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

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.

Learning Outcomes

On the completion of the course, the students will:

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.}

Week 2	**Unit-1** **Protection, Support, and Movement** 1.1 Protection: Integumentary systems 1.2 Movement and Support: Skeletal System 1.3 Movement: Non-muscular movement and muscular systems	{Miller, S. A., & Harley, J. B. (2000). Zoology (4th, 5th,6th, 10th ed) (International). Singapore: McGraw Hill.}
Week 3	**Unit-2** **Communication I: Nervous and Sensory systems** 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	{Miller, S. A., & Harley, J. B. (2000). Zoology (4th, 5th,6th, 10th ed) (International). Singapore: McGraw Hill.}
Week 4	**Unit-2** **Communication I: Nervous and Sensory systems** 1.5 Sensory perception 1.6 Invertebrate Sensory Receptors 1.7 Vertebrate sensory receptors	{Miller, S. A., & Harley, J. B. (2000). Zoology (4th, 5th,6th, 10th ed) (International). Singapore: McGraw Hill.}
Week 5	**Unit-3** **Communication II (The Endocrine System and Chemical Messengers)** 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.	{Miller, S. A., & Harley, J. B. (2000). Zoology (4th, 5th,6th, 10th ed) (International). Singapore: McGraw Hill.}
Week 6	**Unit-3** **Communication II (The Endocrine System and Chemical Messengers)** 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	{Miller, S. A., & Harley, J. B. (2000). Zoology (4th, 5th,6th, 10th ed) (International). Singapore: McGraw Hill.}
Week 7	**Unit-4** **Circulation and Gas Exchange** 1.1 Internal transport and circulatory systems 1.2 Transport systems in invertebrates 1.3 Transport systems in vertebrates	{Miller, S. A., & Harley, J. B. (2000). Zoology (4th, 5th,6th, 10th ed) (International). Singapore: McGraw Hill.}

	1.4 Hearts and circulatory systems of bony fishes, amphibians, reptiles 1.5 The heart and circulatory systems of birds crocodilians and mammals 1.6 The lymphatic system is an open, one way system.	
Week 8	**Unit-4** **Circulation and Gas Exchange** 1.7 Gas exchange: 1.8 Vertebrate Respiratory systems 1.9 Human respiratory system 1.10 Evolution of Respiratory Pigments	{Miller, S. A., & Harley, J. B. (2000). Zoology (4th, 5th,6th, 10th ed) (International). Singapore: McGraw Hill.}
Week 9	**Unit 5** **Nutrition and Digestion** 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	{Miller, S. A., & Harley, J. B. (2000). Zoology (4th, 5th,6th, 10th ed) (International). Singapore: McGraw Hill.}
Week 10	**Unit 5** **Nutrition and Digestion** 5.6 Diversity in digestive structures: Vertebrates 1.6 The mammalian digestive system	{Miller, S. A., & Harley, J. B. (2000). Zoology (4th, 5th,6th, 10th ed) (International). Singapore: McGraw Hill.}
Week 11	**Unit 6** **Temperature and Body Fluid Regulation** 6.1 Homeostasis and Temperature Regulation; 6.2 Control of Water and Solutes (Osmoregulation and Excretion); 6.3 Invertebrate Excretory Systems	{Miller, S. A., & Harley, J. B. (2000). Zoology (4th, 5th,6th, 10th ed) (International). Singapore: McGraw Hill.}
Week 12	**Unit 6** **Temperature and Body Fluid Regulation** 6.4 Vertebrates Excretory Systems	{Miller, S. A., & Harley, J. B. (2000). Zoology (4th, 5th,6th, 10th ed) (International). Singapore: McGraw Hill.}
Week 13	**Unit 7** **Reproduction** 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	{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