

BIOLOGY 324—VERTEBRATE ZOOLOGY (4 units)

SYLLABUS, FALL 2018

Welcome to Vertebrate Zoology! Zoology is the scientific study of all animal life. You have elected to join a community of zoologists for a semester, and together we will study the physical form and structure (morphology), function (physiology), behavior and interactions (ecology), and evolutionary relationships (systematics) of a diversity of animals. This course centers on observation of preserved specimens and of live animals in their natural habitat. We will also have many inquiry-based and active-learning activities!

Instructor: Dr. Bree Putman

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Office + OH: MLSC 139; MW 12:00-15:00

Meeting times and location

Lecture: 8:00-8:50 on MW in HSCI-072

Laboratory: 9:00-11:50 on MW in HSCI-072

Some class sessions will take place off-campus. You will be expected to provide your own transport to the field trip location (we can arrange carpools), and to arrive promptly at 8:00 am. Field trips will end at 11:15 to give you time to drive back to campus.

Required texts and other materials

Required:

1. Pough, F. H. & C. M. Janis, 2019, *Vertebrate Life*, tenth edition, Oxford University Press. Because this text has many useful illustrations, plan on bringing it to class for use during class activities. I will also give you additional material through Beach Board.
2. Laptop or tablet, or regular access to computer, plus headphones (bring to class)
3. Digital camera or smartphone
4. Composition notebook

Optional/Recommended:

1. Van de Graaff, K. M. & J. L. Crawley, 2013, *A Photographic Atlas for the Zoology Laboratory*, 7th edition. Useful for the lab exercises.
2. Pair of binoculars
3. Field guides for herpetofauna, birds, and mammals of Southern California

We will use the above materials during lecture and lab, and we will also be using selected readings from the scientific literature and lab worksheets (provided to you via BeachBoard), and YouTube videos from the PBS Digital Series, mainly PBS Eons (<https://www.youtube.com/channel/UCzR-rom72PHN9Zg7RML9EbA>) and CrashCourse (<https://www.youtube.com/user/crashcourse>).

This semester you paid a laboratory fee of \$25.00. We use the money to purchase specimens, supplies for the class, entrance fees to off-campus locations, and a few other disposable items, such as paper towels and soap.

Catalogue description of course

Phylogenetic survey of vertebrates (craniates). Lecture concentrates on origin and radiation of vertebrates and their functional morphology. Laboratory concentrates on skeletal and internal anatomy and taxonomy to the ordinal and familial level of living vertebrates. Letter grade only (A-F). Course fee may be required. (Lecture 2 hrs., laboratory 6 hrs.)

Detailed summary and learning outcomes

Vertebrate Zoology is an upper division, undergraduate course for majors in the biological sciences. The prerequisites for this course are BIOL 211, 212, and 213 or some similar sequence for majors, with a grade of C or better. Vertebrate Zoology will continue the material on vertebrate biology taught in those courses, concentrating mostly on systematics, phenotypic differences (morphology, physiology, behavior) among clades, and natural history.

We will conduct a phylogenetic survey of the various taxa of chordates, starting with the “invertebrates” and proceeding through the “fishes”, “amphibians”, “reptiles”, birds, and mammals. We will also concentrate on morphology and phylogeny with some attention to the physiology, behavior, and ecology of these organisms. In the process, we will cover many of the major topics taught in Ichthyology (BIOL 419), Herpetology (BIOL 421), Ornithology (BIOL 424), and Mammalogy (BIOL 423), although not in as much depth as in those courses. This course, then, should give you a general overview of the biology of vertebrates.

STUDENT LEARNING OUTCOMES:

1. Understand the naming (taxonomy), evolutionary relationships (systematics), and patterns of descent (phylogeny) of major vertebrate groups.
2. Apply the principles of basic biology and physiology to understand how animals have adapted to diverse ecological conditions.
3. Recognize taxa, identify morphological structures on animals, and explain the functional significance of phenotypic traits.
4. Interpret and visualize data in light of ecological and evolutionary theory.
5. Recognize current methods in, the value to society of, and the diversity of people within organismal research.

Specific learning outcomes will be provided at the beginning of class activities that describe the skills/knowledge you will be assessed on during examinations. These should be used to study!

Expectations of me

I am not here to show you how smart I am or to trick you in guessing wrong answers. My goal is for you to learn valuable information and skills that will help you succeed in a career beyond college. Thus, you can expect me to be honest with you, to treat you in a professional and respectful manner, to listen to your opinions and/or grievances, and to provide you encouragement and feedback as you work on class assignments.

I will respect your time by getting things going when they're supposed to start and not exceeding the time limits of our class meetings. I too have a schedule to follow, so I expect you to show up to class on time, ready to participate. If you have scheduled to meet with me outside of class, please show up to that meeting on time too. Finally, you can expect me to be fun and silly, and to use plain language when explaining scientific concepts. It is my responsibility to follow these expectations of me (and you should hold me accountable to them), and I expect you to do the same for the expectations of you detailed on this syllabus.

Field trips

This semester we will have required field trips to the Aquarium of the Pacific, the Natural History Museum of Los Angeles County, Deane Dana Wilderness Park, Bolsa Chica Wetlands, and an undisclosed natural area for one of the field quizzes. CSULB pays your entrance and parking fees, but you must provide transportation to and from the sites. We will meet at the locations specified on the course schedule (unless stated otherwise). You must dress appropriately for each field trip—wear comfortable clothing, and clothes appropriate for the forecasted weather. Bad weather will NOT cancel field trips, only in extreme circumstances. You should also wear sunscreen and bring water, writing materials, and your notebook to the field site. Should any injuries occur during a field trip, immediately notify me as soon as possible.

Assignments and basis for course grade

This course has a large laboratory (active learning) component, and your grade will be critically influenced by your level of engagement in activities done in class (as opposed to memorizing lecture slides). For instance, you will be expected to recall the family, genus, and/or species names of notable vertebrates (mainly from Southern CA), and time in class will be available for you to learn distinguishing characteristics of various clades. Lecture and lab will be intertwined to maximize the effectiveness of each day's activities and learning goals (e.g., a traditional lecture might not always occur at the start of the class session). Thus, it is important that you attend the full class period to maximize learning opportunities. You will have many opportunities to contribute to your grade throughout the semester through various exercises. Your course grade will be based on these major requirements:

1) Preparation for and in class-based activities (20% of grade)

For this class, you will work in a group of four students (chosen by the instructor) on activities over the course of the semester. During nearly every class session, you will work with your group on activities related to the course's learning outcomes. These activities vary day-by-day depending on the session's topic, but some examples include watching and discussing YouTube videos, discussing scientific papers, engaging with a guest speaker, interpreting data, drawing animal specimens and associated structures, and creating and interpreting phylogenetic trees. You may be required as homework to prepare for a day's activities (i.e., reading a paper beforehand), and I will provide you with these pre-class assignments at least a week in advance. Class-based activities will not be graded individually; instead, you will receive a **score of 0-4** on your level of engagement for each class session, including whether you prepared for the activity ahead of time (if appropriate for that class session). **You will be permitted three passes that grant an exemption for a day's worth of activity** (e.g., you may miss up to three class sessions), but if you miss class, you will lose opportunities to learn material that will be on the exams (38% of your overall grade). Because most of the examination questions come from classroom material, you will probably have difficulty getting a very high grade if you do not regularly attend class.

Participation Rubric

0 – No show

1 – Did less than half of the class activities and/or did not attend full class period

2 – Did more than half of the class activities, but not engaged with discussions or their group

3 – Did more than half of the class activities, engaged with discussions and their group

4 – Did 100% of activities and fully engaged

2) Lab/field notebook (8% of grade)

This course requires a considerable amount of visual-spatial thinking, and professional zoologists use notebooks to help learn and visualize organisms and their traits. You will track your observations of animal specimens and of live animals (seen on field trips) in a notebook. You will be expected to draw the specimens that are set out for observation during some lab sessions. Although you may take photographs of animals, these photos WILL NOT COUNT towards the notebook drawing credit and cannot be included in the notebooks. You will be expected to keep species lists (common and scientific names) of the animals we observe during field trips. You will use a modified version of the Grinnell field notebook style to record these observations. During each Lab Practical/Exam, I will check your notebook and if it is up to date, you will receive credit up to that date. **Late notebooks will not be considered.**

3) Field activities/test (16% of grade)

You will have three chances to raise your grade during field trips this semester. These assessments will take place at off-campus locations, generally a place where we can observe live animals or animal specimens. Activities will involve identifying taxa based on looking at an animal or signs of an animal (e.g., scat), and then explaining an aspect of the animal's behavior, ecology, or natural history.

Questions on the final test will be impromptu, meaning that they will be based on what is observed during the field trip, which cannot be predicted ahead of time. Most questions will be short answer (1-2 words) and some may be true/false. Take advantage of time in class to look at specimens to prepare for these activities. Because they will be done at an off-campus location, the activities **cannot be made up**.

4) Exams and lab practicals (38% of grade)

There will be three exams over the course of the semester. These will include a mixture of traditional examination questions (short answer, matching, fill-in-the-blank, or multiple choice) and a lab practicum that, together, test how well you demonstrate your knowledge of the course subject matter. The practicum will test your ability to classify specimens and identify important structures on those specimens, both external and internal. These are **in-class exams**. Refer to the schedule for lab practical dates. Exams will be non-cumulative. Due to the nature of the setup involved for these exams, you cannot make up a lab practical for ANY REASON! If you miss the exam, you will receive a zero.

5) Semester-long project assignments (17% of grade)

You will have two projects that will be due by the end of the semester, the 'iNaturalist Participation' assignment and the 'Horror Movie' assignment. You will work on the iNaturalist assignment alone, and on the Horror Movie concept in a group. For the iNaturalist assignment, you will contribute wildlife observations to and engage with fellow naturalists on the iNaturalist citizen science platform (accessible via smartphone app). For Horror Movie assignment, you will write a synopsis and create a movie trailer for a horror movie about an unusual vertebrate animal. You will have time during our field trips to record iNaturalist observations and you will have time in class at the end of the semester to work on the Horror Movie project. I will provide you with detailed instructions on what is expected of you for each of these assignments at a later date.

Evaluation

Your overall grade will be based on the following:

Assignment	Total points	Percent of grade
Participation in Class (23 at 4 pts ea.)	92	20%
Notebook (1 for whole semester)	39	8%
Field Activities (2 at 20 pts ea.)	40	8%
Field Exam (1 at 40 pts)	40	8%
Exams/Lab practicals (3 at 60 pts ea.)	180	38%
Horror Movie Project	45	10%
iNaturalist Participation	35	7%
TOTAL =	471	100%

Grade cutoffs

Grades will be based on the following: 424 points for an A, 377 for a B, 330 for a C, 283 for a D, and <283 for an F. NO EXCEPTIONS.

Contacting me

I enjoy meeting with students outside of class to talk about animals, biology, music, etc. I would love to see you during my office hours. Outside of personal contact in class and during open office hours, my CSULB email is the best method of contacting me about the course. I do not have course email directed to my phone, which means I must be in front of a computer to receive email. I also do not look at emails past 6 pm (work-life balance is important!). So keep in mind that my responses may not be instantaneous. Give me enough time to respond please!

Use of electronic devices

If someone is speaking (i.e., me, a guest lecturer, or a fellow classmate during a discussion), it is extremely rude to use your electronic device. Don't do it! If you are taking a quiz or test, it is unethical and against university policy to use an electronic device. Don't do it! If you use your electronic device inappropriately you will lose points and I will take it away for the class session. You are free to use electronic devices at any other times and they will be required for several class activities (e.g., iNaturalist observations). I realize the sessions are long, and I encourage the use of devices for research and taking images of specimens. In short, please use your electronic devices in a responsible and respectful manner.

Withdrawal policies

You must secure my signature in order to withdraw from this course after September 11. If you intend to withdraw from this course using a low grade as the reason, you must secure my signature to do so by the end of November 16. Between November 19 and December 12, you may withdraw only for reasons beyond your control and not a low grade.

Disabilities

If you have a university-verified disability, please notify me in advance so I can arrange for the appropriate accommodations. *It is the student's responsibility to notify the instructor in advance of the need for accommodation of a university verified disability.*

Strategies for success

I have high expectations of you, and I want to see you succeed in understanding and applying the material in my class. Please do not hesitate to ask questions at any time! I am more than happy to discuss questions and problems both in class and outside of class. In order to succeed in this class, you must both know and understand the material. I suggest the following study tips:

- **BEFORE CLASS:** Look over the text BEFORE COMING TO CLASS. Do the assigned homework as well 😊
- **DURING CLASS:** BE THERE!! Participate in the group activities! Be ready to ask questions!! Chances are that if you have a question over a term or concept, other students in the class do as well. Make good use of the scheduled class time—don't just go through a model or microscope slide or specimen once, go through it until you know it! Draw the specimens. Drawing forces you to pay attention to details such as relative position and size of various structures. Take a little time each class to review what you did in the previous class as well...this keeps the lab practical material from becoming overwhelming. Stay for the full class period to maximize your time.
- **AFTER CLASS:** Look over your notes and re-read parts of chapters covering any terms or concepts that you are still not comfortable with.

Fall 2018 Schedule

Because life is unpredictable, this schedule is tentative and may change!

Text pgs do not include the chapter summaries and discussion questions, but I highly recommend looking over those to prepare for the exams!

Blue cells = dates when participation is graded (23 total)

Yellow cells = exams

Peach cells = field trips

Week	Date	Day	Topic	Text pgs	Class activities	HW (due the following class session)
1	27-Aug	Mon	Introductions, How do we classify life?	1-9	Taxonomy and phylogeny exercises	Definitions of phylogenetic terms
1	29-Aug	Wed	Phylogenetics	1-9	Taxonomy and phylogeny continued	
2	3-Sep	Mon	NO CLASS			
2	5-Sep	Wed	What makes a vertebrate?	19-29	Chordate specimens	Read Spear et al 2017
3	10-Sep	Mon	Extant jawless fishes, Intro to iNaturalist and field notes	46-50	Campus walk – practice field techniques	Read articles on cyclostomes, cyclostome synapomorphies
3	12-Sep	Wed	Extinct armored fishes; Transition to jaws	41-45, 50-61	Specimens of jawless fish and armored fish, Chondrichthyes synapomorphies	
4	17-Sep	Mon	Challenges for life in water	65-80	Stations Exercise	Read article + Q&A
4	19-Sep	Wed	Cartilaginous fishes	95-98, 103-116	Guest speaker, fish specimens	Read article + Q&A
5	24-Sep	Mon	Bony fishes	122-128, 134-142	Guest speaker, fish specimens, bony fish synapomorphies	Bony fish synapomorphies
5	26-Sep	Wed	Bony fishes continued	142-157	Specimen Grouping exercise, review for test	
6	1-Oct	Mon	Aquarium of the Pacific - Field Activity			
6	3-Oct	Wed	Exam/Lab practical + Notebook check			
7	8-Oct	Mon	Origin and radiation of tetrapods, life on land	128-130, 164-168, 172-175, 211-226	Stations Exercise, Intro to Southern CA terrestrial vertebrates	"Rise of tetrapods" + Lissamphibian synapomorphies
7	10-Oct	Wed	Salamanders, anurans and caecilians	181-206	Southern CA terrestrial vertebrates continued	
8	15-Oct	Mon	Deane Dana Wilderness Park			
8	17-Oct	Wed	Synapsids vs Sauropsids (including Diapsids), Turtles	175-177, 283-297, 343-352	Diapsid synapomorphies, Herp specimens	Diapsid synapomorphies
9	22-Oct	Mon	Turtles + Lepidosaurs	283-297, 301-324	TSD activity, Herp specimens	
9	24-Oct	Wed	Lepidosaurs + Crocodylians	301-324, 329-338	Herp specimens	
10	29-Oct	Mon	Bolsa Chica Wetlands			

10	31-Oct	Wed	Ectothermy vs Endothermy	227-230, 253-255, 269-280, 371-383	Rattlesnake temperature activity, herps continued	
11	5-Nov	Mon	Dinosaurs	353-367	Specimen Grouping exercise, Review for test	Prepare for test
11	7-Nov	Wed	Exam/Lab practical + Notebook check			
12	13-Nov	Tue	Birds	387-394	Bird specimens, Horror Movie time	
12	14-Nov	Wed	Birds continued	399-430	Birds continued, Horror Movie time	Prepare for field test!
13	19-Nov	Mon	NO CLASS			
13	21-Nov	Wed	NO CLASS			
14	26-Nov	Mon	Field Test - Location TBD			
14	28-Nov	Wed	Synapsids and mammals	451-474	Mammal specimens	Read article + Q&A
15	3-Dec	Mon	Mammals continued	482-515	Guest speaker, mammals continued	iNaturalist due next class!
15	5-Dec	Wed	Mammals continued	482-515, 519-549	Review iNaturalist data, mammals continued	
16	10-Dec	Mon	Natural History Museum of LA County – Field Activity			
16	12-Dec	Wed	Exam/Lab practical			
17	17-Dec	Mon	Horror Movie Trailer Festival!	None!	Horror Movie Trailer Festival!	