



**University of Management & Technology**  
**School of Science**  
**Department of Life Sciences**

**ZL-312: Animal Form and Functions**

<b>Lecture Schedule</b>	Wednesday & Friday 2:00 pm-3:15pm , 05:00pm-06:15pm	<b>Semester</b>	Spring 2021										
<b>Pre-requisite</b>	F.Sc. /A-level	<b>Credit Hours</b>	4 (3+1)										
<b>Instructor(s)</b>	Ms Nabiha Naeem	<b>Contact Moodle link</b>	<a href="mailto:nabiha.naeem@umt.edu.pk">nabiha.naeem@umt.edu.pk</a>										
<b>Office</b>	3S-37	<b>Office Hours</b>	Displayed on office door & on Moodle										
<b>Objectives</b>	<p>The course aims to teach the students about:</p> <ul style="list-style-type: none"> <li>• Animals diversity adapted in different ways for their functions through modifications in body parts.</li> <li>• The diversity in integumentary, skeletal, muscular, nervous and sensory, endocrine, circulatory, respiratory, nutritive, excretory, osmoregulatory and reproductive systems according to strategies to survive in their specific conditions.</li> <li>• Organ systems, their specialization and coordination with each other and constantly changing internal and external environment, inside and outside the animal's body.</li> </ul>												
<b>Expected Outcomes</b>	<p>After completion of this course, students will learn:</p> <ul style="list-style-type: none"> <li>• Animal's diversity</li> <li>• Form and functions of animal's different body organ systems</li> <li>• Coordination between different organ systems</li> </ul>												
<b>Text book &amp; Reference book(s)</b>	<ol style="list-style-type: none"> <li>1. Pechenik, J. A. (2016). Biology of the invertebrates. 7<sup>th</sup> Ed. Singapore: McGraw-Hill Education</li> <li>2. Miller, S. A., &amp; Harley, J. P. (2016). Zoology. 10<sup>th</sup> Ed. New York, NY: McGraw-Hill.</li> <li>3. Campbell, N. A., Taylor, M. R., Simon, E. J., Dickey, J. L., Hogan, K., Reece, J. B., &amp; Campbell, N. A. (2018). Biology: Concepts &amp; connections. 9<sup>th</sup> Ed. New York Pearson.</li> </ol>												
<b>Grading Policy</b>	<table style="width: 100%; border: none;"> <tr> <td style="padding-right: 20px;">Assignments:</td> <td>10%</td> </tr> <tr> <td>Presentation:</td> <td>5%</td> </tr> <tr> <td>Quizzes:</td> <td>10%</td> </tr> <tr> <td>Midterm:</td> <td>30%</td> </tr> <tr> <td>Final:</td> <td>45%</td> </tr> </table>			Assignments:	10%	Presentation:	5%	Quizzes:	10%	Midterm:	30%	Final:	45%
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## Course Schedule

Week	Lecture #	TOPICS
1	1 2	<ul style="list-style-type: none"> <li>• Protection, Support, and Movement</li> <li>• Protection: the integumentary system of invertebrates and vertebrates;</li> </ul>
2	1 2	<ul style="list-style-type: none"> <li>• Movement and support: the skeletal system of invertebrates and vertebrates;</li> <li>• Movement: non-muscular movement; an introduction to animal muscles; the muscular system of invertebrates and vertebrates</li> </ul>
3	1 2	<ul style="list-style-type: none"> <li>• Communication I: Nerves</li> <li>• Neurons: structure and function.</li> </ul>
4	1 2	<ul style="list-style-type: none"> <li>• Communication II: Senses</li> <li>• Sensory reception: baroreceptors, chemoreceptors, georeceptors, hygrometers, phonoreceptors, photoreceptors, proprioceptors, tactile receptors, and thermoreceptors of invertebrates</li> </ul>
5	1 2	<ul style="list-style-type: none"> <li>• Lateral line system and electrical sensing, lateral-line system and mechanoreception, hearing and equilibrium in air and water, skin sensors of mechanical stimuli, sonar, smell, taste and vision in vertebrates.</li> </ul>
6	1 2	<ul style="list-style-type: none"> <li>• Communication III: The Endocrine System and Chemical Messengers</li> <li>• Chemical messengers: hormones chemistry; and their feedback systems; mechanisms of hormone action</li> </ul>
7	1 2	<ul style="list-style-type: none"> <li>• Hormones with principal function each of porifera, cnidarians, platyhelminthes, nemertean, nematodes, molluscs, annelids, arthropods, and echinoderms invertebrates;</li> <li>• An overview of the vertebrate endocrine system; endocrine systems of vertebrates, endocrine systems of birds and mammals</li> </ul>
8	1 2	<ul style="list-style-type: none"> <li>• Circulation, Immunity, and Gas Exchange</li> <li>• Internal transport and circulatory systems in invertebrates</li> <li>• Characteristics of invertebrate coelomic fluid, hemolymph, and blood cell transport systems in vertebrates; characteristics of vertebrate blood, blood cells and vessels; the hearts and circulatory systems of bony fishes, amphibians, reptiles, birds and mammals; the human heart: blood pressure and the lymphatic system; immunity: nonspecific defenses, the immune response</li> </ul>
9	1 2	<ul style="list-style-type: none"> <li>• Mid Term</li> </ul>
10	1 2	<ul style="list-style-type: none"> <li>• Nutrition and Digestion: Evolution of nutrition; the metabolic fates of nutrients in heterotrophs; digestion</li> <li>• Animal strategies for getting and using food, diversity in digestive structures of invertebrates.</li> <li>• The mammalian digestive system: gastrointestinal motility and its control</li> </ul>

		<ul style="list-style-type: none"> <li>• Oral cavity, pharynx and esophagus, stomach, small intestine: main site of digestion; large intestine; role of the pancreas in digestion; and role of the liver and gallbladder in digestion.</li> </ul>
11	1 2	<ul style="list-style-type: none"> <li>• Temperature and Body Fluid Regulation: The Impact of Temperature on Animal Life; Heat Gains and Losses; Some Solutions to Temperature Fluctuations; Temperature Regulation in Invertebrates, Fishes, Amphibians, Reptiles, Birds and Mammals; Heat Production in Birds and Mammals</li> </ul>
12	1 2	<ul style="list-style-type: none"> <li>• Control of Water and Solutes (Osmoregulation and Excretion); Invertebrate and Vertebrate</li> <li>• Excretory Systems; How Vertebrates Achieve Osmoregulation; Vertebrate Kidney Variations; Mechanism in Metanephric Kidney Functions. Reproduction and Development</li> </ul>
13	1 2	<ul style="list-style-type: none"> <li>• Reproduction and Development: Asexual reproduction in invertebrates; advantages and disadvantages of asexual reproduction;</li> <li>• Sexual reproduction in invertebrates; advantages and disadvantages of sexual reproduction; sexual reproduction in vertebrates; reproductive strategies; examples of reproduction among various vertebrate classes</li> </ul>
14	1 2	<ul style="list-style-type: none"> <li>• The human male reproductive system: spermatogenesis, transport and hormonal control, reproductive function;</li> <li>• The human female reproductive system: folliculogenesis, transport and hormonal control, reproductive function; hormonal regulation in gestation; prenatal development and birth: the placenta; milk production and lactation.</li> </ul>
15		<ul style="list-style-type: none"> <li>• Final term</li> </ul>