

Syllabus: BISC 445, Fundamentals of Vertebrate Biology

4 units

Spring (Maymester) 2019

Instructor: Dr. Trond Sigurdson, ZHS 256; Email: sigurdse@usc.edu

Course Description

BISC 445 will cover the biology and evolution of the major vertebrate groups including fish, amphibians, birds, and mammals. Emphasis will be on evolution, functional anatomy, and embryology. The course is therefore a great choice for students who are interested in comparative anatomy, biodiversity, or evolution. We will discuss vertebrate evolution in detail, and also describe the methods used to study the relationships of biological taxa.

The diversity of modern vertebrates will be one major area of focus. We will also go through the nomenclature of anatomy covering the various organ systems (muscular system, nervous system etc). Special focus will be placed on the skeletal anatomy, as this provides important data both from living species and from the fossil record. The evolution of modern taxa will be illuminated with the use of fossils.

All the major groups of vertebrates will be described and demonstrated in lab, and a special focus will be put on important stages leading up to the evolution of mammals, and finally modern humans. Tours will be given by curators of fish, amphibians, birds, and mammals, and some information will also be given on the preparation of fossils. The methods studied in this course are therefore an excellent fit for students involved in programs focusing on evolutionary biology and human evolution.

Lectures will not be recorded, but supplementary files will be posted on Blackboard. However, these do not contain all the information needed, so it is very important to come to the lectures, take notes, and participate in class. Although parts of the course will be handled at the USC Dornsife ZHS building (Zumberge Hall of Science), we will spend more than half of our time in various areas of the Natural History Museum of Los Angeles County (including the La Brea Tar Pits). It is therefore very important to pay attention to messages informing you when and where to meet any given day. Our first lesson will be at ZHS.

Course Dates: May 13 – June 7

Locations: Morning sessions (9 am): ZHS 363

Afternoon sessions (12:30): Collaboratory Room, Natural History Museum

Literature:

All topics in the exam and quizzes will be covered in lectures and in the museum assignments. Participation, careful note-taking, and reading of assigned textbook chapters and papers are therefore of prime importance.

Textbook: *Vertebrate Life*, 10th edition, by Pough, & Janis.

Other readings will be announced in class.

For updates and important information see:

<https://blackboard.usc.edu>

Grading:

Participation: 15%

Quizzes: 15%

Paper assignment: 20%

Paper presentation: 20%

Final Exam: 30%

Schedule: lectures and assignments

The readings should be read BEFORE we meet each day.

(Mornings at USC, Afternoons at the NHM):

May 13

Morning: Introduction to the course; defining vertebrates; phylogenetics and paleontology

Afternoon: Introduction to the Natural History Museum, writing scientific papers

Readings: Skim Textbook chapter 1.

May 14

Morning: Chordates, agnathans, fish

Afternoon: Fish collections at the NHM with Rick Feeney

Readings: Textbook chapters 3 and 7

May 15

Morning: Amphibians, reptiles

Afternoon: Amphibian and reptile collections, with Nefti Camacho

Readings: Skim textbook chapters 14, 16, 17, 18

May 16

Morning: Introduction to birds and bird diversity

Afternoon: Ornithology collections of the NHM with Kimball Garrett

Readings: Textbook chapters 21, 22

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May 17

Morning: Introduction to mammals and mammalian diversity

Afternoon: Mammal collections of the NHM presented by Jim Dines

Readings: Textbook chapters 24, 25.

May 20

Morning: Introducing the fossil record; Paleozoic, Mesozoic, Cenozoic

Afternoon: Tour of the NHM halls.

Readings: Textbook chapters 5, 13, 23

May 21

Morning: Evolutionary history of vertebrates; paleontological record

Afternoon: Dinosaur Hall, NHM (bring dinosaur worksheet)

Readings: Textbook skim chapters 6, 8, 10. Worksheet

May 22

Morning: Evolutionary history of vertebrates cont.

Afternoon: Age of Mammals Hall, NHM

Readings: 19, 24. Worksheet on mammalian evolution

May 23

Morning: Embryology

Afternoon: Embryological stages, slides and models, paper and presentation topic due

Readings: Textbook chapter 2. Embryology worksheet.

May 24

Morning: Sensory systems in land vertebrates

Afternoon: Specimens showing sensory systems, and development of the ear

Readings: Textbook chapter 12. Assigned paper.

No lecture Memorial Day May 27

May 28

Morning: The skeletal system, the skull

Afternoon: Overview of the vertebrate skull

Readings: Skull handout and worksheet

May 29

Morning: Skeletal system cont.

Afternoon: Vertebrate postcranial skeletons

Readings: Postcranial skeleton handout and worksheet

May 30

Morning: The muscular system

Afternoon: Dissecting fish, frog and rat, bring a draft of your paper

Readings: Muscular system handout and worksheet

May 31

Friday May 31 will be spent at the La Brea Tar Pits. The paper is also due the same day (Friday May 31), so bring it with you on our trip to the tar pits.

June 3

Morning: Student presentations. Bring your PP file on a flash drive.

Afternoon: Tour in the fossil preparation lab with Doug Goodreau, NHM.

Readings: Textbook chapters 4, 12.

June 4

Morning: The nervous system

Afternoon: The brain and nervous system, models and sheep brain dissections

Readings: Textbook chapter 2 and brain handout

June 5

Morning: Metabolism, the evolution of endothermy

Afternoon: Paper discussion in the Collaboratory

Readings: Textbook chapters 15, 20, assigned paper

June 6

Morning: Digestion, respiration and circulatory system

Afternoon: Dissections, models of respiratory and circulatory systems

Readings: Textbook chapter 2, circulatory system handout

June 7

Morning: Final Exam

Statement on Academic Conduct and Support Systems

Academic Conduct:

Plagiarism – presenting someone else’s ideas as your own, either verbatim or recast in your own words – is a serious academic offense with serious consequences. Please familiarize yourself with the discussion of plagiarism in *SCampus* in Part B, Section 11, “Behavior Violating University Standards” <https://policy.usc.edu/scampus-part-b/>. Other forms of academic dishonesty are equally unacceptable. See additional information in *SCampus* and university policies on scientific misconduct, <http://policy.usc.edu/scientific-misconduct>.

Support Systems:

Student Counseling Services (SCS) - (213) 740-7711 – 24/7 on call

Free and confidential mental health treatment for students, including short-term psychotherapy, group counseling, stress fitness workshops, and crisis intervention.

<https://engemannshc.usc.edu/counseling/>

National Suicide Prevention Lifeline - 1-800-273-8255

Provides free and confidential emotional support to people in suicidal crisis or emotional distress 24 hours a day, 7 days a week. <http://www.suicidepreventionlifeline.org>

Relationship & Sexual Violence Prevention Services (RSVP) - (213) 740-4900 - 24/7 on call

Free and confidential therapy services, workshops, and training for situations related to gender-based harm. <https://engemannshc.usc.edu/rsvp/>

Sexual Assault Resource Center

For more information about how to get help or help a survivor, rights, reporting options, and additional resources, visit the website: <http://sarc.usc.edu/>

Office of Equity and Diversity (OED)/Title IX compliance – (213) 740-5086

Works with faculty, staff, visitors, applicants, and students around issues of protected class.

<https://equity.usc.edu/>

Bias Assessment Response and Support

Incidents of bias, hate crimes and microaggressions need to be reported allowing for appropriate investigation and response. <https://studentaffairs.usc.edu/bias-assessment-response-support/>

Student Support & Advocacy – (213) 821-4710

Assists students and families in resolving complex issues adversely affecting their success as a student EX: personal, financial, and academic. <https://studentaffairs.usc.edu/ssa/>

Diversity at USC

Tab for Events, Programs and Training, Task Force (including representatives for each school), Chronology, Participate, Resources for Students. <https://diversity.usc.edu/>