

**Name of the Programme:** M.Sc. Zoology

**Course Code:** ZOO-501

**Title of the Course:** Anatomy of Non-Chordates

**Number of Credits:** 3

**Effective from AY:** 2023-24

<b>Pre-requisites for the Course:</b>	Basic knowledge on non-chordate anatomy, taxonomy and systematics is a prerequisite for this course.	
<b>Course Objectives:</b>	<ol style="list-style-type: none"> <li>1. To Provide knowledge about fundamental anatomical principles among non- chordates.</li> <li>2. To identify the adaptive changes in anatomical structures through the course of evolution.</li> <li>3. To explain the invertebrate anatomy from an evolutionary perspective</li> <li>4. To study the anatomical structures and their interactions in various environments.</li> </ol>	
<b>Content:</b>	<p><b>Module 1</b> Skeletal system types: Endoskeleton-like (Poriferans), Exoskeleton (Arthropods) and Hydrostatic skeleton (Cnidarians, Molluscs and Echinoderms).</p> <p>Annelid locomotory organs involved in simple propulsion, burrowing, peristaltic waves, sinusoidal and inchworm type of locomotion. Primitive and advanced flight muscles of insects. Diffused, simple ganglionic, cycloneurialian, heteroganglionic types of non-chordate nervous systems. Tetraneury plan of molluscan nervous system, streptoneury, eothyneury and centralization in molluscs.</p> <p><b>Module 2</b> Digestive system types: Channel-network systems, Coelenteronic, Saccular and Tubular systems. Radula of Molluscs and various types of mouthparts in Arthropods.</p> <p>Coelomoduct derived, gut derived and other excretory organs of non-chordates. Calciferous gland of earthworms.</p> <p>Reproductive system in arthropods with Gonad-Gonoduct-Gonopore (G-G-G) concept with addition of adjunctive organs</p> <p><b>Module 3</b></p>	<p>4 hours</p> <p>5 hours</p> <p>6 hours</p> <p>5 hours</p> <p>5 hours</p> <p>7 hours</p>

	Respiratory organs and specialized respiratory structures of Annelids, Molluscs and Arthropods.  Open and closed circulatory system concept of Invertebrates. Circulatory system in Annelids, Arthropods and Molluscs. Hearts of Oligochaetes and bivalves.	8 hours
<b>Pedagogy:</b>	Lectures/ tutorials/online teaching mode/self-study and discussions	
<b>References/ Readings:</b>	<ol style="list-style-type: none"> <li>1. L.H. Hymen, The invertebrates (all volumes), USA: McGraw Hill, 1951.</li> <li>2. R.D. Barnes, E.E. Ruppert, Invertebrate Zoology, Saunders College Publishing, 1994.</li> <li>3. E. J. W. Barrington, Invertebrate Structure and Function, Thomas Nelson and Sons, 1972.</li> <li>4. A.J. Marshall, and W.D. Williams, Textbook of Zoology (Vol. 1). CBS Publishers &amp; Distributors, 2004.</li> <li>5. R. D. Jurd, Animal Biology, BIOS Scientific Publishers, 2004.</li> <li>6. P. Cleveland, C. P. Hickman, L.S. Roberts, and A. Larson, Integrated Principles of Zoology, NY: McGraw-Hill, 2001.</li> <li>7. R. S. K. Barnes, P. Calow, P. J. W. Olive, D. W. Golding and J. I. Spicer, The Invertebrates: A Synthesis. Blackwell Science, 2001.</li> <li>8. A. Schmidt-Rhaesa, The Evolution of Organ Systems, Oxford and New York: Oxford University Press, 2007.</li> <li>9. B. B. Gangully, A. K. Shina, and S. Adhikary, Biology of Animals (Vol. 1), Kolkata: New Central Agency, 2011.</li> </ol>	
<b>Course Outcomes:</b>	<p>The learner will</p> <ol style="list-style-type: none"> <li>1. Articulate the basic concepts associated with each system of the body.</li> <li>2. Identify structures in the body systems which perform the functions according to the habits or habitats of the animals.</li> <li>3. Compare the anatomy of different taxa based on evolutionary patterns.</li> <li>4. Defend the role of evolution in anatomy of non-chordates.</li> </ol>	