Institute of Zoology
Faculty of Life Sciences
University of the Punjab, Lahore

Course Outline

Programme	BS Zoology	**Course Code**	ZOOL-105	**Credit Hours**	2
Course Title	**Animal Diversity-II**				

Course Introduction

This course provides an in-depth exploration of the anatomy, physiology, and evolutionary significance of echinoderms, protochordates, and hemichordates. Students will learn about the taxonomy, morphology, ecological roles, and developmental biology of these groups, emphasizing their importance in the evolutionary context.

Learning Outcomes

On the completion of the course, the students will:

1. Understand the distinguishing features of echinoderms, protochordates, and hemichordates.
2. Explore the evolutionary relationships among these groups and other animals.
3. Examine the anatomical and physiological adaptations of each group.
4. Investigate the ecological roles and life histories of these organisms.
5. Develop skills in comparative analysis and scientific observation.

Course Content		**Assignments/Readings**
Week 1	Overview of Deuterostomia	
	General characteristics of Echinoderms	
Week 2	Water vascular system, Maintenance Functions of Echinoderms	
	Locomotion, feeding, and respiration of Echinoderms	
Week 3	Regeneration and Reproduction of Echinoderms	
	Evolutionary Significance of Echinoderms	
Week 4	Echinoderms in marine ecosystems	
	Evolutionary history, Classification of Echinoderms	
Week 5	Diversity within Echinoderms	
	Overview of Protochordates	
Week 6	Introduction to Protochordates	
	Introduction to Protochordates	
Week 7	Characteristics and classification of Urochordata,	
	Characteristics and classification of Cephalochordata	
Week 8	Anatomy of Protochordates	
	Physiology of Protochordates	
Week 9	Structure and function of notochord of Protochordates	
	Locomotion, feeding, and respiration of Protochordates	

Week 10	Reproduction and development of Protochordates	
	Ecological Roles of Protochordates of Protochordates	
Week 11	Evolutionary Significance of Protochordates	
	Protochordates in marine ecosystems	
Week 12	Evolutionary history of Protochordates	
	Introduction to Hemichordates	
Week 13	Characteristics and classification of Enteropneusta,	
	Characteristics and classification of Pterobranchia	
Week 14	Structure and function of proboscis, collar, and trunk of Hemichordates	
	Locomotion, feeding, and respiration of Hemichordates	
Week 15	Physiology of Hemichordates	
	Reproduction and development of Hemichordates	
Week 16	Hemichordates in marine ecosystems	
	Evolutionary Significance of Hemichordates	

Textbooks and Reading Material

1. Edward E. Ruppert, Richard S. Fox, Robert D. Barnes 2003 Invertebrate Zoology: A Functional Evolutionary Approach 7th Edition Cengage Learning
2. Jan Pechenik 2015 Biology of the Invertebrates, 7th Edition McGraw Hill.
3. Barrington E.J.W. 1965 The Biology of Hemichordata and Protochordata Oliver & Boyd
4. **Suggested Readings**
   4.1. Verma P. S. Chordate Zoology 2010 S. Chand Publishing, 2010
   4.2. Saxena O.P 1985 Modern text-book of Protochordata S. Chand & company Limited,

Teaching Learning Strategies

Course Overview:

This course covers the biology, diversity, and evolutionary relationships of Echinoderms, Protochordates, and Hemichordates. It includes lectures, laboratory work, field trips, and group discussions to provide a comprehensive understanding of these groups' structure, function, and ecological roles.

Learning Objectives:

1. Identify and describe the key characteristics and classifications of Echinoderms, Protochordates, and Hemichordates.
2. Understand the evolutionary relationships among these groups and other deuterostomes.
3. Analyze the anatomical and physiological adaptations of these organisms.
4. Explore the ecological roles and life histories of Echinoderms, Protochordates, and Hemichordates.
5. Develop skills in comparative analysis, critical thinking, and scientific research.

Teaching Strategies:

1. Interactive Lectures:

Objective: Provide foundational knowledge on the taxonomy, morphology, physiology, and evolution of Echinoderms, Protochordates, and Hemichordates.

Strategy:

- Use multimedia presentations (slides, videos, animations) to illustrate concepts.

- Incorporate real-life examples and case studies to enhance understanding.
- Encourage active participation through question-and-answer sessions and small group discussions.

2. Laboratory Sessions:
Objective: Develop hands-on skills in identifying and analyzing anatomical structures and physiological processes.

Assignments: Types and Number with Calendar

Group Presentations:
Objective: Foster collaboration and deeper understanding through research and peer teaching.
Strategy:

- Assign group projects on specific topics such as evolutionary relationships, ecological roles, or conservation issues.
- Require groups to prepare and deliver presentations, promoting peer learning.
- Incorporate peer assessment and feedback to improve learning outcomes and presentation skills.

Assessment

Sr. No.	Elements	Weightage	Details
1.	Midterm Assessment	35%	Written Assessment at the mid-point of the semester.
2.	Formative Assessment	25%	Continuous assessment includes: Classroom participation, assignments, presentations, viva voce, attitude and behavior, hands-on-activities, short tests, projects, practical, reflections, readings, quizzes etc.
3.	Final Assessment	40%	Written Examination at the end of the semester. It is mostly in the form of a test, but owing to the nature of the course the teacher may assess their students based on term paper, research proposal development, field work and report writing etc.