

# Evolution and Ecology, Fall 2011

Professor: Corey Devin Anderson, Ph.D. (Evolution, Ecology, and Population Biology)

Lecture location: BSC 1025

Days and time: Tuesday and Thursday 9:30 to 10:45 AM

Lab location: BSC 2073

Lab sections: 1) Wed, 9:00 to 11:50 AM; 2) Fri, 8:30 to 11:20 AM; Fri 12:00 to 2:50 PM

Office: 1104 Bailey Science Center

Office Hours: Thursday 3-5PM, or by appointment.

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## Tentative schedule of topics\*

### Week 1 (16/18 Aug)

16 Aug: Introduction to ecology and evolution; overview of course.

18 Aug: History of evolutionary biology; science and religion “conflict”.

*Lab Week 1: The scientific method and scientific writing; nature of biological inquiry.*

### Week 2 (23, 25 Aug)

23 August: Macroevolution I (phylogeny and “tree-thinking”); molecular evolution.

25 August: Microevolution I (Hardy-Weinberg; population structure: gene flow, drift, mutation, system of mating).

*Lab Week 2: Natural history and natural history notes.*

### Week 3 (30 Aug, 01 Sept)

30 Aug: Microevolution II (quantitative genetics, natural selection).

01 Sept: Macroevolution II (species concepts; speciation/extinction, tempo and mode of evolution; development evolutionary biology).

*Lab Week 3: Cladistics and methods of phylogenetic reconstruction.*

### Week 4 (06, 08 Sept)

06 Sept: EvoDevo guest lecture (Dr. Cristina Calestani—Gene regulatory networks underlying development and evolution of Sea Urchin embryos).

08 Sept: Behavioral Ecology I (coevolution: predator-prey arms race, warning coloration, mimicry; group living and sociality; fighting and assessment, evolutionary stable strategies).

*Lab Week 4: Bacterial Selection I; Computer simulations of microevolutionary mechanisms.*

Week 5 (13, 15 Sept)

13 Sept: Behavioral Ecology II (sexual conflict; sexual selection; parental care and mating systems; selfishness, altruism, cooperation).

15 September: Review session I.

*Lab Week 5: Bacterial selection II.*

Week 6 (20, 22 Sept)

20 Sept: **Midterm exam I.**

22 Sept: History of ecology.

*Lab Week 6: Mistletoe lab, part I.*

Week 7 (27, 29 Sept)

27 Sept: Population Ecology I (density dependence and independence; population growth and decline).

29 Sept: Population Ecology II (metapopulation ecology, competition, predation).

*Lab Week 7: Survivorship lab.*

Week 8 (04, 06 Oct)

04 Oct: Community Ecology I (stratification, species dominance and diversity, food webs, island biogeography).

06 Oct: Ecology guest lecture (Dr. Tim Henkel—Interspecific interactions between brittlestars and sponges).

*Lab Week 8: Forest diversity lab, part I (tree identification).*

Week 9 (11, 13 Oct)

11 Oct: Community Ecology II (classification; community assembly and succession).

13 Oct: Ecosystem Ecology I (Biomes/life zones).

*Lab Week 9: Forest diversity lab, part II (Field trip).*

Week 10 (18, 20 Oct)

18 Oct: Ecosystem Ecology II (Energy cycling, food chains, ecological pyramids).

20 Oct: Ecosystem Ecology III (Biogeochemistry).

*Lab Week 10: Forest diversity lab, part III (Field trip).*

Week 11 (25, 27 Oct)

25 Oct: Fall Break; NO CLASS!!!!!!!!!!!!!!!!!!!!!!

27 Oct: Global change.

*Lab Week 11: Forest diversity lab, part IV (Field trip).*

Week 12 (01, 03 Nov)

01 Nov: Review session I.

03 Nov: **Midterm exam II.**

*Lab Week 12: Forest Diversity lab, part V (crunch data).*

Week 13 (08, 10 Nov)

08 Nov: Physiological Ecology (physical exchange, bioenergetics and metabolic scaling, form and function, phenotypic plasticity).

10 Nov: Spatial Ecology and Landscape Ecology (spatial autocorrelation, scale, heterogeneity; fragmentation and edge effects).

*Lab Week 12: Forest Diversity lab, part VI (First drafts due; review and critique in lab).*

Week 14 (15, 17 Nov)

15 Nov: Landscape Genetics and Landscape Genomics; Phylogeography and Biogeography.

17 Nov: Conservation Biology.

*Lab Week 13: Forest diversity lab final drafts due; Mistletoe lab, part II.*

Week 15 (22, 24 Nov)

22 Nov: Urban Ecology.

24 Nov: Thanksgiving; no class!

**NO LAB THIS WEEK.**

Week 16 (29 Nov, 01 Dec)

29 Nov: Human evolution (human genetics and paleontology).

01 Dec: Last day of class! Wrap up and review.

*Lab Week 14: TBA.*



## Course information and requirements

This course is a survey of topics in the broad fields of ecology and evolution. The lectures are intended to provide an overview of key topics and the labs are intended to provide further training in statistical, computational, and field-based methods in ecology and evolution. The lab component of this class will also provide students with some training in scientific writing. Throughout the course, students will be exposed to the scientific literature. The lecture course will also contain two seminar presentations (one ecologist and one by and evolutionary biologist) that will further expose students to empirical research.

### Standards

Education outcomes for BS Degree in Biology: 1 & 5.

VSU General Education Outcomes: 3, 4, 5, & 7.

### Books and reading assignments and lecture notes

We will be using two required texts:

- 1) Evolution Principles and Processes by Brian K. Hall; the publisher is Jones and Bartlett.
- 2) Ecology and Field Biology (Sixth Edition) by Smith and Smith; the publisher is Benjamin Cummings.

While you should plan on using these texts, this class will not be based entirely on textbooks. You will also be tested on the lecture material, distributed readings, and guest lectures. The text books are intended as a guide to reinforce and to help explain the material.

### Grading

There are 1000 points available in this class. Final grades will be based on a curve, with the mean/median set at a low "B".

There will be two midterm examinations, each worth 100 points, which will consist primarily of multiple choice style questions. The final exam will also include a multiple choice section that covers the third part of the course, as well as a comprehensive writing exercise based on the entire course; the final exam will also be worth 100 points (50 points for the multiple choice section and 50 points for the comprehensive writing exercise). The sum total of your exam grades will be multiplied by two, for a total of 600 possible points.

Labs will be worth a total of 400 points. We will be doing a four-part forest diversity lab that will culminate in writing a formal scientific paper; this will be worth 100 points. All other labs will be worth 30 points each, for a total of 300 points.

Lecture attendance and participation in laboratory exercises is an important aspect of this class. At the end of the course, you will receive a *subjective* final attendance/participation grade of "above average", "average", or "subpar". If your final grade falls just below the cutoff for the next highest grade (here defined as within 30 points of the cutoff), those with "above average" attendance/participation will be bumped up to the next highest grade. If your final grade falls just above the cutoff for the next highest grade (here defined as within 30 points of the cutoff), those with "below average" attendance/participation will be dropped to the next lowest grade. For example, if the cutoff for a "B" is 800 points and you earned  $\geq 770$  points with "above average" attendance/participation, you will get a

“B” in the course. Likewise if you earned  $\leq 830$  points, but your attendance/participation was “below average”, you will receive a “C”.

#### Attendance policy

Attendance is requisite for all laboratories and is strongly encouraged for lecture (see above). If you miss a lab, you will receive zero points for that lab! If you are sick, a note is required from a health professional on official letterhead...and you must contact me ASAP (i.e., before the next lab). Other excuses will be considered on a case by case basis. If you are enrolled in the Friday lab and have a planned absence, you may participate in the Wednesday lab section (or vice versa)...but, for field trips, you must arrange your own transportation (i.e., if no space is available). It is very important that you are not late for lab, especially field trips. I will take roll at the beginning of each lab; consistent tardiness will result in a “below average” participation grade.

#### Field trip attire

We will be taking multiple field trips into inhospitable areas and will often be “off trail”. You need to wear long pants and closed toed shoes; long sleeve shirts are also recommended. During some of these trips, you will like get muddy, wet, and downright dirty; so don’t wear “nice” clothes. Insect repellent, hats, and/or sunscreen are also suggested. Don’t forget to bring drinking water!

#### Writing and plagiarism policy

For writing assignments, copying of phrases and sentences from references without proper quotation or citation will be considered plagiarism and will result in a zero on that assignment. I have access to all previous assignments from previous versions of this course and I will be checking to make sure that nobody has “borrowed” previous work. If we are caught plagiarizing previous work, you will receive a zero for that assignment and will be reported to the Dean of Undergraduate Academic Affairs.

#### Cheating policy

Do NOT get caught cheating on an exam. You will receive a zero on the exam will be reported to the Dean of Undergraduate Academic Affairs.

#### Cell phone and computer policy

Please turn your cell phones off (or on silent) when you enter the classroom. I also ask that your avoid using your computer during lecture for any other purpose beyond note taking. If you text or surf the internet excessively in class, you will receive a “below average” grade in participation/attendance.

#### Students with disabilities

Students requiring classroom or testing accommodations because of documented disabilities should discuss their needs with the instructor at the beginning of the quarter. Students not registered must contact the Access Office, Farber Hall, Phone; 245-2498. Website: <http://www.valdosta.edu/access/>