

BIO 24
Vertebrate Zoology
Class meets 10: MWF 10:00 AM – 11:05 AM.
The X-hour is Th 12-12:50 PM (we will be using some of the X-hours)

Professor

Ryan G. Calsbeek 338 Life Sci Office Hours: T 11-12 pm & Fri 2:30-3:30pm

Overview

This course will examine origins, diversity, structure and function within and among the vertebrate classes (including fish, amphibians, reptiles, birds and mammals). We will consider the evolution of the vertebrate body plan and innovations associated with common organ systems (e.g., skeletal, muscular, digestive, sensory, etc.) shared by different taxa. In addition, we will consider specialization of form and function to the diverse ecology of vertebrates as well as the manner in which very different taxa cope with similar habitats and environmental demands. In so doing, we will draw on evolutionary principles such as adaptation, convergent and parallel evolution and evolutionary constraints. **Prerequisites** Bio 15 or 16

Objectives

The objectives of this course are to...

1. *Examine* physical adaptations and constraints across the vertebrates
2. *Investigate* evolutionary outcomes of changes in life history from water to land to air
3. *Apply* these physical, physiological and evolutionary principles to the most common contexts for making a living in the vertebrates (locomotion, mating, social and interspecific interactions).
4. *Integrate* this information and these concepts across the groups.

Readings

I will post readings before each class period on blackboard. Most of these will be from the recommended text book but occasionally we will read papers from the primary literature.

I have set up a Blackboard site (<https://www.dartmouth.edu/~blackboard/>) for Bio 24. The specific reading assignments for each class, as well as powerpoint slides will be available on Blackboard. Other materials such as sample quiz questions and keys may also be posted. I recommend that you check the site often for newly posted material.

Assessment of Your Academic Performance

I will give two midterms and a final exam, and you will write one term paper (title TBD) during this term. Midterms will be given during class or the Xhour (**Thursday 12-12:50 PM**). You must arrange your schedule such that you can attend the X-hour—no exceptions. If you are taking a course with a lab, please make sure that you do not sign up for a laboratory section that meets on Thursday afternoons. Each midterm will be worth 20% of your grade. The Final Exam (35%) will be cumulative and cover all aspects of the course. The term paper will be worth 15% of your grade. The remainder of your grade will be assessed based on short laboratory exercises and participation.

Academic Honesty

Academic honesty is essential. The following is quoted directly from the Dartmouth College Student Handbook : "Students who submit work that is not their own or who commit other acts of academic dishonesty forfeit the opportunity to continue at Dartmouth."

The complete text of the Academic Honor Principle is in the Student Handbook or at:

(<http://www.dartmouth.edu/~reg/regulations/undergrad/acad-honor.html>). Please read the Honor Principle carefully; **you** are responsible for knowing and understanding the Honor Principle, and adhering to its letter and spirit. Any violations of the Honor Principle in this course will be referred to

the Committee on Standards and may result in your suspension for multiple terms, or, in the most extreme cases, separation from the College.

Special Circumstances

I encourage students with learning, physical, or psychiatric disabilities that may need special classroom accommodations to make an appointment to see me by the end of the second week of the term. All discussions will be confidential, although we may need to consult the Student Accessibility Services office to discuss implementation of special requests. I recognize that some students may wish to take part in religious observances that fall during the term. Should you have a religious observance that conflicts with your participation in the course, please speak with me by then end of the second week of the term to discuss appropriate accommodations.

Important Dates: **Midterm I (20%) Lectures 1-7: (OCTOBER 4 in class)**
 Midterm II (20%) Lectures 8-17: (OCTOBER 30 in class)
 Final Exam (cumulative) (35%): (NOVEMBER 22 8 a.m.)
 Term Paper (15%): in class

Lecture Schedule:

1. Vertebrate origins 9/18
2. Evolutionary Process 9/20
3. Axial Skeleton 9/23

The Fishes

4. Fish origins (*adaptive radiation of cichlids*) 9/25
5. Life under water (*physiology I*) 9/27
6. Fish locomotion (*physiology II*) 9/30
7. Fish reproduction and behavior (*sex allocation theory*) 10/2
8. Bone 10/7

Amphibians

9. Tetrapod origins and amphibian lifehistory 10/9
10. Amphibian phys; lingual feeding (*constraints, natural selection as a problem solver*) 10/11
11. Lifehistory II and amphibian mating (*plasticity and mosaics*) 10/14
12. Amphibian biodiversity and speciation (*ring species*) 10/16

Reptiles:

13. Endothermy vs. ectothermy (discussion, debate, and lecture) 10/18
14. Reptile locomotion 10/21
15. Behavior and reproduction (*cryptic choice*) 10/23
16. review (*lifehistory evolution, growth/dimorphism, metamorphosis*) 10/25
17. endocrine system 10/28

Birds (X-hour birds in flight)

18. Flight (*physiology*) 11/1
19. Communication (*learning and cognition*) 11/4
20. Reproduction and behavior (*lekking*) 11/6

Mammals

- 21. Mammal Origins 11/8
- 22. Locomotion in mammals (*walking versus running, performance*) 11/11
- 23. Reproduction and behavior 11/13
- 24. Language acquisition (*log-transformations and brain size*) 11/15
- 24. Course review and catching up 11/18