

# **Morphology of the Vertebrate Skeleton with Laboratory**

## **IB 184L, 2019F, odd-numbered years**

*Four (4) semester credits*

### **Course Description**

Morphology of the Vertebrate Skeleton is a survey of the comparative osteology of vertebrates, with lectures on evolution, ontogeny, systematics, ecomorphology, and locomotion. The labs take advantage of a diverse teaching collection and specimens from the Museum of Vertebrate Zoology (MVZ) and Museum of Paleontology (UCMP). The laboratory section of the course includes four tracks—paleontology, morphometrics, functional morphology, and museum science—and the course includes two field trips, a half-day trip to the research collections of the California Academy of Sciences, and an overnight trip to the Point Reyes Field Station for observations of vertebrate natural history.

### **Prerequisites**

General Biology (Bio 1B) or permission of instructor.

### **Course Objectives**

By the end of the semester, you will have the ability to:

- Identify the major skeletal elements of fish, amphibians, reptiles, birds, and mammals
- Track the major transitions in the evolution of vertebrates from the Cambrian explosion to the Anthropocene
- Integrate organismal form with ecological function through comparative biomechanics
- Understand the taphonomy of fossil formation and methods of fossil recovery, element identification, and faunal analysis
- Enjoy more fully the beauty and science of the vertebrate body plan

## Instructor Contact Information

### Course Instructor

- Alan Shabel, Ph.D. | shabel@berkeley.edu | Department of Integrative Biology, UC Berkeley

### Email

You are welcome to email the instructors at any time—and you can expect a timely response—but please be respectful of your instructor's availability, particularly on weekends and holidays.

## Course Materials

There is no required textbook, but pdfs and links to web resources will be provided throughout the semester. You will also receive an instructor-authored lab manual (at no cost) that will anchor your study of lab specimens. If you are keen to get a textbook to delve more deeply, we recommend the following:

- Hildebrand, M., and G. E. Goslow, Jr. 2001. *Analysis of vertebrate structure*. 5th edition. John Wiley & Sons: New York. [The primary author of this book was a master specimen preparator, and the Museum of Vertebrate Zoology houses his finest works! We will see some of these specimens during the semester, and the lab manual includes photographs of other specimens.]
- Kardong, K. V. 2014. *Vertebrates: comparative anatomy, function, evolution*. 7th edition. McGraw-Hill Higher Education: New York. [This textbook is generally excellent on the subject.]
- Hillson, S. 2005. *Teeth*. 2nd edition. Cambridge University Press: Cambridge. [One of the better guides to that most important hard tissue of mammals, viz., teeth. Available electronically.]

## Grading Summary

Your grade in IB 184L is based on four or five lab quizzes, two midterms, a functional morphology lab assignment, an independent research project, and your attendance and participation. Lab quizzes are in the form of practical exams and are given every other week, starting in the third week of lab. The first midterm covers the lecture content of the first half of the semester, and the second midterm covers the second half and is not cumulative. The functional morphology lab is conducted with a partner and includes a write-up in scientific format. The research project is conducted independently on a subject of your choice: projects may focus on paleontology, morphometrics, functional morphology, biomechanics, museum science, or related topics. Your research project will be conveyed with a 15-minute oral presentation and a write-up of any length. In summary, your final grade will be based on the first midterm (15%), lab quizzes (30%), functional morphology lab (5%), second midterm (20%), independent project (25%), and attendance/participation (5%). We expect you to be a good citizen throughout the course and to support one another when possible. We expect you to attend all course activities; if you have a conflict, just let us know in advance, and we can accommodate you. In general, we strive to reduce the pressure and stress of grades in the course and to create an environment that is challenging, fun, and vibrant. Fiat lux!

## Laboratory policies

### Room security and maintenance

Access to the lab rooms is granted only to students and instructors of IB 184L, and no one is allowed in the lab rooms if they are not affiliated with the course. An instructor or a student Chief must be present in one of the rooms at all times (we will define the Chief concept for you on the first day of lab). Only the instructors are permitted to enter the 3093 VLSB teaching collection room that is connected to 3095 VLSB. The last person to leave the lab rooms must be sure that all doors are closed and that the lights are out. No food or drink is permitted in the lab rooms.

### Specimen handling

One of the luxuries of this course is the fact that Integrative Biology has such an incredible teaching collection for the study of vertebrates.

In addition, we will draw on specimens from the research collections of the Berkeley Natural History Museums to exhibit a wide diversity of vertebrate form and function. A small number of these specimens are too fragile or precious to be handled by students and will remain on the front lab bench for viewing only. The rest of the specimens are to be handled and closely examined with good illumination from a direct light source. Use common sense when handling specimens and please be sure to follow these guidelines: (1) Wash and dry your hands before holding specimens; (2) Hold specimens over a table, never over the floor; for fossils, always have a hand under the specimen; (3) Hold large specimens with both hands; (4) Do not lift specimens by edges or fragile processes; (4) Never point or poke at specimens with a pen or pencil; use a tool that cannot leave a mark; (5) If something breaks or comes loose, let an instructor know immediately so we can make repairs.

## General Course Policies

### Collaboration and Independence

It is possible to work in this course collaboratively and working together is encouraged. However, all graded assignments are to be completed independently, and the materials that you submit must be the result of your own independent work. To copy text or ideas from another source without reference is plagiarism, and any form of cheating or plagiarism will result in a failing grade for the assignment, as well as further disciplinary action. For information on plagiarism and how to avoid it, please explore the [UC Berkeley Library Citation Page, Plagiarism Section](#) and the [GSI Guide for Preventing Plagiarism](#).

### Honor Code

The student community at UC Berkeley has adopted the following Honor Code: "As a member of the UC Berkeley community, I act with honesty, integrity, and respect for others." Please personify this code!

### Promptness

Lectures will begin on time, and we ask that you be punctual. If it is a challenge for you to arrive on time consistently for any reason, just let us know so we can be aware of your situation. Labs will start 10 minutes *after* the official start time; on quiz days, tardiness will impact your performance. We expect you to meet the deadlines for the morphology lab write-up and the final project.

## **Students with Disabilities**

If you require course accommodations due to a physical, emotional, or learning disability, please first contact [UC Berkeley's DSP Program](#). Once your accommodations are established with the DSP Program, notify an instructor of the accommodations that you have received, and we will work with you to find good solutions.