

**Biology of Southern Appalachian Salamanders  
Highlands Biological Station, 2020**

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*Course syllabus (as of 5 January, subject to revision)*

<b>June 1 Monday</b>	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 southern Appalachians
<b>June 2 Tuesday</b>	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
<b>June 3 Wednesday</b>	AM	WORK ON READINGS FOR DISCUSSION: 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
<b>June 4 Thursday</b>	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
<b>June 5 Friday</b>	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
<b>June 6 Saturday</b>	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
<b>June 7 Sunday</b>	AM	<i>CLASS EXERCISE:</i> Score courtship experiment
	PM	Open
	EVE	

<b>June 8</b> <b>Monday</b>	AM	<i>FIELD TRIP:</i> Blue Ridge Escarpment/Hickory Nut Gorge
	PM	Continue to Black Mountains (through Asheville)
	EVE	(Camp at Black Mountain Campground, Pisgah National Forest)
<b>June 9</b> <b>Tuesday</b>	AM	<i>FIELD TRIP:</i> Black Mountains/Mount Mitchell
	PM	
	EVE	Return to HBS
<b>June 10</b> <b>Wednesday</b>	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.
<b>June 11</b> <b>Thursday</b>	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	<b>Field trip reports due, 5 PM.</b>
<b>June 12</b> <b>Friday</b>	AM	<b>Final Exam</b>
	PM	Work on research papers.
	EVE	
<b>June 13</b> <b>Saturday</b>	AM	Work on research papers. Pack up belongings.
	PM	<b>Papers due, 5 PM.</b>

**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

**Things to bring (continued):**

*Suggested:*

- Rain pants
- Water shoes, rubber/plastic knee boots, or rubber/plastic (not neoprene) hip waders
- 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*, 4<sup>th</sup> 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 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. *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:** Attendance is required for all classes, lab exercises, and field trips. For an absence to be excused, the reason must be documented (in advance when possible) following the guidelines presented in the Western Carolina University undergraduate and graduate catalogs (<http://catalog.wcu.edu/>). 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 “view our forms page”]). 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 lab or field activities (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 out of sight and turned off or silenced during class.

**Academic honesty policy** (source: Western Carolina University, administrator of Highlands Biological Station): “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.

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>