Biol 3250, Ecology and Evolution, Spring 2012

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

Preferred salutation: “Dr. Anderson”

Lecture location: BSC 1025
Days and time: Tuesday and Thursday, 11:00 AM to 12:15 PM.

Lab location: BSC 2073
Lab sections: A) Wed, 8:00 AM to 10:50 AM; B) Wed, 11:30 AM to 2:20 PM; C) Tu, 2:30 to 5:20 PM.

Final exam: BSC 1025
Fri May 4, 10:15 AM to 12:15 PM.

Office: 1104 Bailey Science Center
Office Hours: Thursday 2-4PM, or by appointment; **READ** my policy on *drop-ins*.
Email: coreanderson@valdosta.edu

The lectures provide a survey of key topics in the disciplines of ecology and evolution; the labs are intended to reinforce the lecture material, as well as 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.

Standards

Education outcomes for BS Degree in Biology: 1 & 5.
VSU General Education Outcomes: 3, 4, 5, & 7.

Policy on office “drop-ins”

I generally have an open-door policy for students who need help. That said, I prefer that students take advantage of office hours or make an appointment. I am particularly averse to students who never show up for office hours, but then try to drop-in right before an exam. Likewise, I do not like it when students show up at my office before an exam in an attempt to “milk me” for information.

As a professor at VSU, teaching is a major part of my job description. However, I am also a very active research scientist (amongst other university responsibilities). This means that I have other obligations during the semester beyond this course. If students want me to respect the fact that they have other courses beyond Biol 3250, you must respect the fact that I also have other things to do. In particular, this means that students should avoid showing up at my office unscheduled unless it is a dire situation.

Course overview

This course is an introduction to ecological and evolutionary theory. Although ecology and evolution are presented as separate disciplines, their interaction is emphasized and proficient knowledge of how ecology and evolution interact is a major learning goal and requirement for passing this course.

While the course presents an integrated view of ecology and evolution, in the first half of the class, the focus is on evolution. Macroevolutionary concepts are discussed in detail, but my presentation of the course is admittedly biased towards population genetics and microevolutionary theory. The emphasis on microevolutionary mechanisms partly reflects the fact that this is my area of expertise and I feel most comfortable teaching this material. This emphasis also reflects the fact that most macroevolutionary change is ultimately a consequence of microevolutionary change; therefore, sufficient training in microevolutionary theory is required to understand most evolutionary patterns.

While comprehension of biological evolution requires training in microevolution, the theory underlying this subject is largely based on probability theory applied to population genetic data. The quantitative nature of the subject makes it challenging for some students and teachers, so it is often underemphasized in most evolution textbooks (usually given a chapter or two, at most). In the present course, by choosing to emphasize microevolutionary theory, I have taken the opposite approach. My hope is that this emphasis will provide my students with a sound understanding of the mechanisms underlying evolutionary change at the most basal level (i.e., the population), and that enhanced training with this subject will put my students at an advantage over others who have received less instruction in this arena. Finally, I would like to note that most of the development of evolutionary biology over the last several decades has been perpetuated by technology breaks in molecular genetics; therefore, students in the modern era need to develop a good grasp of the genetic mechanisms underlying biological evolution.

At a certain point in the course, the focus shifts from evolution to ecology. In teaching ecology, I take a hierarchical approach, starting with interactions between individuals in a population (i.e., population ecology) and then subsequently covering interactions between species in a community (i.e., community ecology). The course ends with the more synthetic view of ecosystem ecology, which treats biotic and abiotic factors as an integrated whole. As both ecology and evolution have to be covered in the same semester, there are surely many important subdisciplines and topics that are not covered in sufficient detail (e.g., physiological ecology, landscape ecology, and biogeochemistry). Students requiring training in these areas are encouraged to investigate the topics independently, or to seek out more focused courses on these subjects.

It is very important for students in this course to understand that much of the development of ecological and evolutionary theory is based on quantitative models. These quantitative models usually present themselves as equations. However, as opposed to a course in mathematics, the goal is not simply to be able to manipulate and solve the equation, but rather to be able to apply the pertinent concept. The conceptual nature of the subject represents a departure from the manner in which most biology students have been trained (i.e., to memorize and regurgitate answers). This challenge is exacerbated by the fact that most students have not had previous training in ecology and evolution. These challenges, combined with the shear breadth of the material, may make this a very challenging course for some students.

Grading

I grade on a curve, using a rank-based system; this means that you will be evaluated based on how well you perform relative to other students in the class.

If you are at or above the median score in the class you will receive no lower than a "B"; the top 10-20% of the class will receive an "A". If you fall below the median, you will receive a "C" or lower; the bottom 10 to 20% of the class will get a "D" or "F".

There a total of 800 points that can be earned in this course, 400 points from lecture exams and 400 points from laboratory exercises. There will be three midterm exams (all multiple choice format), each worth 100 points. My multiple choice tests are designed to be challenging; I expect the median score to be around 50/100.

There will also be a cumulative final (essay questions) worth 100 points. I consider the final exam to be *very* important. For students near the "borderline" (i.e., at or just below the cutoff for a passing "C"), your performance on this final test may influence my decision as to whether you will pass or fail. I will also consider your performance on this test if you fall near the cutoff between other letter grades (e.g., C/B and B/A).

The laboratory exercises come in various formats, but a big chunk of your score (160/400) will be based on a written scientific paper near the end of the semester. All of the other labs are worth 30 points each. For the 30 point labs, I will drop your lowest score and double your highest score. Unless otherwise noted, labs are always due at the beginning of the next lab. Labs that are turned in excessively late will be docked five points.

Note that laboratory exercises comprise 50% of your final grade. This means that a strong performance in lab can raise your rank considerably; conversely, a poor performance in lab can also drop your class rank. In my opinion, success in the laboratory part of this class is primarily a function of effort and attention to detail. It is the primary manner by which effort is evaluated in this course.

Behavioral factors:

While I gauge effort primarily via lab, your behavior in lecture and lab may also affect your final grade. Excessive tardiness, absence, or simply a bad attitude will affect my decision making if you are one of those students near the cutoff between grades. In contrast, if you are consistently on time, attend lecture consistently, and have a good attitude (esp. during field trips), I am likely to bump up your grade if you fall near a cut-off. Typically, effort and attitude (plus overall performance on the final exam) will factor into your grade if you fall within 20 points of the next highest grade.

For those students in danger of failing (< C), I also consider whether or not you took advantage of office hours or made appointments. I will reward students who make an overt effort to succeed in this course.

Books

Required texts:

1) Population Genetics and Microevolutionary Theory by Alan R. Templeton; the publisher is Wiley.
2) Ecology and Field Biology (Sixth Edition) by Smith and Smith; the publisher is Benjamin Cummings.
3) A Primer of Ecology by Nicholas J. Gotelli; the publisher is Sinauer Associates, Inc.

Recommended text:

Any general textbook on evolution, such as:

Bergstrom CT, Evolution. Norton.
Futuyama DJ, Evolution. Sinauer Associates, Inc.
Hall BK, Evolution Principles and Processes. Jones and Barlett.
Ridley M, Evolution. Blackwell.

Why three books???

Unfortunately, there is only one text book in print that covers both ecology and evolution; for various reasons, we have chosen not to use this particular book. On the other hand, there are many satisfactory text books that cover ecology and evolution as separate subjects, but each text has its own strengths and weaknesses. For example, the required general textbook on ecology for this course (*Ecology and Field Biology* by Smith and Smith) does a nice job with the basic concepts and in giving illustrative examples, but is somewhat weak in terms of its treatment of the mathematics underlying the concepts. In contrast, the other required ecology text for this course (*A Primer of Ecology* by Gotelli) does a really nice job explaining the mathematics, but is relatively more limited in its scope and in terms of visual illustrations. Hence, I have decided that the students will be best served by requiring both books.

I have also decided to forgo a standard evolution textbook in favor of a more focused book on population genetics and microevolutionary theory. The pop gen book may be considered "overkill" by some, as its level is advanced and it contains some information that is beyond the scope of the present course. However, as much time is spent covering microevolutionary theory, I think students will benefit from the additional examples and practice problems contained in this book. Moreover, many of my lectures on this subject are based directly from this text, so reading the book should help to reinforce the lecture material.

The downside to this plan is that the total cost of all three books is rather expensive (~ $265+)…and students are still left without a textbook for the information on macroevolution presented in the course. While I am confident that I can explain the macrevolutionary concepts in sufficient detail, some students might consider buying or "checking out" a general textbook on evolution.

Students who cannot afford all three books might consider splitting them among their friends/study partners. If more affordable, students might also consider buying the books online.

Attendance policy

Attendance is requisite for all laboratories and is strongly encouraged for lecture. 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 have a planned absence, you may participate in the other lab sections…but, for field trips, you may have to 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. Excessive tardiness will affect my decision making if you have a borderline grade.

Although I will not take role throughout the entire semester, I may occasionally give a quiz or additional test questions (as required) during lecture. This means that if you miss lecture, you will get a zero on these exercises. If you are planning on missing a lecture, or are too sick to come to a lecture, I suggest you contact me via email beforehand.

Field trip attire

We will be taking multiple field trips into inhospitable areas and on some of these field trips we 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 you are caught plagiarizing previous work, you will receive a zero for that assignment and will be reported to the Dean of Undergraduate Academic Affairs. For some of the labs, I do not mind if you work as a team; however, for the formal lab report at the end of the semester, you must turn in your own original work (even if you did the analyses as a team).

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.

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/