

ZOO4462C Herpetology

Instructors

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Course Summary

This course features lectures and laboratory sections that provide a broad introduction to the diversity, evolution, and biology of amphibians and reptiles. Topics include evolutionary history, systematics, diversity, ecology, behavior, physiology, anatomy, and natural history. Laboratory sections provide hands-on experience with amphibians and reptiles and make use of the scientific collections of the Florida Museum of Natural History. 4 Credit hours.

Course Lectures and Laboratory Sections

The course will meet for lecture once each week and once for laboratory each week.

Lecture: Monday, Wednesday, and Friday, Period 2 (8:30 – 9:20 am), Bartram 211

Laboratory Sections, Carr 120

Section (1), Thursday, Periods 7 and 8 (1:55 PM – 3:50 PM)

Section (2), Friday, Periods 7 and 8 (1:55 PM – 3:50 PM)

Required Course Materials

There is no required textbook. Instructors will distribute readings from the primary literature each week.

Course Objectives

- (1) identify major groups of amphibians and reptiles in the United States
- (2) demonstrate familiarity with natural history of amphibians and reptiles
- (3) summarize basic biology of major groups of amphibians and reptiles
- (4) describe major research themes and career paths in herpetology

Grading:

Grades will be based on quizzes, several short writing assignments, attendance in class and field trips, laboratory assignments and lab practicals, and cumulative final exam during Finals Period that includes content from both lecture and laboratory assignments.

Quizzes (4)	10%
Amphibian Biologist Biography	5%
Reptile Biologist Biography	5%
Amphibian Family Account	10%
Amphibian Meme	2%
Reptile Poem	3%
Reptile Research Group Project	15%
Cumulative Final Exam	15%
Attendance (lecture <u>and</u> lab)	10%
Laboratory assignments	10%
Laboratory practical	15%
Total:	100%

Grading Scale

A	93–100%	C+	77–79%
A-	90–92%	C-	70–72%
B+	87–89%	D+	67–69%
B	83–86%	D	63–66%
B-	80–82%	D-	60–62%
C	73–76%	F	<60%

Exams and Assignments:Quizzes

We will have four (10–15 minutes) in-class quizzes covering lecture and jigsaw content. These will involve multiple choice and short (1–3 sentences) written responses.

Biographies

Students will complete a one-page biography of both an amphibian biologist and a reptile biologist; students must receive approval from the faculty about the chosen person. Biographies must provide the following details: (1) career trajectory (including academic and/or professional training); (2) a summary about the type of work the person did; (3) the groups of amphibians and/or reptiles with which the person is best known for working; (4) a summary of the individual's role in mentoring (whether academic or otherwise); and (5) a summary of their broader impact on the profession of herpetology.

Amphibian Family Account

Each student will write a 3-page (maximum; not including references), double-spaced account about the biology of an amphibian family. Each student will be randomly

assigned an amphibian family to write about. Each family account must summarize (1) taxonomic diversity and phylogenetic relationships to other families, (2) geographic and elevational distribution, (3) description of habitats and microhabitats, (4) general description of body forms, size, and distinctive anatomy, (5) life history and reproductive mode (including what is known of larval biology, if relevant), (6) known threats and conservation concerns, and (7) and at least two natural history facts that the student found surprising. Each account must include in-text citations (e.g., “Darwin, 1859”) and be accompanied by a section containing full citations for all references cited.

Amphibian Meme

Each student must create a meme representing one fact about amphibian biology. Creativity is encouraged, but memes should not contain potentially offensive terms or imagery. These will be shared with all students in the course via Canvas.

Reptile Poem

Each student must create a short poem (5–10 lines) representing one or more facts about reptile biology. These will be shared with all students in the course via Canvas.

Reptile Research Group Project

In groups of three or four, students must write a hypothetical 5-page (maximum; not including references) research project examining some aspect of reptile research. Groups will choose their own topics and develop proposal that seeks to address a novel question related to the ecology, evolution, behavior, or conservation of reptiles. Groups must receive approval for their topics from faculty. Research projects should include (1) an introduction providing background and addressing the research gap for the chosen topic, (2) a specific research question(s) pertaining to the topic, (3) proposed hypotheses and predictions, (4) hypothetical methods that could be used to test the hypotheses, (5) expected results, and (6) a short discussion. Research proposal must be formatted as a scientific article, include in-text citations (e.g., “Blackburn & Longo, 2022”), and requires a section containing full citations for all references cited. There will be two opportunities for groups to receive feedback from instructors. Groups will submit their written research projects at the end of the semester and give a presentation about their projects in class.

Rubrics

Rubrics for all written assignments will be posted on Canvas. Please review our expectations before submitting the assignments.

Laboratories

Each week, students will participate in one of the two-hour laboratory sections. Labs will be organized largely taxonomically with a different focus each week (i.e., crocodylians, turtles, lizards). For several labs, we will visit natural areas on the UF campus and students will learn methods and techniques used to capture and sample amphibians and reptiles. Most labs will make use of the scientific specimens (both skeletons and preserved in alcohol) preserved in the Florida Museum of Natural History. Labs will focus on providing students with hands-on familiarity with major lineages of amphibians

and reptiles around the world as well as the diversity found in Florida. Lab assignments will guide students through examination of specimens for each week's focal group and build skills in identification. The lab practical will evaluate identification skills but also important biological themes (e.g., locomotion, feeding, life history) as they relate to anatomy of preserved specimens.

Class Schedule:

Date	Topic	Lead	Assignments	Reading
Mon - Jan 9	Introduction & History @ UF	Blackburn		
Wed - Jan 11	Amphibian Origins	Blackburn		Womack, Molly C., et al. "State of the Amphibia 2020: A review of five years of amphibian research and existing resources." <i>Ichthyology & Herpetology</i> 110.4 (2022): 638-661.
Fri - Jan 13	Caecilian Diversity & Biology	Blackburn		Wilkinson, M., 2012. Caecilians. <i>Current Biology</i> , 22(17), pp.R668-R669.
LAB 1	Intro to Collections / NATL			
Mon - Jan 16	Holiday - NO CLASS			
Wed - Jan 18	Salamander Diversity	Blackburn		Bonett, R.M., Ledbetter, N.M., Hess, A.J., Herrboldt, M.A. and Denoël, M., 2022. Repeated ecological and life cycle transitions make salamanders an ideal model for evolution and development. <i>Developmental Dynamics</i> , 251(6), pp.957-972.
Fri - Jan 20	Salamander Biology	Longo		Wake, D.B., Deban, S.M., 2000. Terrestrial feeding in salamanders. <i>Feeding: Form, function and evolution in tetrapod vertebrates</i> , pp.95-116.
LAB 2	Caecilians & Salamander			
Mon - Jan 23	Frog Diversity	Blackburn		Feng, Y.J., Blackburn, D.C., Liang, D., Hillis, D.M., Wake, D.B., Cannatella, D.C. and Zhang, P., 2017. Phylogenomics reveals rapid, simultaneous diversification of three major clades of Gondwanan frogs at the Cretaceous–Paleogene boundary. <i>Proceedings of the national Academy of Sciences</i> , 114(29), pp.E5864-E5870.
Wed - Jan 25	Frog Biology	Blackburn	Quiz	Sherratt, E., Anstis, M. and Keogh, J.S., 2018. Ecomorphological diversity of Australian tadpoles. <i>Ecology and evolution</i> , 8(24), pp.12929-12939.
Fri - Jan 27	Jigsaw Activity: taxonomy			
LAB 3	Frogs Diversity			
Mon - Jan 30	Amphibian Physiology	Longo		
Wed - Feb 1	Amphibian Reproduction & Life History	Longo		Zamudio, K.R., Bell, R.C., Nali, R.C., Haddad, C.F. and Prado, C.P., 2016. Polyandry, predation, and the evolution of frog reproductive modes. <i>The American Naturalist</i> , 188(S1), pp.S41-S61.
Fri - Feb 3	Amphibian Parental Care	Longo		Schulte, L.M., Ringler, E., Rojas, B. and Stynoski, J.L., 2020. Developments in amphibian parental care research: history, present advances, and future perspectives. <i>Herpetological monographs</i> , 34(1), pp.71-97.
LAB 4	Frog Reproductive Biology + Tadpoles			

Date	Topic	Lead	Assignments	Reading
Mon - Feb 6	Amphibian Communities & Phenology	Hartmann		Werner, E.E., Skelly, D.K., Relyea, R.A. and Yurewicz, K.L., 2007. Amphibian species richness across environmental gradients. <i>Oikos</i> , 116(10), pp.1697-1712.
Wed - Feb 8	Amphibian Coevolution & Symbioses	Longo		Kerney, R. Symbioses between salamander embryos and green algae. <i>Symbiosis</i> 54, 107–117 (2011). https://doi.org/10.1007/s13199-011-0134-2
Fri - Feb 10	SPEAKER			
LAB 5	Dissection & Internal Anatomy			
Mon - Feb 13	Amphibian Genomes, Sex Determination, & Cells	Longo		Mueller, R.L. and Jockusch, E.L., 2018. Jumping genomic gigantism. <i>Nature Ecology & Evolution</i> , 2(11), pp.1687-1688.
Wed - Feb 15	Amphibian Neurobiology	Blackburn		O'Connell, L.A., 2020. Frank Beach Award Winner: Lessons from poison frogs on ecological drivers of behavioral diversification. <i>Hormones and behavior</i> , 126, p.104869.
Fri - Feb 17	Jigsaw Activity: Die-offs		DUE: 1-page bio of amphibian biologist	
LAB 6	--Amphibian Lab Practical--			
Mon - Feb 20	Amphibian Diseases	Longo		Fisher, M.C., Garner, T.W.J. Chytrid fungi and global amphibian declines. <i>Nat Rev Microbiol</i> 18, 332–343 (2020). https://doi.org/10.1038/s41579-020-0335-x
Wed - Feb 22	Amphibian Threats, Declines	Longo	Quiz	Stuart, S.N., Chanson, J.S., Cox, N.A., Young, B.E., Rodrigues, A.S., Fischman, D.L. and Waller, R.W., 2004. Status and trends of amphibian declines and extinctions worldwide. <i>Science</i> , 306(5702), pp.1783-1786.
Fri - Feb 24	Amphibian Conservation & Mitigation	Hartmann		
LAB 7	OUTSIDE LAB: NATL			Johnson, S.A. and Barichivich, W.J., 2004. A simple technique for trapping <i>Siren lacertina</i> , <i>Amphiuma means</i> , and other aquatic vertebrates. <i>Journal of Freshwater Ecology</i> , 19(2), pp.263-269.
Mon - Feb 27	Amphibian Family Biology Presentations	--student led--		
Wed - Mar 1	Amphibian Family Biology Presentations	--student led--		
Fri - Mar 3	SPEAKER		DUE: 2–3 page written amphibian family account	
LAB 8	Crocodylans			
Mon - Mar 6	Reptile Origins	Blackburn		
Wed - Mar 8	Crocodylans Diversity & Biology	Blackburn		Guillette Jr, L.J., Gross, T.S., Masson, G.R., Matter, J.M., Percival, H.F. and Woodward, A.R., 1994. Developmental abnormalities of the gonad and abnormal sex hormone concentrations in juvenile alligators from contaminated and control lakes in Florida. <i>Environmental health perspectives</i> , 102(8), pp.680-688.

Date	Topic	Lead	Assignments	Reading
Fri - Mar 10	Turtle Diversity & Biology	Blackburn	DUE: amphibian meme	Putman, N.F. and Mansfield, K.L., 2015. Direct evidence of swimming demonstrates active dispersal in the sea turtle "lost years". <i>Current Biology</i> , 25(9), pp.1221-1227.
LAB 9	Turtles			
Mon - Mar 13 Fri - Mar 17				SPRING BREAK - NO CLASS
Mon - Mar 20	Lizard Diversity	Blackburn		Losos, J.B., Hillis, D.M. and Greene, H.W., 2012. Who speaks with a forked tongue?. <i>Science</i> , 338(6113), pp.1428-1429.
Wed - Mar 22	Lizard Biology	Blackburn		Muñoz, M.M. and Losos, J.B., 2018. Thermoregulatory behavior simultaneously promotes and forestalls evolution in a tropical lizard. <i>The American Naturalist</i> , 191(1), pp.E15-E26.
Fri - Mar 24	SPEAKER		DUE: choice of topic for reptile research proposal group project	
LAB 10	Lizards			
Mon - Mar 27	Snake Diversity	Blackburn		Schwenk, K., 1994. Why snakes have forked tongues. <i>Science</i> , 263(5153), pp.1573-1577.
Wed - Mar 29	Snake Biology	Blackburn		Jackson, T.N., et al. 2016. Rapid radiations and the race to redundancy: An investigation of the evolution of Australian elapid snake venoms. <i>Toxins</i> , 8(11), p.309.
Fri - Mar 31	Jigsaw Activity: Laws & Policies			
LAB 11	Snakes			
Mon - Apr 3	Reptile Physiology	Longo	Quiz	Seebacher, F., & Franklin, C. E. (2005). Physiological mechanisms of thermoregulation in reptiles: a review. <i>Journal of Comparative Physiology B</i> , 175(8), 533-541.
Wed - Apr 5	Reptile Reproduction & Life History	Longo		Shine, R. (2005). Life-history evolution in reptiles. <i>Annual Review of Ecology, Evolution, and Systematics</i> , 23-46.
Fri - Apr 7	Reptile Communities & Phenology	Longo	DUE: 1-page bio of reptile biologist	
LAB 12	OUTSIDE LAB: NATL			
Mon - Apr 10	Reptile Coevolution	Longo		Reimche, JS, Brodie, ED, Stokes, AN, et al. The geographic mosaic in parallel: Matching patterns of newt tetrodotoxin levels and snake resistance in multiple predator-prey pairs. <i>J Anim Ecol.</i> 2020; 89: 1645- 1657.
Wed - Apr 12	Reptile Genomes & Sex Determination	Blackburn		Gamble, T., Coryell, J., Ezaz, T., Lynch, J., Scantlebury, D.P. and Zarkower, D., 2015. Restriction site-associated DNA sequencing (RAD-seq) reveals an extraordinary number of transitions among gecko sex-determining systems. <i>Molecular Biology and Evolution</i> , 32(5), pp.1296-1309.
Fri - Apr 14	SPEAKER			
LAB 13	--Reptile Lab Practical--			
Mon - Apr 17	Reptile Neurobiology	Blackburn		Mason, R.T. and Parker, M.R., 2010. Social behavior and pheromonal communication in reptiles. <i>Journal of Comparative Physiology A</i> , 196(10), pp.729-749.

Date	Topic	Lead	Assignments	Reading
Wed - Apr 19	Reptile Diseases, Threats, and Declines	Ossiboff		
Fri - Apr 21	Reptile Conservation & Mitigation	Longo	Quiz; DUE: reptile poem	Cox, N., Young, B.E., Bowles, P. et al. A global reptile assessment highlights shared conservation needs of tetrapods. Nature 605, 285–290 (2022).
LAB 14	Panel of Grad students & postdocs			
Mon - Apr 24	Reptile Research Group Presentations	--student led--		
Wed - Apr 26	Reptile Research Group Presentations	--student led--	DUE: 5-page written research group project	

Preferred Methods for Public and Private Communications

Canvas mail should be used for all course-related communications. The instructors will NOT answer emails from external accounts (e.g., GMAIL). Note: Participation in Canvas Discussions is considered a public conversation within the class.

Class Attendance and Make-Up Policy

Excused absences are consistent with university policies in the undergraduate catalog (<https://catalog.ufl.edu/ugrad/current/regulations/info/attendance.aspx>) and require appropriate documentation. Late assignments will not be accepted without a documented excuse. A make-up quiz will be provided at the end of the semester. This score will replace one missing quiz grade or the lowest score. No extra assignments will be provided.

Class Demeanor

Students are expected to be to class on time and behave in a manner that is respectful to the instructor and to fellow students. Please do not use cell phones during class. Opinions held by other students should be respected in discussion, and conversations that do not contribute to the discussion should be held at minimum, if at all. Emails sent to the instructor must follow professional etiquette.

Accommodations

Students with disabilities who experience learning barriers and would like to request academic accommodations should connect with the Disability Resource Center. It is important for students to share their accommodation letter with their instructor and discuss their access needs, as early as possible in the semester. Faculty can expect to receive a student's accommodation letter within the first 3 weeks of classes; however, if a student registers with the DRC later in the semester faculty are still obligated to facilitate accommodations. Neither faculty nor administrators may independently deny a request for accommodation that is approved by the Disability Resource Center.

Plagiarism will not be tolerated in this class, as it constitutes intellectual theft and academic dishonesty. We will use Turnitin on all written assignments. UF students are bound by The Honor Pledge which states, "We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honor and integrity by abiding by the Honor Code. On all work submitted for credit by students at the University of Florida, the following pledge is either required or implied: "On my honor, I have neither given nor received unauthorized aid in doing this assignment." The Honor Code specifies behaviors that are in violation of this code and the possible sanctions. Furthermore, you are obligated to report any condition that facilitates academic misconduct to appropriate personnel. If you have any questions or concerns, please consult with the instructor.

All students must conform to UF's Honesty Code regarding cheating, plagiarism, and the use of copyrighted materials, which you can find at the [Student Honor Code and Student Conduct Code](#).

Plagiarism includes but is not limited to:

1. Stealing, misquoting, insufficiently paraphrasing, or patch-writing.
2. Self-plagiarism, which is the reuse of the Student's own submitted work, or the simultaneous submission of the Student's own work, without the full and clear acknowledgment and permission of the Faculty to whom it is submitted.
3. Submitting materials from any source without proper attribution.
4. Submitting a document, assignment, or material that, in whole or in part, is identical or substantially identical to a document or assignment the Student did not author.
5. Using artificial intelligence language technologies to generate written content for class assignments.

Evaluations

Students are expected to provide professional and respectful feedback on the quality of instruction in this course by completing course evaluations online via GatorEvals. Guidance on how to give feedback in a professional and respectful manner is available at <https://gatorevals.ua.ufl.edu/students/>. Students will be notified when the evaluation period opens, and can complete evaluations through the email they receive from GatorEvals, in their Canvas course menu under GatorEvals, or via <https://ufl.bluera.com/ufl/>. Summaries of course evaluation results are available to students at [GatorEvals Public Data](#).

Additional Resources

- **U Matter, We Care:** If you or someone you know is in distress, please contact umatter@ufl.edu, 352-392-1575, or visit umatter.ufl.edu/ to refer or report a concern and a team member will reach out to the student in distress.
- **Counseling and Wellness Center:** Visit counseling.ufl.edu/ or call 352-392-1575 for information on crisis services as well as non-crisis services.
- **Student Health Care Center:** Call 352-392-1161 for 24/7 information to help you find the care you need, or visit shcc.ufl.edu/
- **University Police Department:** Visit police.ufl.edu/ or call 352-392-1111 (or 9-1-1 for emergencies).
 - **UF Health Shands Emergency Room / Trauma Center:** For immediate medical care call 352-733-0111 or go to the emergency room at 1515 SW Archer Road, Gainesville, FL 32608; [UF Health Emergency room/trauma center](#).