



COURSE DESCRIPTION FORM

Department: **Biological Sciences**
Program: **Animal Biology**

COURSE DESCRIPTION

Course Title: **Chordates Biology**

Course Number: **0493-201**

Course Level: ☒ Undergraduate ☐ Postgraduate
Course Type: ☐ University Requirements ☐ Department Requirements
☒ Major Compulsory ☒ Major Elective
☒ Minor Compulsory ☒ Minor Elective

Credit Hours: ☐ 1 credit ☐ 2 credits ☐ 3 credits ☒ 4 credits

Lecture Hours per Week: ☐ none ☐ 1 hour ☐ 2 hours ☒ 3 hours

Lab Hours per Week: ☐ none ☐ 2 hours ☒ 3 hours ☐ 6 hours

Tutorial Hours per Week: ☒ none ☐ 1 hour ☐ 2 hours

Credits: (1-3-4)

Prerequisites:

0490-103

Recommended Textbook(s):

Textbook: Animal Diversity, 8th edition. Cleveland P. Hickman et al. (2022)

Catalogue Brief Description:

The course helps students understand the theory of evolution, especially the chordates' history. It introduces students to the groups of chordates and explores the anatomical and physiological evolution of chordates within the context of the functional interrelationships of organs and the changing environments to which chordates have adapted. In other words, the course synthesizes concepts include functional morphology, evolutionary history, physiology and adaptation to new environments in order to compare, comprehend and explain the diversity of life exhibited by chordates groups.



Lectures Topics:

1. Science of Zoology and Evolution of Animal Diversity
2. Animal Architecture
3. Taxonomy and Phylogeny of Animals
4. Vertebrates Beginnings: The Chordates
5. Fishes
6. The Early Tetrapods and Modern Amphibians
7. Amniote Origins and Nonavian Reptiles
8. Birds
9. Mammals

Practical Topics (Laboratory):

1. Movie: Chordates and Vertebrates evolution
2. Movie: Vertebrates Extinctions
3. Animal Body Plan & Cavities + Subphylum: Urochordata (Tunicates)
4. Subphylum: Cephalochordate (Amphioxus) + Superclass: Agnatha (Vertebrates)
5. Class: Chondrichthyes (Cartilaginous Fish)
6. Class: Actinopterygii (Bony Fish)
7. Class: Amphibia (Body systems, External & Internal Structures)
8. Class: Reptilia
9. Class: Aves (Birds) (External & Internal Structures)
10. Class: Mammalia (External & Internal Structures)



Course Lecture Contents and Hours

A Legacy of change. Principles of science methods by comparing Experimental vs. Comparative Methods. Darwin's Theory of Evolution and Evidence. Neo-Darwinism Microevolution and Macroevolution.

[6 Hours]

Animal body plans. Animal Development and Evidence of common ancestors of chordates. Characteristics and phylogenetic relationships of Deuterostomes vs Protostomes.

[3 Hours]

Taxonomy and Systematics (Phylogeny) of Animals. Classification method origin. History of Species concept.

[1 Hours]

Definition of Chordates and the five Chordates Hallmarks. Introducing the traditional divisions of the phylum Chordata. The order of the phylum history and characteristics. The differences between Protochordates vs Vertebrates (Craniata), Agnatha vs Gnathostomata, and Anamniote vs Amniote groups. Subphylum Urochordate and Subphylum Cephalochordate, And Subphylum Vertebrate main modifications.

[5 Hours]

Fishes classes history and classification. Comparing eleven characteristics among the four classes. Identifying the extinct groups of fish within the four classes. Structural and functional adaptations of Fishes, saltwater fish vs freshwater fish. Fish migration

[6 hours]

The early Tetrapods and modern amphibians. Evolution from water to land. Eleven characteristics of Amphibian class. Extinct groups vs Extant groups. Structural and functional adaptations of Amphibians.

[5 Hours]

Amniote Origins and Nonavian Reptiles. Water eggs characteristics vs terrestrial eggs extraembryonic membranes. Temporal region feeding behaviors. Eleven characteristics of Reptiles class. Extinct groups vs Extant groups. Structural and functional adaptations of Reptiles.

[5 hours]

Origin and Relationships of Birds. Birds' adaptation of anatomy and physiology toward flight. Flight concept. Eleven characteristics of Birds class. Birds Migration and Navigation. Humans effect on Bird Populations

[5 Hours]

Origin and Evolution of Mammals. Eleven characteristics of Mammals class. Mammals Orders in reproduction procedures.

[4 Hours]

Lecture Hours	[40 hours]
Midterm Exams	[2 hours]

Total Hours	[42 hours]
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ASSESSMENT METHODS & GRADING

- Check all forms of assessments that may be used for this course.

☒ Term Exams	20 %
☒ Quizzes	10 %
☐ Homework/Assignments	%
☐ Computer Assignments	%
☐ Term Paper/Projects	%
☐ Oral Presentation	%
☐ Poster Presentation	%
☒ Lab. Work	30 %
☐ Fieldwork	%
☐ Class Participation/Activity	%
☐ Other	%
☒ Final Exam	40 %
Total	100 %



COURSE LEARNING OUTCOMES

1. Understand evolution theory and the need of organisms to adapt to the changing environments which lead to diversity.
2. Develop knowledge and the Principles Comparative Scientific Method.
3. Understand the chordate Architecture and development.
4. Study the history of classification and the concept Taxonomy, Systematic, and Phylogenetic trees.
5. Understand phylogenetic relationships of animal kingdom especially that of Chordates.
6. Think like an evolutionary vertebrate biologist and explain and describe the evolutionary relationships of the major Chordates groups: protochordates, fishes, amphibians, reptiles, birds, and mammals.
7. Explain and describe significant structural and functional adaptations that have occurred in various vertebrate lineages, and how such adaptations have affected the pattern and history of vertebrate life.
8. Understand and compare among vertebrate groups some aspects of the Skeletal system, Digestive system, Excretory system, Circulatory system, Reproductive system.
9. Be able to compare among vertebrate groups skin composition (keratin protein), sense organ types and capabilities, and reproductive methods.



Relevance Rate to the Course Learning Outcomes

Course Learning Outcomes	Example(s) of Relevant Topics/Activities	Relevance Rate
①	Darwin Theory of Evolution	H
②	Principles Comparative Scientific Method	H
③	the chordate Architecture and development	M
④	Phylogenetic Relationships	M
⑤	The diversity of vertebrate reflects its structural and functional adaptation during its evolution	H
⑥	The study of some aspects of Vertebrates (Craniata) like the digestive, excretory, circulatory, reproductive systems	M
⑦	vertebrate groups skin composition (keratin protein), sense organ types and capabilities, and reproductive methods	H
⑧	Dissecting and studying some vertebrate organ systems in the lab to see evolutionary development in different vertebrate groups	H



PROGRAM LEARNING OUTCOMES

Using the labels H, M, or L, rate the relevance of each **Course Learning Outcome** in the learning outcome matrix below to the **Program Learning Outcomes** where applicable. (A summary of the Program Learning Outcomes is provided in a separate document).

		COURSE LEARNING OUTCOMES							
		1	2	3	4	5	6	7	8
PROGRAM LEARNING OUTCOMES	1. Apply the scientific method to questions in animal biology and perform qualitative and quantitative analysis and interpretation of biological data to demonstrate proficiency in the experimental techniques and methods of analysis appropriate for their area of specialization within animal biology.	H	H	L	H	M	H	M	H
	2. Identify the major groups of organisms with emphasis on animals and be able to classify them within a phylogenetic framework to compare and contrast the characteristics of animals that differentiate them from other forms of life.	H	M	L	H	H	H	H	H
	3. Comprehend the breadth of studies on the biology of animals as they relate to evolution, adaptation, behavior and ecology.	H	L	L	H	H	M	M	M
	4. Explain how organisms' function at the level of the gene, genome, cell, tissue, organ and organ-system thus appreciating the complexities of animals.	L	L	M	L	H	H	H	H



5. Relate the physical features of the environment to the structure of animal populations, communities, and ecosystems.	L	L	L	M	H	M	H	L
6. Integrate related topics in animal biology from separate parts of the course or courses.	H	L	L	M	H	H	H	H
7. Access primary literature, identify a particular topic and evaluate its scientific content and extract information from biological literature, and communicate it effectively in writing scientific reports and essays in the field of animal biology.	L	L	L	M	L	L	L	L

DEPARTMENT LEARNING OUTCOMES

Using the labels H, M, or L, rate the relevance of each **Course Learning Outcome** in the learning outcome matrix below to the **Department Learning Outcomes** where applicable. (A summary of the Department Learning Outcomes is provided in a separate document).

		COURSE LEARNING OUTCOMES					
		①	②	③	④	⑤	⑥
DEPARTMENT LEARNING OUTCOMES	1.						
	2.						
	3.						
	4.						
	5.						

Course Coordinator: DR. Jasem Alrubaian

Program: Animal Biology