**University of Kerala**

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| Discipline | **ZOOLOGY** | | | | |
| Course Code | **UK3DSCZOO202** | | | | |
| Course Title | **Diversity of Chordates** | | | | |
| Type of Course | **DSC** | | | | |
| Semester | III | | | | |
| Academic Level | 200-299 | | | | |
| Course Details | Credit | Lecture per week | Tutorial per week | Practical per week | Total Hours/Week |
| | 4 | 3 hours | - | 2 hours | 5 |
| Pre-requisites | Pass in Class XII | | | | |
| Course Summary | Diversity of Chordates is an undergraduate course that leads the learner into the captivating world of chordates, with animals ranging from fish to mammals. Through engaging lectures and practical sessions, students explore the anatomical, physiological, and ecological intricacies of chordates. The course also delves into evolutionary relationships among chordate taxa, shedding light on the fascinating journey of life from primitive sea creatures to complex terrestrial vertebrates. With hands-on activities, and interactive discussions, the students gain a profound appreciation for the wonders of chordate life and their crucial roles in shaping ecosystems worldwide. | | | | |

**Detailed Syllabus**

| Module | Unit | Content | 45 hrs |
|---|---|---|---|
| I | | **Chordate investigations – In water** | **14** |
| | 1.1 | What are chordates – Explain apomorphies | 1 |
| | 1.2 | Outline of Chordate classification (Use cladistic classification with study of apomorphies of each clade) | 4 |
| | 1.3 | Urochordata and Cephalochordata (mention examples) | 2 |
| | 1.4 | Agnatha - Myxinomorphi, Petromyzontomorphi | 2 |
| | 1.5 | Fishes – General morphology and anatomy (Overview of viscera and skeleton) | 2 |
| | 1.6 | Outline of fish classification, origin and evolution | 1 |
| | 1.7 | Common freshwater fishes *Sahyadria, Garra, Channa, Anguilla* (genus as a whole) and State fish of Kerala, National fish of India | 2 |
| II | | **Into the land - Amphibians** | **7** |
| | 2.1 | Outline of amphibian classification, Apomorphies of amphibia, Origin and evolution | 2 |
| | 2.2 | Study of skeletal system of frogs, respiratory system | 2 |
| | 2.3 | Features of Gymnophiona (caecilians) with mention of Ichthyophis and Uraeotyphlus from Kerala | 1 |
| | 2.4 | Batrachia – Features of Anura, description of frogs and toads | 1 |
| | 2.5 | Batrachia – Features of Urodela, description of Indian salamander | 1 |
| III | | **Conquerors of land - Reptiles** | **8** |
| | 3.1 | Outline of reptilian classification, Apomorphies of Reptiles | 1 |
| | 3.2 | Origin and evolution of reptiles, Brief mention of dinosaurs | 1 |
| | 3.3 | Squamata – Lizards: General outline of lizards and brief description of house lizards, skinks and chameleon | 2 |
| | 3.4 | Squamata – Snakes: Brief outline of seven families of snakes (Mention venomous snake groups in India) | 2 |

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| | 3.5 | Brief outline of Rhynchocephalia and Crocodilia | 1 |
| | 3.6 | *Testudinea*: differentiate between Turtles, Tortoises and Terrapins | 1 |
| **IV** | **Into the air - Aves** | | **7** |
| | 4.1 | Outline of avian classification, Apomorphies of Aves, Origin and evolution of birds | 2 |
| | 4.2 | Morphological characters of birds, feathers and plumage, Anatomy – synsacrum and syrinx | 2 |
| | 4.3 | Techniques in bird watching, Bird calls. | 2 |
| | 4.4 | Identification of 10 common birds in the locality, State bird of Kerala and National bird of India. | 1 |
| **V** | **Explorers of fur - Mammals** | | **9** |
| | 5.1 | Outline of mammalian classification, Apomorphies of mammalia, Origin and evolution of mammals. | 2 |
| | 5.2 | Prototheria – brief description of Platypus and Echidnas. | 1 |
| | 5.3 | Theria – Metatheria, brief description of marsupials. | 1 |
| | 5.4 | Theria – Eutheria, Characters of placental mammals. | 1 |
| | 5.5 | Study of Arboreal mammals and their systematic position. | 1 |
| | 5.6 | Study of relationship between Sirenea and Proboscida. | 1 |
| | 5.7 | Study of relationship between Artiodactyla and Cetacea. | 1 |
| | 5.8 | Study of primates with macaques and langurs as example. | 1 |

**Practicum (30 hrs)**

| Sl.No. | Contents |
|---|---|
| 1 | Prepare a detailed note on Latimeria with images |
| 2 | Collection (geotagged photographs) and identification of 5 freshwater fishes and 5 brackish/marine fishes using taxonomic keys |
| 3 | Dissection of digestive system of any available fish |

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| 4 | Extraction and identification of Placoid, ctenoid and cycloid scales |
| 5 | Identification of clades from the latest chordate tree of life. |
| 6 | Identification of vertebrae of frog |
| 7 | Differentiate between Ichthyophis and Uraeotyphlus and prepare notes.<br>(Use specimens, if available in the museum. Else collect images or videos for identification.) |
| 8 | Identification of any one species each of house lizard and skink |
| 9 | Identification of any 4 species of snakes |
| 10 | Prepare a detailed note on any dinosaur species (include details of its discovery, museum specimens and structural recreation) |
| 11 | Identification of morphological characters of birds |
| 12 | Study of bird feathers |
| 13 | Observation and identification of minimum 10 birds in the locality and preparation of short notes. |
| 14 | Prepare a presentation on any mammal species (5 slides and submit print out) |
| 15 | Prepare a poster for the identification of any mammalian order |
| 16 | Prepare a detailed note on any 5 wild mammal species. |

**References**


1. Vertebrate Life, 11th Edition; Harvey Pough, William E. Bemis, Betty Anne McGuire, and Christine M. Janis; Oxford University Press
2. The Diversity of Fishes: Biology, Evolution, and Ecology; Gene S. Helfman, Bruce B. Collette, Douglas E. Facey; Wiley
3. The Cornell Lab of Ornithology Handbook of Bird Biology (third edition); Irby J. Lovette and John W. Fitzpatrick; John Wiley & Sons


**Web Resources**

1. https://ebird.org
2. https://amazingzoology.com/latest-classification
3. https://open-education-repository.ucl.ac.uk/view/keywords/vertebrate.html

## Course Outcomes

| No. | Upon completion of the course the graduate will be able to | Cognitive Level | PSO addressed |
|---|---|---|---|
| CO-1 | Identify the systematic status of chordates from the tree of life by applying the principles of cladistics. | R, U, Ap | PSO-1,2 |
| CO-2 | Understand the origin and evolution of various chordate groups. | R, U | |
| CO-3 | Systematically identify and place an animal under a specific chordae group. | R, U | |
| CO-4 | Identify morphological and anatomical features of various chordates. | R, U | |
| CO-5 | Prepare notes on the identification and description of an animal | U, An | |

**R-Remember, U-Understand, Ap-Apply, An-Analyse, E-Evaluate, C-Create**

**Name of the Course: Diversity of Chordates**

**Credits: 3:0:1 (Lecture: Tutorial: Practical)**

| CO No. | CO | PO/PSO | Cognitive Level | Knowledge Category | Lecture (L)/Tutorial (T) | Practical (P) |
|---|---|---|---|---|---|---|
| CO-1 | Identify the systematic status of chordates from the tree of life by applying the principles of cladistics. | PO-1,2,3 PSO-1, PSO-3 | R, U, Ap | F, C | L | P |
| CO-2 | Understand the origin and evolution of various chordate groups. | PO- 1,2 PSO-1 | R, U | F, C | L | |

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| CO-3 | Systematically identify and place an animal under a specific chordae group. | PO -1,2 PSO-1 | R, U | F, C | L | |
| CO-4 | Identify morphological and anatomical features of various chordates. | PO- 1,2 PSO-3 | R, U | F, C | L | P |
| CO-5 | Prepare notes on the identification and description of an animal | PO 1,6 PSO-1, PSO-6 | U, An | F, C, P | | P |

**F-Factual, C- Conceptual, P-Procedural, M-Metacognitive**

**Mapping of COs with PSOs and POs**

| | **PSO1** | **PSO2** | **PSO3** | **PSO4** | **PSO5** | **PSO6** | **PO 1** | **PO 2** | **PO 3** | **PO 4** | **PO 5** | **PO 6** | **PO 7** |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **CO 1** | 3 | - | 2 | - | - | - | 3 | 2 | - | 1 | - | | - |
| **CO 2** | 3 | - | - | - | - | - | 2 | 1 | - | - | - | - | - |
| **CO 3** | 3 | - | - | - | - | - | 3 | 3 | - | - | - | - | - |
| **CO 4** | - | - | 3 | - | - | - | 3 | 1 | - | - | - | - | - |
| **CO 5** | 3 | - | 3 | - | - | - | 2 | - | - | - | - | 3 | - |

**Correlation Levels:**

| **Level** | **Correlation** |
|---|---|
| - | Nil |
| 1 | Slightly / Low |
| 2 | Moderate / Medium |
| 3 | Substantial / High |

**Assessment Rubrics:**

**Assignments**

1. Migration in fishes
2. Accessory respiratory organ in fishes
3. Parental care in amphibians
4. Flight adaptations in birds
5. Aquatic adaptations in mammals
6. Dentition in mammals

**Continuous Comprehensive Assessment**

1. Assignments
2. Seminars
3. Test
4. Quiz/Debate

**End Semester Evaluation**

1. Multiple Choice Questions
2. Very Short Answer Questions
3. Short Answer questions
4. Essay Type questions

**Mapping of COs to Assessment Rubrics:**

| | Quiz | Assignment | Presentations | Group Discussions | End Semester Examinations |
|---|---|---|---|---|---|
| CO 1 | ✓ | ✓ | | | ✓ |
| CO 2 | ✓ | ✓ | | ✓ | ✓ |
| CO 3 | ✓ | ✓ | | | ✓ |
| CO 4 | ✓ | ✓ | ✓ | | ✓ |
| CO 5 | | ✓ | ✓ | | ✓ |