**Biology of Southern Appalachian Salamanders**

**Highlands Biological Station, 2022**

Kenneth H. Kozak, University of Minnesota (kozak016@umn.edu)

Joseph H. K. Pechmann, Western Carolina University (jpechmann@wcu.edu)

***Course syllabus (as of 15 May, subject to revision)***

|  |  |  |
| --- | --- | --- |
| ***May 23******Monday*** | AM | *LECTURE*: Introduction to the course, amphibians, salamanders, and lungless salamanders. *READINGS:* Vieites et al. 2011; Wake 2012; 2017. |
| PM  | *FIELD TRIP*: Park Gap and Deep Gap, Nantahala Mtns.-Blue Ridge |
| EVE | *LECTURE*: Physiography of the southern Appalachians |
| ***May 24******Tuesday*** | AM | *LECTURE*: Plethodontid systematics, diversity and diversification I. *READINGS:* Chippindale et al. 2004; Vieites et al. 2007;Tilley 2016; Camp and Wooten 2016; Kozak 2017.*FIELD TRIP*: Indian Gap, Great Smoky Mountains; Bunches Bald and Yellow Face Overlooks, Blue Ridge Parkway |
| PM |
| EVE | Return to HBS |
| ***May 25******Wednesday*** | AM | WORK ON READINGS FOR DISCUSSION: Wake 2017; Tilley 2016; Kozak 2017. |
| PM | *LECTURE:* Plethodontid systematics, diversity and diversification II. *READINGS:* Chippindale et al. 2004; Vieites et al. 2007;Tilley 2016; Camp and Wooten 2016; Kozak 2017.*PAPER DISCUSSIONS*: Wake 2017; Tilley 2016; Kozak 2017. |
| EVE | *CLASS EXERCISE*: *Plethodon* hybrid zone sampling |
| ***May 26******Thursday*** | AM | *WORK ON READING*: Hairston et al. 1992. |
| PM | *LECTURE*: Hybrid zones.*CLASS EXERCISE*: Analyze hybrid zone data. |
| EVE | *CLASS EXERCISE*: Collect *Desmognathus ocoee* at Bridal Veil Falls for body size measurements and courtship experiments |
| ***May 27******Friday*** | AM | *WORK ON READINGS FOR DISCUSSION*: Hairston 1986; Peterman et al. 2016.CLASS EXERCISE: Measure salamanders from Bridal Veil Falls.  |
| PM | *LECTURE*: Plethodontid life history, demography, and ecology.*PAPER DISCUSSION*: Hairston 1986; Peterman et al. 2016. |
| EVE | *CLASS EXERCISE*: Collect *D. ocoee* at Whiteside Mountain for body size measurements and courtship experiments |
| ***May 28******Saturday*** | AM | *LECTURE*: Plethodontid courtship behavior. *READINGS:* Arnold et al. 1993; 2017; Wilburn et al. 2017*CLASS EXERCISE*: Measure salamanders from Whiteside |
| PM | *CLASS EXERCISES*: Analyze body size data from Bridal Veil Falls and Whiteside. Setup courtship experiment. |
| EVE | Open |
| ***May 29******Sunday*** | AM | *CLASS EXERCISE*: Score courtship experiment |
| PM | Open |
| EVE |

|  |  |  |
| --- | --- | --- |
| ***May 30******Monday Memorial Day*** | AM | *FIELD TRIP*: Blue Ridge Escarpment/Hickory Nut GorgeContinue to Black Mountains (through Asheville)(Camp at Black Mountain Campground, Pisgah National Forest) |
| PM |
| EVE |
| ***May 31******Tuesday*** | AM | *FIELD TRIP*: Black Mountains/Mount Mitchell |
| PM |
| EVE | Return to HBS |
| ***June 1******Wednesday***  | AM | *WORK ON READINGS FOR DISCUSSION*: Arnold et al. 2017; Wilburn et al. 2017. |
| PM | *CLASS EXERCISES*: -Analyze courtship data.-Analyze body size data from Black Mountains*PAPER DISCUSSIONS*: Arnold et al. 2017; Wilburn et al. 2017. |
| EVE |
| ***June 2******Thursday***  | AM | *FIELD TRIP*: Head to Blue Valley for *Desmognathus marmoratus*, |
| PM | Study for exam*,* work on field trip reports, and research papers.**Field trip reports due, 5 PM.** |
| EVE |
| ***June 3******Friday*** | AM | **Final Exam**  |
| PM | Work on research papers, **Papers due, 5 PM**.  |
| EVE |

**Grading:** The final grade will be based on contributions to activities and discussions in the field and classroom (1/4), field trips report (1/4), paper (on one of the field exercises), (1/4) and final exam (1/4).

97% and above will guarantee an A+ in the course, 93-96% an A, 90-92% an A-, 87-89% a B+, 83-86% a B, 80-82% a B-, 77-89% a C+, 73-76% a C, 70-72% a C-, 67-69% a D+, 63-66% a D, 60-62% a D-, and < 60% an F. Western Carolina University graduate student grades do not include a + or -.

**Things to bring:**

*Required:*

-Field notebook

-Headlamp and 2 sets of spare batteries

-Sleeping bag

-Sleeping pad

-Raincoat

-Hiking boots

-Computer (laptop)

*Suggested:*

-Tent (please bring one for the overnight trip if you have one)

-Camera

-Rain pants

-Water shoes, rubber/plastic knee boots, or rubber/plastic (not neoprene) hip waders

-Water bottle

**Things to bring (continued):**

*Suggested:*

-Field guides/reference books: (Bring 1 or 2)

Beane, J. C., A. L. Braswell, J. C. Mitchell, W. M. Palmer and J. R. Harrison III.

 2010. *Amphibians and reptiles of the Carolinas and Virginia*. Second edition.

 University of North Carolina Press, Chapel Hill, NC.

Powell, R. Roger W. Conant and Joseph T. Collins. 2016. *Peterson Field Guide to Reptiles and Amphibians of Eastern and Central North America*, 4th Edition. Houghton Mifflin Harcourt, New York.

Tilley, Stephen G. and James E. Huheey. 2004. *Reptiles and Amphibians of the Smokies*. Great Smoky Mountains Natural History Association. Second edition.

Mitchell, Joe and Whit Gibbons. 2010. *Salamanders of the Southeast.* University of Georgia Press, Athens, GA.

Petranka, James W. 1998. *Salamanders of the United States and Canada.* Smithsonian Institution Press, Washington, DC.

**Reading List:**

Arnold, S.J., Regan, N.L., and P.A. Verrell. 1993. Reproductive isolation and speciation in plethodontid salamanders. Herpetologica 49:216-228.

Arnold, S.J., Kiemnec-Tyburczy K.M., and L.D. Houck. 2017. The evolution of courtship behavior in plethodontid salamanders, contrasting patterns of stasis and diversification. Herpetologica 73:190-205.

Camp, C.D., and J.A. Wooten. 2016. Hidden in plain sight: cryptic diversity in the plethodontidae. Copeia 104:111-117.

Chippindale, P.T., Bonett, R.M, Baldwin, A.S., and J.J. Wiens. 2004. Phylogenetic evidence for a major reversal of life-history evolution in plethodontid salamanders. Evolution 58:2809-2822.

Hairston, N.G. 1986. Species packing in *Desmognathus* salamanders: an experimental demonstration of predation and competition. American Naturalist 127:266-291.

Hairston, N.G., Haven Wiley, R., Smith, C.K., and K.A. Kneidel. 1992. The dynamics of two hybrid zones in Appalachian salamanders of the genus *Plethodon.* Evolution 46:930-938.

Kozak, K.H. 2017. What drives variation in plethodontid salamander species richness over space and time? Herpetologica 73:220-228.

Peterman, W.E., Crawford, J.A., and D.J. Hocking. 2016. Effects of elevation on plethodontid body size. Copeia 104:202-208.

Tilley, S.G. 2016. Patterns of genetic differentiation in woodland and dusky salamanders. Copeia 104:8-20.

Vieites, D.R., Nieto Román, S., Wake, M.H., and D.B. Wake. 2011. A multigenic perspective on phylogenetic relationship in the largest family of salamanders, the plethodontidade. Molecular Phylogenetics and Evolution 59:623-635.

Vieites, D.R., Min, M-S., and D.B. Wake. 2007. Rapid diversification and dispersal during periods of global warming by plethodontid salamanders. Proceedings of the National Academy of Sciences U.S.A. 104:19903-19907.

Wake, D.B. 2012. Taxonomy of salamanders of the family plethodontidae (Amphibia: Caudata). Zootaxa 3484:75-82.

Wake, D.B. 2017. Persistent plethodontid themes: species, phylogeny, and biogeography. Herpetologica 73:243-251.

Wilburn, D.B. Arnold, S.J. Houck, L.D., Feldhoff, P.W., and R.C. Feldhoff. 2017. Gene duplication, co-option, structural evolution, and phenotypic tango in the courtship pheromones of plethodontid salamanders. Herpetologica 73:206-219.

**Accommodations for students with disabilities** (source: Western Carolina University [WCU], administrator of Highlands Biological Station): “Western Carolina University is committed to providing equal educational opportunities for students with disabilities. The Americans with Disabilities Act (ADA) is a federal anti-discrimination statute that provides comprehensive civil rights for persons with disabilities. Among other things, this legislation requires that students with disabilities be guaranteed a learning environment that provides for reasonable accommodation of their disabilities. If you believe you have a disability requiring an accommodation, please contact the Office of Accessibility Resources located in Killian Annex or call 828-227-2716. For additional information, visit [go.wcu.edu/oar](http://go.wcu.edu/oar)” We recommend contacting Accessibility Resources before the course.

**Attendance and participation policy:** Punctual attendance and participation are required for all classes, field trips, and labs. Please do not attend if you are under quarantine or not feeling well, especially if you have symptoms consistent with Covid-19. Please email the instructors before class or lab and let them know if you don't feel well. Other absences will be excused only for university- or instructor-approved reasons.

 Students are responsible for all material, assignments, and announcements made in class whether they were present or not. If you miss a field trip or lab (excused or not) you must do the exercises on your own, if possible. If you miss a discussion of scientific literature (excused or not) you must write a 2-3 page critique of each paper. All students are expected to participate actively in class, literature discussions, field trips, and laboratory exercises to facilitate learning.

**Class etiquette:** You are expected to be on time for class, field trips, and lab exercises and to participate during their entire duration. Movement in and out of the room while class is in session is distracting and should be avoided. Cell phones should be turned off or silenced during class and lab, and not used except as directed by the instructor for course purposes.

**Community vision for inclusive excellence statement** (source WCU): “The diverse perspectives encountered at WCU are an important part of the preparation of students for roles as regional, national, and global leaders who contribute to the improvement of society. It is expected that members of the WCU community will not only coexist with those who are different from themselves, but also nurture respect and appreciation of those differences. We encourage civil discourse as a part of the learning enterprise, and as a campus we do not tolerate harassing or discriminating behavior that seeks to marginalize or demean members of our community.”

**Academic honesty policy** (source WCU): “Students, faculty, staff, and administrators of Western Carolina University (WCU) strive to achieve the highest standards of scholarship and integrity. Any violation of the Academic Integrity Policy is a serious offense because it threatens the quality of scholarship and undermines the integrity of the community... Instructors have the right to determine the appropriate academic sanctions for violations of the Academic Integrity Policy within their courses, up to and including a final grade of “F” in the course in which the violation occurs…” Violations of the Academic Integrity Policy include:

“Cheating - Using or attempting to use unauthorized materials, information, or study aids in any academic exercise.

Fabrication – Creating and/or falsifying information or citation in any academic exercise.

Plagiarism - Representing the words or ideas of someone else as one’s own in any academic exercise.

Self-plagiarism - Reusing work that you have already published or submitted for a class. It can involve re-submitting an entire paper, copying, paraphrasing passages from your previous work, or recycling old data.

Facilitation - Helping or attempting to help someone to commit a violation of the Academic Integrity Policy in any academic exercise (e.g. allowing another to copy information during an examination).”

Additional information is available on the Student Success website under Student Community Ethics: <http://www.wcu.edu/experience/dean-of-students/academic-integrity.aspx>

**Course recording and broadcasting** (source WCU): “Students may make visual or audio recordings (Recording) of any class related content, using any approved recording device (e.g., smart phone, computer, digital recorder, etc.) upon the prior permission of the instructor and subject to the following restriction(s).  The Recording, along with the video capture of visible course materials (e.g., visible PowerPoint slides and/or visible lecture notes), shall be limited to the student’s personal, course related, educational use and shall be subject to all applicable copyright laws and institutional policies.  The student may not transfer, transmit, or otherwise disseminate the Recording to any third party, including classmates, without the permission of the instructor.  Any violation of these restrictions, or any other restriction verbally communicated by the instructor, may subject the student to the provisions of the [WCU Academic Integrity Policy](https://www.wcu.edu/experience/dean-of-students/academic-integrity.aspx), the [WCU Code of Student Conduct](https://www.wcu.edu/experience/dean-of-students/student-community-ethics/wcucode.aspx) or both.”

[**Be Prepared for an Emergency**](https://www.wcu.edu/discover/campus-services-and-operations/emergency-services/emergency-guide.aspx)

[**Counseling and Psychological Services**](https://www.wcu.edu/experience/health-and-wellness/caps/index.aspx)