BIOL-208 – Vertebrate Biology

University Arts and Science

Effective Term & Year: Fall 2022
Course Outline Review Date: 2024-04-01

Program Area: Math and Sciences

Description:

This course covers the evolution and comparative anatomy of cephalochordates, urochordates, fish, amphibians, reptiles, birds, and mammals. The comparative anatomy of major organ systems among fishes, amphibians, birds, and mammals will be studied in the lab via dissection of representative organisms. The lab will emphasize the relationship between structure and function of vertebrate organisms while the lecture will focus on current controversies and discoveries in the scientific study of vertebrate evolution.

Program Information:

This course may be used as part of a Bachelor of Science in Biology at some institutions. This course is often a prerequisite for a major program in Zoology, Ecology, and Animal Behaviour. The dissection of representative vertebrate organisms and the focus on comparative anatomy of the skeletal system and mammalian dentition make this course useful for students who are considering applying to medical school, veterinarian school, or dentistry.

Delivery Methods: On-campus (Face-to-Face)

Credit Type: College of the Rockies Credits

Credits: 3

Course type/s: Lab Sciences, Sciences

Instructional Activity and Hours:

Activity	Hours

Classroom, Directed Studies or Online Instruction	45
Seminar/Tutorials	
Laboratory/Studio	45
Practicum/Field Experience	
Co-op/Work Experience	
Other	
Total	90

Course Requisites:

- Completed the following:
  - Course Not Found
  - BIOL102 – Introduction to Biology 2 (3)

Flexibile Assessement: Yes

In some cases students may be able to apply for recognition of prior learning outside the classroom. This flexible assessment process provides equivalent course credit. It is a rigorous process that may include external evaluation, worksite assessment, demonstration, standardized test, self-assessment, interview, products/portfolio, and challenge exam, or other measures as appropriate. Tuition fees apply. Contact an education advisor for more information.

Course Transfer Credit:

For information about receiving transfer credit for courses taken at either British Columbia or Alberta institutions, please see https://www.bctransferguide.ca/ or https://transferalberta.alberta.ca . For more transfer credit information, please visit https://www.cotr.bc.ca/Transfer

All requests for course transfer credit from institutions in British Columba or elsewhere should go to the College of the Rockies Enrolment Services office.

Textbook Resources:

Textbook selection varies by instructor and may change from year to year. At the Course Outline Effective Date the following textbooks were in use:

Pough, Janis and Heiser. 2019. *Vertebrate Life,* 10th Ed.

BIOL 208 – Lab Outlines

Please see the instructor's syllabus or check COTR's online text calculator https://textbook.cotr.bc.ca/ *for a complete list of the currently required textbooks.*

Learning Outcomes:

Upon the successful completion of this course, students will be able to:

- list the four defining characteristics of a vertebrate organism;
- explain the basics of phylogenetic systematics and major types of evolutionary processes that are critical to vertebrate evolution;
- draw a phylogenetic tree of the current classes within the Phylum Chordata;
- describe the derived traits of the classes within the Phylum Chordata including:
    - *Amphioxus*
    - Jawless Fishes
    - Jawed Fishes
    - Amphibians
    - Turtles
    - Reptiles
    - Birds
    - Mammals
- discuss the importance of the derived traits to the success of these animals throughout their evolutionary history;
- list the geologic eras and the periods within them;
- provide a brief description of Burgess Shale in Field, BC and discuss the importance of the finding of *Pikaia*;
- describe the major extinction events between eras including the disappearance of major groups of vertebrates and the theories underlying the extinction of these vertebrate animals;
- describe major evolutionary steps in vertebrate evolution including:
    - The evolution of the jaw
    - The transition from water to land
    - The development of the amniotic egg
    - The evolution of the inner ear
    - The transition from land to water
- describe the discovery of *Tiktaalik* and its importance in understanding the transition from water to land;
- list the differences between the two main orders within clade *Dinosauria* (Ornithischia and Saurischia);
- relate the anatomy of theropod dinosaurs to birds;
- summarize the current theory of the origin of birds;
- differentiate between the different types of feathers including their contribution to flight, position on the body, and paleontological discoveries;
- discuss the biological adaptations that were required to transition from an exothermic to an endothermic lifestyle;
- compare and contrast the reproductive biology of the three major groups of mammals

(monotremes, placentals, and marsupials);
- compare and contrast the skull and dentition between herbivorous and carnivorous mammals;
- list the characteristics that define a primate;
- critique the latest research and discoveries regarding early hominid evolution;
- compare and contrast the embryological origin, function, and major anatomical features between fishes, amphibians, birds, and mammals of the following major organ systems:
    - Nervous System
    - Skeletal Muscular System
    - Cardiovascular System
    - Respiratory System
    - Digestive System
    - Urogenital System

Course Topics:

- Introduction to Evolutionary Concepts
- Geologic Time Scale
- Origin of Chordates
- Aquatic Adaptations
- Early Tetrapods
- Evolution and Comparative Anatomy of:
    - Cephalochordates
    - Urochordates
    - Jawless Fishes
    - Jawed Fishes
    - Amphibians
    - Turtles
    - Early Reptiles
    - Dinosaurs
    - Modern Reptiles
    - Birds
    - Mammals
    - Hominids

See instructor's syllabus for the detailed outline of weekly readings, activities and assignments.

Evaluation and Assessments

Assessment Type: On-Campus (face-to-face)

Assessment Type	% of Total Grade
Assignments	10%

Midterm(s)	20%
Final Exam	30%
Lab Assignments	10%
Comparative Anatomy Paper	20%
Lab Exams	10%
Total	100%

Grade Scheme

A+	A	A-	B+	B	B-	C+	C	C-	D	F
>=90	89-85	84-80	79-76	75-72	71-68	67-64	63-60	59-55	54-50	<50

Evaluation Notes: A grade of “D” grants credit, but may not be sufficient as a prerequisite for sequential courses.

Exam Attendance:

Students must attend all scheduled exams at the appointed time and place. Instructors may approve an alternate exam to accommodate an illness or personal crisis. Department heads will consider other written requests. Any student who misses a scheduled exam without prior approval will receive a “0” on the exam.

Academic Policies:

College of the Rockies policies related to courses can be found at https://cotr.bc.ca/about-us/college-policies/ and include the following:

- Policy 2.4.3 Students with Documented Disabilities
- Policy 2.4.4 Student Conduct (plagiarism, other cheating, behavioral misconduct)
- Policy 2.5.8 Academic Performance
- Policy 2.5.3 Grade Appeal
- Policy 2.4.9 Student Concerns Re Faculty

Course Changes:

The College of the Rockies updates course outlines regularly to meet changing educational, employment and marketing needs. The instructor will notify students in writing of any updates to this outline during the semester. The instructor reserves the right to revise, add or delete material while meeting the learning outcomes of this course outline.