

INSTITUTE OF EDUCATION AND RESEARCH

University of the Punjab, Lahore

BS Science Education (1-8)

Course Outline



Programme	BS Science Education (1-8)	Course Code	SE-310	Credit Hours	3
Course Title	Zoology IV: Animal Form and Function				
Course Introduction					
<p>This course will provide information about animals' diversity adapted in different strategies for performance of their similar functions through modifications in body parts in past and present times. It will give understanding of diverse strategic structural adaptations in each of the functions of integumentary, skeletal, muscular, nervous and sensory, endocrine, circulatory, respiratory, nutrition, excretion, osmoregulation, reproduction and development systems for effective survival in their specific conditions. It will impart knowledge about the organ systems, their specialization and coordination with each other and constantly changing internal and external environment, inside and outside the animal's body and embrace the phenomena in basic structure of each system that determines its particular function.</p>					
Learning Outcomes					
<p>On the completion of the course, the students will:</p> <ol style="list-style-type: none">1. Acquire the concept that for the performance of a function for example exchange of respiratory gases the different forms are adapted in the environments e.g. gills in aquatic and lungs in terrestrial environment.2. Understand that diverse forms adapted to perform the same functions are because of the different past and present conditions.3. Solve of emergence of diversity of forms for the performance of similar function.4. Analyze the requirements of diverse forms for the performance of similar function in their past and present needs.5. Evaluate the adaptations in forms for its efficiency in managing the function in differing situations in the past and present times.6. Demonstrate that a form is successfully adapted to perform a function adequately and successfully.					
Course Content				Assignments/Readings	
Week 1	Unit-1 Protection, Support, and Movement 1.1. Protection: the integumentary system of invertebrates and vertebrates, 1.2. Movement and support: The skeletal system of invertebrates and vertebrates			{ Miller, S. A., & Harley, J. B. (2000). Zoology (4th, 5th, 6th, 10th ed) (International). Singapore: McGraw Hill. }	

<p>Week 2</p>	<p>Unit-1 Protection, Support, and Movement</p> <p>1.1 Protection: Integumentary systems 1.2 Movement and Support: Skeletal System 1.3 Movement: Non-muscular movement and muscular systems</p>	<p>{Miller, S. A., & Harley, J. B. (2000). Zoology (4th, 5th,6th, 10th ed) (International). Singapore: McGraw Hill. }</p>
<p>Week 3</p>	<p>Unit-2 Communication I: Nervous and Sensory systems</p> <p>2.1. Neurons: The basic functional unit of the nervous system 2.2. Neuron Communication 2.3. Invertebrate nervous systems 2.4. Vertebrate nervous system</p>	<p>{Miller, S. A., & Harley, J. B. (2000). Zoology (4th, 5th,6th, 10th ed) (International). Singapore: McGraw Hill. }</p>
<p>Week 4</p>	<p>Unit-2 Communication I: Nervous and Sensory systems</p> <p>1.5 Sensory perception 1.6 Invertebrate Sensory Receptors 1.7 Vertebrate sensory receptors</p>	<p>{Miller, S. A., & Harley, J. B. (2000). Zoology (4th, 5th,6th, 10th ed) (International). Singapore: McGraw Hill. }</p>
<p>Week 5</p>	<p>Unit-3 Communication II (The Endocrine System and Chemical Messengers)</p> <p>3.1 Chemical messenger 3.2 Hormones and their feedback mechanism 3.3 Mechanisms of hormone action 3.4 Some hormones of invertebrates 3.5 Some hormones are not produced by endocrine glands.</p>	<p>{Miller, S. A., & Harley, J. B. (2000). Zoology (4th, 5th,6th, 10th ed) (International). Singapore: McGraw Hill. }</p>
<p>Week 6</p>	<p>Unit-3 Communication II (The Endocrine System and Chemical Messengers)</p> <p>3.6 An overview of vertebrate endocrine systems 3.7 Endocrine systems of vertebrates other than birds of mammals 3.8 Endocrine systems of birds and mammals</p>	<p>{Miller, S. A., & Harley, J. B. (2000). Zoology (4th, 5th,6th, 10th ed) (International). Singapore: McGraw Hill. }</p>
<p>Week 7</p>	<p>Unit-4 Circulation and Gas Exchange</p> <p>1.1 Internal transport and circulatory systems 1.2 Transport systems in invertebrates 1.3 Transport systems in vertebrates</p>	<p>{Miller, S. A., & Harley, J. B. (2000). Zoology (4th, 5th,6th, 10th ed) (International). Singapore: McGraw Hill. }</p>

	<p>1.4 Hearts and circulatory systems of bony fishes, amphibians, reptiles</p> <p>1.5 The heart and circulatory systems of birds crocodilians and mammals</p> <p>1.6 The lymphatic system is an open, one way system.</p>	
Week 8	<p>Unit-4 Circulation and Gas Exchange</p> <p>1.7 Gas exchange: 1.8 Vertebrate Respiratory systems 1.9 Human respiratory system 1.10 Evolution of Respiratory Pigments</p>	{ Miller, S. A., & Harley, J. B. (2000). Zoology (4th, 5th,6th, 10th ed) (International). Singapore: McGraw Hill. }
Week 9	<p>Unit 5 Nutrition and Digestion</p> <p>1.1 Evolution of nutrition 1.2 The metabolic fates of nutrients in heterotrophs 1.3 Digestion 1.4 Animal strategies for getting and using food 1.5 Diversity in digestive structures: invertebrates</p>	{ Miller, S. A., & Harley, J. B. (2000). Zoology (4th, 5th,6th, 10th ed) (International). Singapore: McGraw Hill. }
Week 10	<p>Unit 5 Nutrition and Digestion</p> <p>5.6 Diversity in digestive structures: Vertebrates 1.6 The mammalian digestive system</p>	{ Miller, S. A., & Harley, J. B. (2000). Zoology (4th, 5th,6th, 10th ed) (International). Singapore: McGraw Hill. }
Week 11	<p>Unit 6 Temperature and Body Fluid Regulation</p> <p>6.1 Homeostasis and Temperature Regulation; 6.2 Control of Water and Solutes (Osmoregulation and Excretion); 6.3 Invertebrate Excretory Systems</p>	{ Miller, S. A., & Harley, J. B. (2000). Zoology (4th, 5th,6th, 10th ed) (International). Singapore: McGraw Hill. }
Week 12	<p>Unit 6 Temperature and Body Fluid Regulation</p> <p>6.4 Vertebrates Excretory Systems</p>	{ Miller, S. A., & Harley, J. B. (2000). Zoology (4th, 5th,6th, 10th ed) (International). Singapore: McGraw Hill. }
Week 13	<p>Unit 7 Reproduction</p> <p>7.1 Asexual reproduction in invertebrates 7.2 Sexual reproduction in invertebrates; 7.3 Sexual reproduction in vertebrates 7.4 Examples of reproduction among various vertebrate classes</p>	{ Miller, S. A., & Harley, J. B. (2000). Zoology (4th, 5th,6th, 10th ed) (International). Singapore: McGraw Hill. }

Week 14	Unit 7 Reproduction 7.5 The human male reproductive system 7.6 The human female reproductive system 7.7 Prenatal development and birth in a human	{ Miller, S. A., & Harley, J. B. (2000). Zoology (4th, 5th,6th, 10th ed) (International). Singapore: McGraw Hill. }
Week 15	Unit 8 Descriptive Embryology 8.1 Organogenesis:(A brief account): 8.2 Fertilization; embryonic development: cleavage, and egg types 8.3 The primary germ layers and their derivatives Echinoderm embryology 8.4 Vertebrate embryology: the chordate body plan 8.5 Amphibian embryology	{ Miller, S. A., & Harley, J. B. (2000). Zoology (4th, 5th,6th, 10th ed) (International). Singapore: McGraw Hill. }
Week 16	Unit 9 Descriptive Embryology 8.6 Development in terrestrial environments 8.7 Avian embryology 8.8 The fate of mesoderm 8.9 The Fate of Mesoderm	{ Miller, S. A., & Harley, J. B. (2000). Zoology (4th, 5th,6th, 10th ed) (International). Singapore: McGraw Hill. }

Textbooks and Reading Material

Campbell, N. A. (2002). Biology (6th ed). Menlo Park, California: Benjamin/Cummings Publishing Company, Inc.

Hickman, C.P., Roberts, L.S., & Larson, A. (2004). Integrated principles of zoology (12th ed) (International). Singapore: McGraw Hill.

Kent, G. C. & Miller, S. (2001). Comparative anatomy of vertebrates. New York: McGraw Hill.

Miller, S. A., & Harley, J. B. (2000). Zoology (4th, 5th,6th, 10th ed) (International). Singapore: McGraw Hill.

Pechenik, J. A. (2000). Biology of invertebrates, (5th ed) (International). Singapore: McGraw Hill.

Teaching Learning Strategies

1. Discussion
2. Demonstration Method
3. Lecture Method
4. Project Method

Assignments: Types and Number with Calendar

1. Class presentation
2. written assignment
3. Case study.
4. 01 assignment before mid-term exam and 02 assignment after mid-term exam

**Department of Science Education
Institute of Education & Research
University of the Punjab, Lahore
Course Outline**



Programme	BS Science Education	Course Code	BSScEd-708	Credit Hours	04
Course Title	Mathematics A-IV [Ordinary Differential Equations]				
Course Introduction					
<p>Mathematics A-IV focuses on Ordinary Differential Equations (ODEs). In this course, students learn how to solve equations that involve derivatives of functions. Differential equations are very important in mathematics because they are used to describe real-world problems in physics, biology, engineering, economics, and many other fields. This course builds students' understanding of mathematical modeling and analytical thinking.</p>					
Learning Outcomes					
<p>On the completion of the course, the students will:</p> <ol style="list-style-type: none"> 1. Understand the basic concepts of ordinary differential equations. 2. Solve first-order differential equations using different methods. 3. Solve higher-order linear differential equations. 4. Apply differential equations to real-life problems such as growth, decay, and motion. 					
Course Content					
Week 1	Unit -1: Introduction to Differential Equations				
	1.1	Historical background and motivation			
Week 2	1.2	Basic mathematical models: Directional fields			
	1.3	Classification of differential equations			
Week 3	Unit-2: Functions of Several Variables				
	2.1	Separable equations			
Week 4	2.2	Modeling with first order equations			
	2.3	Differences between linear and nonlinear equations			
Week 5	2.4	Exact equations and integrating factors			
	Unit-3: Second Order Differential Equations				
	3.1	Homogenous equations			

Week 6	3.2 Homogenous equations with constant coefficients
	3.3 Fundamental solutions of linear homogenous equations
Week 7	3.4 Linear independence and the wronskian
Week 8	3.5 Method of undetermined coefficients, Variation of parameters
Week 9	MID- TERM EXAM
Week 10	PRESENTATIONS
Week 11	Unit-4: Higher Order Linear Equations
	4.1 General theory of nth order linear equations
Week 12	4.2 Homogenous equations with constant coefficients
	4.3 The methods of undermined coefficients
Week 13	4.4 The method of variation of parameters
	QUIZZ
Week 14	Unit-5: Series Solution of Second Order Linear Equations and Special Functions
Week 15	5.1 Series solution near an ordinary point, Legendr's equation
	5.2 Regular singular points, Series solution near a regular singular point
Week 16	FINAL- TERM EXAM
Textbooks and Reading Material	
<ol style="list-style-type: none"> 1. W.E. Boyce and Dprima, Elementary Differential Equations, 8th Edition, John Wiley & Sons, 2005 2. Erwin, Kreyszig, Advanced Engineering Mathematics, John Wiley and Sons, 2004 3. Ross, S.L, Differential Equations, John Wiley & Sons, 2004 4. Dennis G.Zill & Michael R. Cullen, Differential Equation With Boundary Value Problems, PWS Publihing Company, 2000 5. Richard Bronson, Differential Equations, 2nd Edition, Schaum's Outline Series, Mc-Graw Hill Company, New York, 19 	
Teaching Learning Strategies	
<ul style="list-style-type: none"> • Lecture Method • Collaborative Method • Problem-Solving Approaches • Demonstration Method • Project Method • Connecting mathematics to real world context • Discussion 	
Assignments: Types and Number with Calendar	
<ul style="list-style-type: none"> • Class presentation, Quizzes. • 1st assignment before mid-term exam. • 2nd assignment after mid-term exam 	