

**The Biology of Southern Appalachian Salamanders
Highlands Biological Station, 2022**

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Course syllabus (as of 28 May)

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

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

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 -.

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 relationships in the largest family of salamanders, the plethodontidae. *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. *Herpetological* 73:206-219.

Things to bring:

Required:

- Field notebook
- Headlamp and 2 sets of spare batteries
- Sleeping bag
- Sleeping pad
- Raincoat

Things to bring (continued):

Required:

- Hiking boots

-Computer (laptop)

Suggested:

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

-Camera

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

-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.

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 documented disabilities and/or medical conditions. Students who require accommodations must identify themselves as having a disability and/or medical condition and provide current diagnostic documentation to the Office of Accessibility Resources. Please contact the Office of Accessibility Resources, 135 Killian Annex Building on the WCU campus (next to One Stop), (828) 227-3886 or by email at accessibility@wcu.edu.“ We recommend contacting Accessibility Resources before the course.

Academic honesty policy (source: Western Carolina University, administrator of Highlands Biological Station- undergraduate and graduate catalogs): “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 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...” 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.

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).”

For full information please see the WCU undergraduate and graduate student catalogs at <http://catalog.wcu.edu/>.

Attendance and participation policy: Attendance is required for all classes, labs, and field trips. In order for an absence to be excused, the reason must be documented (in advance when possible) according to the guidelines presented in the Western Carolina University undergraduate and graduate catalogs (links above). Excuses will be granted in the case of a documented and bona fide medical emergency, death of an immediate family member, or religious observance (required form at <http://registrar.wcu.edu> [select Forms & Resources]). Other cases will be judged on an individual basis. Students are responsible for all material, assignments, and announcements made in class whether they were present or not. If you miss a 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 in order to facilitate learning.

Class etiquette: You are expected to be on time for class and to stay for the entire class. Movement in and out of the room while class is in session is distracting and should be avoided. Cell phones should be out of sight and turned off or silenced during class.