

Vertebrate Biology: BZ214 Spring 2024

Instructor: Dr. Shane Kanatous

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Office Hours: 9:30-10:30 Tuesday, Thursday and by appointment.

Meeting times: Lectures will be presented 8:00 to 9:15 (BSB 131) on Tuesday and Thursday.

There will be no Vertebrates labs the first week of Class

Teaching Assistants:

Melissa Morado: mel.morado@colostate.edu: Monday 10-12:50 and Tuesday 10-12:50

Makenna Juergens: makenna.juergens@colostate.edu: Monday 1-3:50 and Tuesday 1-3:50

Andrew Draper: andrew.draper@colostate.edu: Tuesday 4-6:50 and Thursday 10-12:50

Julianna Mendez: Julianna.Mendez@colostate.edu: Wednesday 10-12:50 and 1-3:50

Chloe Butler: chloe.e.butler@colostate.edu: Wednesday 4-6:50 and Thursday 1-3:50

Course Objective: To introduce second year students majoring in zoology or biological science to the evolution of the anatomical, morphological, physiological and ecological characteristics of vertebrate animals.

BZ214 will be a survey of the characteristics that make chordates important, interesting and unique. This class will provide a firm foundation for advanced training in ichthyology, herpetology, ornithology and mammalogy. This course will address the five core areas of knowledge; evolution, Structure and Function, Information flow exchange and storage, Pathways and transformation of energy, and systems, identified by the Department of Biology.

This class will be a challenge; to succeed; you will need to assimilate many new facts. You will need to acquire a basic understanding of numerous mechanisms and processes. We strongly suggest you join a study group and make flash cards with the numerous terms and characteristics you will need to know and understand.

Areas of competency and skill in disciplinary practice

1. **Apply the process of science:** 1) interpret the conclusions drawn from data and current scientific literature

2. **Use quantitative reasoning:**Based on graphs showing the relationship between two variables (e.g. running speed, aerobic metabolic rate), interpret the meaning of the function and predict how the function differs in other species.
3. **Tap into the interdisciplinary nature of science:**Explain the different perspectives different fields of science (i.e. behavior, anatomy, geology, physiology, molecular biology) have in terms of vertebrate history.
4. **Communicate and Collaborate with Other Disciplines:**Explain and discuss the different perspectives different fields of science have in terms of vertebrate history. The objective is to be able to elaborate and share the concepts learned in Vertebrates with colleagues both inside and outside of your discipline.
5. **Understand the relationship between science and society:**Explain the differences between current views and timescales of conservation and environmental change versus geologic perspectives.
6. **Use situational skills:**Use dissections to learn the many characteristics that are shared and derived that classify and distinguish different organisms as vertebrates. Use preserved museum specimens and accompanying databases as research tools in vertebrates.
7. **Respect diversity, practice inclusion:** 1. Introduce the different viewpoints of vertebrate research across different cultures and fields of science. In addition, introduce the contributions of numerous different cultures to the understanding of vertebrates. 2. Introduce and discuss concepts associated with personal biases towards science and the need to respect diverse viewpoints and concepts.
8. **Write:**The writing competency and concept recognition will be tested by short answer format questions on quizzes and exams throughout the semester.
9. **Use a computer:**Explain how computational tools are used to address diverse questions about vertebrates (e.g. biomechanics of locomotion and feeding, phylogenetic history and rates of speciation and extinction, and historical losses and regains of traits over evolutionary time). Perform computer-visualization-enabled comparative analyses of 3D skull structure in vertebrates.

Required Text: *Vertebrate Life*, 11th edition, 2023 by F. Harvey Pough et al., Pearson, New Jersey, ISBN 978-1-60535-607-5 and *The Dissection of Vertebrates*, 3rd edition by De Iuliis and Pulera, Academic Press, ISBN-978-0-12-410460-0

Dissection kits, gloves, and old shirt, etc. will be needed for the lab

Canvas: Registered students will have automatic access to the Canvas site. Prior to each class we will post some figures to aid, but not replace in-class notetaking. A list of review topics will be provided following each lecture.

iClickers are required for this course. They will be used for extra credit quizzes and in-class exercises. It will be your responsibility to ensure you have and have registered your own i-clicker in order to receive credit for the quizzes and to perform exercises.

Grading: Your final grade will be based on your performance on the lecture exams and laboratory practical exams. There will be 5 lecture exams worth 100 points each. In addition there will be 3 lab quizzes worth 10 points each, 3 lab practical exams worth 40 points each and

2 take home assignments worth 25 points each. The total number of points for this course will be 700.

Exams are 50% multiple choice questions, 25% true/false questions and 25% short answer questions. These exams are meant to test your comprehension and synthesis of the information.

Exams must be taken on the scheduled date. Makeup exams will only be given to students with a University approved absence, which provide documented evidence. Makeup exams will be given at a time of the instructor's choosing. **If you miss an exam for any other legitimate reason, we will average the other exams to compute your final grade. If you miss more than one exam or the final exam, you will receive an incomplete.** If you miss a lecture exam for any unapproved reason, you will receive a score of zero on that exam. If you belong to any University sponsored group, we must be informed of known conflicts with exams with a letter signed by an appropriate authority **by the beginning of the second week of classes.** Cutoffs for A, B, C, and D grades will be 90, 80, 70, and 60% of the class point total, respectively. We are happy to discuss exam questions with you at any time. However, for scoring purposes, no exam scores will be changed after 7 days following posting of exam scores and keys. **We adhere to the Academic Integrity Policy of the Colorado State University General Catalog {Page 7} and the Student Conduct Code.**

Please note that attendance at the exams and labs are required. If you do not show up for the first two labs of the semester, you will be dropped from this course.

There will be no extra credit assignments for either the lecture or lab.

There may be random pop quizzes in the lecture that if answered correctly will be worth 1 point as well as extra credit questions on each exam.

Lecture and Readings: Reading assignments should be completed prior to coming to lecture. Some supplemental reading will be provided in Canvas to provide interesting aspects and real life applications of vertebrate biology.

BZ214 Lecture Outline

Kanatous

Dates	Topic	Reading Assignment
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Introduction to Comparative Anatomy and the Origin of Chordates

Jan. 16	Intro and Comparative Anatomy as a tool	Chapters 1-2
Jan. 18	Origin of Chordates/Vertebrates	Chapters 1-2
Jan. 23	Early vertebrates	Chapter 3

The Characteristics of Early Vertebrates

Jan. 25	Jawless and jawed vertebrates	Chapter 3
Jan. 30	Aquatic life characteristics	Chapter 4

Feb. 1 Exam 1 (100 points)

The Chondrichthyes

Feb. 6 Sharks, skates and rays Chapter 6

The Ray-Finned and Lobe-Finned Fishes

Feb. 8 Bony fish and lobed fin fish Chapter 7 and 8

Feb. 13 Bony fish and lobed fin fish Chapter 7 and 8

Movement to Land

Feb. 15 How animals evolved to live on land Chapters 11

Feb. 20 Characteristics for air-breathing Chapter 11

Feb. 22 Exam 2 (100 points)

Characteristics of Early Tetrapods, Amphibians, and Turtles (Early Reptiles)

Feb. 27 Origin of early tetrapods Chapters 9

Feb. 29 Amniotes/amphibians/Salamanders Chapters 12

Mar. 5 Reptilian characteristics Chapters 13-17

Mar. 7 Lepidosaur and squamates Chapter 15

Mar. 12 Spring Break

Mar. 14 Spring Break

Mar. 19 Vertebrates and their environment Chapter 13

Mar. 21 Exam 3 (100 points)

Dinosaurs, Crocodilians and the Evolution of Birds

Mar. 26 Ornithischian and Saurischian dinosaurs Chapter 18

Mar. 28 Ectothermy vs. endothermy Chapters 14

Apr. 2 Avian Specializations Chapter 19 and 21

Mammalian Evolution

Apr. 4 Early origins of mammals Chapter 22

Apr. 9 Common features amongst mammals Chapter 23

Apr. 11 Exam 4 (100 points)

Apr. 16	Skeleton Tour
Apr. 18	Special Dissection (Tentative Date subject to change)
Apr. 23	Mammalian Nutrition and Digestion
Apr. 25	Mammalian Reproduction
Apr. 30	Human Impact on Vertebrates
May 2	Exam 5 (100points)

There will be no final exam in this class

CSU COVID Guidance:

All students are expected and required to report any COVID-19 symptoms to the university immediately, as well as exposures or positive tests from a non-CSU testing location.

If you suspect you have symptoms, or if you know you have been exposed to a positive person or have tested positive for COVID, are directed to fill out the COVID Reporter (<https://covid.colostate.edu/reporter/Links to an external site.>). If you know or believe you have been exposed, including living with someone known to be COVID positive, or are symptomatic, it is important for the health of yourself and others that you complete the online COVID Reporter. Do not ask your instructor to report for you. If you do not have internet access to fill out the online COVID-19 Reporter, please call (970) 491-4600. You may also report concerns in your academic or living spaces regarding COVID exposures through the COVID Reporter. You will not be penalized in any way for reporting. When you complete the COVID Reporter for any reason, the CSU Public Health office is notified. Once notified, that office will contact you and, depending upon each situation, will conduct contact tracing, initiate any necessary public health requirements and notify you if you need to take any steps.

For the latest information about the University's COVID resources and information, please visit the **CSU COVID-19 site**: <https://covid.colostate.edu/Links to an external site.>.