian oesophagus, stomach, duodenum, ileum, rectum, trachea, lung, Testis and Ovary.	20
5	Practical Records/Charts/Models.	10
6	Viva- voce.	10

Suggested Books:

- Tortora, G.J. & Grabowski, S (2006) Principles of Anatomy & Physiology, XI edition.

John Wiley & Sons

- Vander A, Sherman J, and Luciano D (2014). Vander's Human Physiology: The mechanism of Body Function. XIII Edition, Mc Graw Hills.
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**Semester IV
Major Course 5 (MJC-5)**

Course Title	Credit	Credit Distribution	
		Theory	Practical
Cell Biology	5	3	2

Course Outcome: Upon completion of the course, students should to be able to:

CO-1: Understand fundamental principles of cell biology.

CO-2: Explain structure and functions of cell organelles involved in diverse cellular processes.

CO-3: Appreciate how cells grow, divide, survive, die and regulate these important processes.

CO-4: Comprehend the process of cell signaling and its role in cellular functions.

CO-5: Have an insight of how defects in functioning of cell organelles and regulation of cellular processes can develop into diseases.

CO-6: Learn the advances made in the field of cell biology and their applications.

MJC-5: Cell Biology (Theory: 3 Credits) 30 hrs		
Unit	Topics to be covered	No. of lectures
1	1. Overview of Virus, Prokaryotic and Eukaryotic cells.	2
2	2. Plasma Membrane: 2.1 Various models of plasma membrane. 2.2 Transport across membranes (passive and active transport).	6
3	3. Cytoplasmic organelles: 3.1 Endoplasmic Reticulum – Structure, Signal hypothesis. 3.2 Golgi apparatus – Structure, Protein sorting. 3.3 Lysosomes and Peroxisomes. 3.4 Mitochondria – Structure, Respiratory chain and oxidative phosphorylation.	10