

**Institute of Zoology,  
Faculty of Life Sciences  
University of the Punjab, Lahore  
Course Outline**



|   |   |                    |          |                     |                             |
|---|---|--------------------|----------|---------------------|-----------------------------|
| <b>Programme</b>  | BS Zoology  | <b>Course Code</b> | ZOOL-201 | <b>Credit Hours</b> | 2                           |
| <b>Course Title</b>   | <b>Animal Diversity-III</b>   |                    |          |                     |                             |
| <b>Course Introduction</b>  |   |                    |          |                     |                             |
| This course provides an in-depth exploration of the diversity, structure, function, and evolutionary relationships of chordates, focusing on fishes, amphibians, reptiles, birds, and mammals. Students will study the taxonomy, morphology, physiology, ecological roles, and evolutionary significance of these groups, with a focus on comparative analysis.   |   |                    |          |                     |                             |
| <b>Learning Outcomes</b>  |   |                    |          |                     |                             |
| On the completion of the course, the students will:   |   |                    |          |                     |                             |
| <ol style="list-style-type: none"> <li>1. Understand the distinguishing features and classification of major chordate groups.</li> <li>2. Explore the evolutionary relationships and phylogeny of chordates.</li> <li>3. Examine the anatomical and physiological adaptations of each chordate group.</li> <li>4. Investigate the ecological roles and life histories of these organisms.</li> <li>5. Develop skills in comparative analysis and scientific observation.</li> </ol> |   |                    |          |                     |                             |
| <b>Course Content</b>   |   |                    |          |                     | <b>Assignments/Readings</b> |
| <b>Week 1</b>   | Introduction to Chordates, General characteristics and classification   |                    |          |                     |                             |
|   | Phylogenetic relationships among chordates  |                    |          |                     |                             |
| <b>Week 2</b>   | Characteristics and classification of fishes  |                    |          |                     |                             |
|   | Anatomy and physiology of jawless fishes (Agnatha), cartilaginous fishes (Chondrichthyes), and bony fishes (Osteichthyes)<br>Reproduction and development in fishes |                    |          |                     |                             |
| <b>Week 3</b>   | Ecological roles of fishes in aquatic ecosystems  |                    |          |                     |                             |
|   | Evolutionary history and adaptive radiation of fishes   |                    |          |                     |                             |
| <b>Week 4</b>   | Characteristics and classification of amphibians  |                    |          |                     |                             |
|   | Anatomy and physiology of frogs (Anura), salamanders (Caudata), and caecilians (Gymnophiona)<br>Reproduction and development in amphibians                          |                    |          |                     |                             |
| <b>Week 5</b>   | Ecological roles of amphibians in terrestrial and aquatic ecosystems  |                    |          |                     |                             |
|   | Evolutionary history and adaptive radiation of amphibians   |                    |          |                     |                             |
| <b>Week 6</b>   | Characteristics and classification of reptiles  |                    |          |                     |                             |
|   | Anatomy and physiology of turtles (Testudines), lizards and snakes (Squamata), and crocodilians (Crocodylia),<br>Reproduction and development in reptiles           |                    |          |                     |                             |
| <b>Week 7</b>   | Ecological roles of reptiles in various ecosystems  |                    |          |                     |                             |

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|---|--|--|
|   | Evolutionary history and adaptive radiation of reptiles<br>Conservation issues affecting reptile populations |  |
| <b>Week 8</b>   | Characteristics and classification of birds  |  |
|   | Anatomy and physiology of birds<br>Reproduction and development in birds                                     |  |
| <b>Week 9</b>   | Ecological roles of birds in various ecosystems  |  |
|   | Evolutionary history and adaptive radiation of birds   |  |
| <b>Week 10</b>  | Characteristics and classification of mammals  |  |
|   | Anatomy and physiology of mammals<br>Reproduction and development in mammals                                 |  |
| <b>Week 11</b>  | Ecological roles of mammals in various ecosystems  |  |
|   | Evolutionary history and adaptive radiation of mammals   |  |
| <b>Week 12</b>  | Comparative anatomy of fishes, amphibians, reptiles, birds, and mammals                                      |  |
|   | Evolutionary trends and phylogenetic relationships among chordates   |  |
| <b>Week 13</b>  | Implications for understanding vertebrate evolution  |  |
|   | Conservation issues affecting fish, amphibians and reptiles populations                                      |  |
| <b>Week 14</b>  | Conservation issues affecting birds and mammal populations   |  |
|   | Importance of conserving chordates diversity   |  |
| <b>Week 15</b>  | Role of zoos and safari parks in global conservation efforts   |  |
|   | Captive breeding and reintroduction programs   |  |
| <b>Week 16</b>  | Future challenges and opportunities in conservation  |  |
|   | The evolving role of zoos and safari parks in the 21st century   |  |
| <b>Textbooks and Reading Material</b>   |  |  |
| <ol style="list-style-type: none"> <li>1. Campbell, N.A. Biology. 9<sup>th</sup> Ed. 2011. Menlo Park, California Benjamin/Cummings Publishing Company, Inc.</li> <li>2. Miller, S.A. and Harley, J.B. 2010. Zoology, 8<sup>th</sup> Edition (International) Singapore: McGraw Hill.</li> <li>3. Miller, S.A. 2002. General Zoology Laboratory Manual. 5<sup>th</sup> Ed. (International), Singapore: McGraw Hill.</li> <li>4. Hickman, C.P., Roberts, L.S. and Larson, A. Integrated Principles of Zoology, 14th Edition (International), 2009. Singapore: McGraw-Hill.</li> <li>5. <b>Suggested Readings</b> <ol style="list-style-type: none"> <li>5.1. Verma P. S. Chordate Zoology 2010 S. Chand Publishing, 2010</li> </ol> </li> </ol> |  |  |
| <b>Teaching Learning Strategies</b>   |  |  |
| <b>Course Overview:</b>   |  |  |
| This course covers the biology, diversity, and evolutionary relationships of fishes, amphibians, reptiles, birds, and mammals. It includes lectures, laboratory work, field trips, and group discussions to provide a   |  |  |

comprehensive understanding of these groups' structure, function, and ecological roles. Teaching the topic of chordates, which includes fishes, amphibians, reptiles, birds, and mammals, can be made engaging and effective through a variety of learning strategies.

**Learning Objectives:**

1. Identify and describe the key characteristics and classifications of fishes, amphibians, reptiles, birds, and mammals.
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 fishes, amphibians, reptiles, birds, and mammals.
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 fishes, amphibians, reptiles, birds, and mammals.

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.

**3. Field Trips and Guest Speakers**

Zoo, Safari Park or Aquarium Visits: Organize trips to local zoos, Safari Parks, aquariums, or natural history museums where students can see live specimens and learn from experts.

Guest Lectures: Invite biologists, veterinarians, or conservationists to speak about their work and experiences with chordates.

**4. Real-Life Applications**

Case Studies: Use real-life case studies to discuss issues like endangered species, the impact of climate change on various chordates, and the role of different animals in ecosystems.

Conservation Projects: Engage students in local conservation projects or citizen science initiatives to give them practical experience in preserving biodiversity.

**Group Work (20 minutes)**

Divide students into groups and assign each group a specific chordate to research.

Groups prepare a short presentation on their chordate, covering habitat, behavior, and adaptations.

Conduct a quick quiz or use flashcards to review key concepts.

By combining these strategies, you can create a dynamic and comprehensive learning experience that helps students understand and appreciate the diversity and complexity of chordates.

**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**

| <b>Sr. No.</b> | <b>Elements</b>      | <b>Weightage</b> | <b>Details</b>   |
|----------------|----------------------|------------------|--|
| 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. |