

BIOLOGY 211-05&07
BIODIVERSITY, ECOLOGY AND CONSERVATION BIOLOGY

College of Charleston, Department of Biology, Fall 2016

Lecture: 9:30 p.m. - 10:20 p.m. MWF; HWWE 305
Discussion: Section 5- 2:00 p.m. – 4:50 p.m. Mon; HWWE 305
Section 7- 11:30 a.m. – 2:20 p.m. Wed., HWWE 305
Final Exam: Wed. Dec. 14, 2016, 8:00 a.m. – 11:00 a.m.
Instructor: Dr. Arch McCallum
Office: I don't use my assigned office at 65 Coming Street. I use the faculty offices on 3rd floor of HWWE.
Email: mccallumd@cofc.edu

Office hours: Mondays, 11:25-12:00; Mondays, 13:10-13:30; and by appointment,

Instructional Objectives

This course is intended to foster an understanding of the fundamental principles of ecology at the individual, population, community and ecosystem levels; of evolutionary processes and the phylogenetic patterns that have emerged as a result; of the diversity of life on Earth now and in the past; and of the severe impacts of humans on all of these patterns and processes.

More specifically as a student in this course you will

- review the theory of evolution, as posed by Charles Darwin and as developed into a modern concept integrated with all elements of biology
- explore the evidence in support of evolutionary theory
- explore mechanisms (or processes) of evolution including
 - how differences among individuals provide the raw material for natural selection
 - how populations evolve at the genetic level (evolutionary genetics)
 - how new species arise (speciation)
 - how life diversified on earth and what the current “tree of life” looks like (systematics and phylogeny)
- explore the features of the diverse species that inhabit the planet to discover
 - the anatomical, physiological and behavioral associations between related groups of organisms
 - the contributions of the diverse groups of living organisms to ecological systems and human welfare
 - an astonishing multiplicity of lifestyles, traits, and solutions to the challenges of life
- explore how individual organisms interact with their environment
 - in relationships with similar and different individuals (behavioral ecology)
 - as members of a reproductive community (population ecology)
 - species to species (community ecology)
 - as ecosystem components, i.e., producers, consumers, or recyclers

- apply evolutionary and ecological knowledge to the conservation of biodiversity on earth (conservation biology).

Student Learning Outcomes

At the end of this course, students are expected to be able to:

- describe the processes by which populations of organisms change in size
- explain the forces that lead to evolutionary change in populations and diversification among species
- interpret phylogenetic trees to comprehend the evolutionary relationships they depict
- discuss how interactions with the physical environment and with other organisms influence populations and communities
- build a foundation of knowledge about life's diversity and its interrelatedness
- apply ecological and evolutionary principles to the conservation of biodiversity
- apply the following skills used by professional biologists: use primary literature, generate scientific questions and pose testable hypotheses, analyze data to evaluate hypotheses, use quantitative models to describe biological processes, and communicate these to a scientific audience.

Course Description: Biologists study the natural world at many levels of a hierarchy. This course focuses on biology at the level of the whole organism and above. What explains the abundance and distribution of different organisms? How have groups of organisms diverged over time? How does science aid our ability to conserve biodiversity? During the semester, you will be introduced to three areas of focus: (1) evolutionary theory (changes in populations over time); (2) ecology (interactions between organisms and their environments at the social, population, community, ecosystem and biosphere levels, and (3) biodiversity and the study of how groups of organisms are related by common descent.

Course Structure: Professional biologists rely on understanding theoretical concepts and on using practical skills to develop and test those concepts. In this sense, biology is as much a way of knowing as it is a body of knowledge. This course includes two essential components – lecture and discussion – which contribute to a single course grade (as described later in this document).

Lecture will introduce you to key concepts in evolution, ecology, biodiversity and conservation biology as well as examples of the research involved in developing and testing these concepts. Exams given in Lecture and Finals hours will be worth 60% of your grade. You are encouraged to take notes on paper during lecture. Research has shown that this enhances understanding. While it is fun for a student to look up something on the internet and share it with the class, you are encouraged to be offline during lecture, as paying attention pays higher dividends.

Discussion/Lab will help you develop many of the practical skills used in doing science. You will gain experience exploring, reading and understanding primary scientific literature; organizing, visualizing and analyzing data; identifying research questions and developing experiments; and presenting scientific information in various lab reports and

an independently written proposal. In addition, lecture and discussion will give you the skills and perspective to evaluate an important book on evolution or ecology. Finally, through field trips and lab work, you will learn to identify and classify some 200 species of living things, most of which can be seen in the wild in Charleston County. This component addresses the course goal of literacy in natural history, which is required for any citizen to be a responsible steward of the world's biodiversity. Discussion activities, projects, and practicals, will be worth 35% of your grade. We use computers during most discussion sessions, so you are encouraged to bring a laptop if you have one, although we have enough for everyone.

Book Report. During the semester, you will obtain and read one of the books listed in the table below. A 5-page (word-processed, double-spaced) analysis must be submitted electronically by Monday, February 15 at 11 p.m. for full credit. Lecture will give you the theoretical grounding, and Discussion will give you the practical skills to evaluate the scientific legitimacy of your book. Each is ground-breaking, mind-bending, and extremely well-written in non-technical language. For more information on the assignment, see OAKS. This assignment is worth 5% of your grade.

Last Name	First Name	Title	Description
Dawkins	Richard	<i>The Selfish Gene</i>	Evolution is really about the replicators (genes) rather than the vehicles (phenotypes)
Dawkins	Richard	<i>The Blind Watchmaker</i>	Refutes William Paley's "Argument from Design" for the existence of a supernatural creator
Diamond	Jared	<i>Collapse</i>	Details why some civilizations have destroyed their life support system and others haven't.
Diamond	Jared	<i>Guns, Germs, and Steel</i>	An ecological explanation for the recent (last few centuries) dominance of Europeans in politics and business.
Harari	Yuval Noah	<i>Sapiens, a Brief History of Humankind</i>	Charts the rise of <i>Homo sapiens</i> from an evolved member of natural systems to a species that is designing its own future
Wright	Robert	<i>Nonzero</i>	How humans find win-win solutions to conflict
Wright	Robert	<i>The Moral Animal</i>	Similar to <i>Selfish Gene</i> , how morality is a biological adaptation
Quammen	David	<i>Monsters of God</i>	Efforts to save 4 apex predators.
Quammen	David	<i>Song of the Dodo</i>	The theory of island biogeography and conservation.
Quammen	David	<i>Spillover</i>	The role of wild nature in human epidemics called zoonoses.
Marris	Emma	<i>Rambunctious Garden</i>	Marris advocates for "eco-modernism." Espouses rewilding, assisted migration, and other nontraditional practices.
Earle	Sylvia	<i>The World is Blue</i>	A marine perspective
Barlow	Connie	<i>Ghosts of Evolution</i>	How "the mystery of the rotting fruit" inspired Dan Janzen and Paul Martin to formulate the "ecological widows" hypothesis, leading to need for assisted dispersal and migration of plant species that have lost their seed dispersers.

Levy	Sharon	<i>Once and Future Giants</i>	What megafaunal extinctions tell us about managing our remaining megafauna
Kolbert	Elizabeth	<i>The Sixth Extinction</i>	Past mass extinctions compared to the current one.
Harris	Eugene	<i>Ancestors in our Genome</i>	The new science of human ancestry. Fairly technical, but details recent discoveries of specific genes in humans.
Turchin	Peter	<i>Ultra Society</i>	“how 10,000 years of war made humans the greatest cooperators on earth”
Bolster	Jeffrey	<i>Mortal Sea</i>	pre-industrial depletion of North Atlantic fisheries in the age of sail

Emphases:

- understand and practice science as a way of knowing.
- understand the universality of the logic of natural selection, and be able to apply this logic to all manifestations of descent with modification
- acquire a foundation of knowledge of the diversity of living things, how they are related, and how they came to be different
- learn to use a genetic perspective in interpreting the costs and benefits of individual behavior, life-history strategies, and interspecific interactions
- understand how ecosystems function and sustain life on earth
- be able to recognize and to classify signature species of local ecosystems and representative species from all branches of the tree of life
- consider the ethical dimensions of human-caused extinction of other species, and learn to apply ecological and evolutionary principles to the conservation of biodiversity
- apply many of the skills used by professional biologists, including using primary literature, generating scientific questions and posing testable hypotheses, analyzing data to evaluate hypotheses, and developing critical thinking and writing skills.

Required Text: *Biological Science* OR *Biological Science (volume 2)*, 5th edition. S. Freeman. This is the version with the picture of a lizard on the front.

Prerequisites: **Biology 111, 112**

COURSE POLICIES

Communication – Students are responsible for knowing and complying with all announcements made by the instructor during the regularly scheduled hours of Lecture and Discussion. Additionally, documents needed for completing required (and optional) work will be available on OAKS. Check OAKS frequently for newly uploaded or recently revised documents. Finally, the instructor will send emails to the entire class as needed to inform students of changes of schedule, interesting seminars, materials needed for class, etc. It’s a good idea to check your cofc email shortly before each class.

Lecture – You are expected to attend every lecture. It is very difficult to succeed in this course without regular attendance in lecture. If you must miss lecture, be sure to get help with the notes from a classmate. All students are encouraged to meet with the instructor during office hours to ask questions.

Discussion – Discussion is “hands-on.” You will need to be on time, and present until the end of the session, to get the benefit of the exercises. Roll will be taken and a part of your grade for each discussion session will be based on attendance. You will be doing a variety of activities in the discussions, with numerous reports to hand in. Each report that is not satisfactory will be returned for revision until it is satisfactory. Failure to revise as directed will result in no credit for that report. These reports in the aggregate are worth 13% of your grade. Other sessions, such as field trips, provide familiarity with taxa covered on the final Lab Practical (12% of final grade) and you will be required to document the taxa you see on these trips. Learn where the designated parking lot is in advance of the field trip, and do not be late.

Exams – You will be tested on lecture material and assigned readings. You are encouraged to study in groups – you will learn more if you quiz each other to test the depth of your understanding of terms and concepts.

Exams cannot be made up except in the case of a true medical emergency *suffered on the day of the exam*. Other legitimate, unavoidable conflicts (e.g., med school interviews) are at the instructors’ discretion and must be approved *well in advance*. Extracurricular activities and travel plans do not qualify – please plan accordingly. Any make-up exams must be taken before the exam is handed back to the class and no more than three days after the scheduled exam time. SNAP students are requested to make arrangements with the instructor well in advance of exams.

Computers – All assignments will be required to be completed on a word processor (or other necessary software (e.g. Excel saved in version MS 2010, Powerpoint MS 2010, statistical software). Submit all assignments in Microsoft Office format. If you use a different program, convert your document to a pdf. A Computer lab is available in Harbor Walk (HWWE 206) and is generally open during the day. The Biology computer lab may be reserved for classes or labs so check the door for postings. There are additional computer labs in the Addlestone library and other locations around campus.

Class Courtesies – Be on time, turn off cell phones, do not eat, drink or smoke in the HWWE Laboratory, do study, do ask questions, *make class success a priority by not scheduling other appointments during class time*, be courteous to your colleagues. **Bring your enthusiasm – it is contagious. If you need to take an emergency call, please step out of the classroom to do so.**

ACADEMIC INTEGRITY

Academic integrity is important to the College of Charleston community. In addition, this course asks you to perform tasks like a professional biologist, and you will be required to uphold the standards of integrity expected in the profession. Plagiarism, lying, cheating or attempted cheating are violations of the College's honor code and will be dealt with accordingly. Please be absolutely sure that you understand what the honor code requires of you (refer to pages 10-12 of the student handbook, <http://cofc.edu/generaldocuments/handbook.pdf>). If you have any questions or concerns about honor code expectations or about how to avoid violations, please consult with the instructor.

Any honor code violations that occur will be handled as outlined in the student handbook.

- (a) For lesser or unintentional offenses, the student will be asked to sign a form acknowledging an understanding of the mistake. This form will be kept on file by the Dean of Students, and a second such violation will automatically result in an honor court hearing.
- (b) More serious cases of suspected academic dishonesty will be reported to the Dean of Students and forwarded to the honor board. Severe punishments are mandatory if found in violation of the honor code, including an XF for the course, a mark that indicates failure due to academic dishonesty.

Plagiarism: Plagiarism is any use of words or ideas produced by another person without proper attribution, and includes failing to paraphrase adequately or to cite sources properly. Whether intentional or unintentional, plagiarism is forbidden by the honor code. Please consult the instructor if you have any questions or concerns about how to use and cite sources.

Collaboration: Many of your Discussion projects will involve working with other students. Nevertheless, the work you submit must be completed independently. Please be sure that you understand the distinction between collaborating and copying; ask the instructor if you have any doubts. Suspicions of copying will be dealt with according to the honor code.

Re-using work: Please be aware that re-submitting work that you or anyone else has done for this or any other class or project is a violation of the honor code, even if the work is revised. Biology 211 instructors keep copies of assignments submitted by students in previous semesters, and reuse or modification of such will result in referral to the Dean of Students.

ASSESSMENT

Your grade in this course will be based on the components shown below. These components will be worth the following percentages of your final grade:

Course component

% of grade

Lecture

3 hour exams (covers material since last exam)	45%
Final exam (covers everything)	15%

Discussion

Lab Reports	13%
Lab Final Practical	12%
Proposal	10%

Book Report

5%

Total

100%

Grading policy –

A:	93.0-100.0%
A-:	90.0 - 92.9%
B+:	87.0 - 89.9%
B:	83.0 - 86.9%
B-:	80.0 - 82.9%
C+:	77.0 - 79.9%
C:	73.0 - 76.9%
C-:	70.0 - 72.9%
D+:	67.0 - 69.9%
D:	63.0 - 66.9%
D-:	60.0 - 62.9%
F:	0.0 - 59.9%

COLLEGE of CHARLESTON

SCHOOL OF SCIENCES AND MATHEMATICS

SAFETY POLICY AND PROCEDURES

The School of Sciences and Mathematics of the College of Charleston understands that the safety of our students, staff and faculty is of paramount importance. Engendering a safety culture is an important part of our mission in teaching and doing science. Each department, course of instruction, or research lab may require higher standards or procedures. The policies and procedures set forth below are understood to be minimum requirements across our departments.

In this document, the term "laboratory" is meant for a work space/facility where chemicals, biological agents, or equipment is used for research and/or instruction.

No one (student, staff, faculty, or visitor) will be allowed in a laboratory (teaching or research) to perform experiments or where experiments may be in progress unless these regulations are followed.

Students dismissed from a teaching lab due to violations of the safety procedures will not be allowed to re-enter the laboratory until authorized to do so by their supervisor (instructor) and, in the case of research laboratories, by the department chair or designee. Any course work missed because of a violation of these guidelines cannot be made up at another time (or by an extension of the lab period) and will be treated as an unexcused absence.

1. You are responsible for knowing the biological, chemical, electrical, ergonomic, mechanical, and physical hazards associated with the equipment and materials that are being utilized in the laboratory. Listen to all instructions and ask questions about that which you do not understand.
2. Know the location of safety equipment: telephones, emergency shower, eyewash, fire extinguisher, fire alarm pull.
3. Know the appropriate emergency response procedures. If there is an injury or emergency, call 953-5611.
4. Do not work alone in the laboratory if you are working with hazardous materials or equipment.
5. Use hazardous chemicals, equipment, and biological agents only as directed and for their intended purpose.
6. Do not engage in horseplay, pranks or other acts of mischief while in lab.
7. Drinking, eating, and application of cosmetics is forbidden in laboratories where chemicals or biohazards are present. Smoking is forbidden in all College buildings.
8. Appropriate personal protective equipment shall be worn. The dress code for laboratory work when using chemicals, biological or physical hazards, or when instructed to do so by the laboratory supervisor is as follows:
 - a) Wear safety glasses or goggles at all times.
 - b) No exposed skin on arms, legs or torso.
 - c) Wear lab coats or other approved protective garments.
 - d) Wear gloves or other personal protective equipment (PPE) as directed by the instructor or mandated by prudent practices based on the chemicals being handled. If in doubt, wear appropriate gloves. Latex is not permitted. Avoid cross-contamination.
 - e) Remove PPE (gloves and lab coat) when exiting the laboratory.
 - f) Wash your hands, even if gloves were used, before leaving a lab where you did any lab work.

- g) Closed toe shoes are required. The heel and top of foot must be covered. High heeled shoes, sandals, and perforated shoes are not permitted.
- h) Confine long hair and loose clothing.

9. Inspect equipment or apparatus for damage before adding chemical reagents or biological samples or energizing electrical equipment. Do not use damaged equipment.

10. Never remove chemicals, biological samples, or laboratory equipment from a lab without proper authorization.

11. Presume that all chemicals and biological samples used in the laboratory are hazardous for you and the environment, unless instructed otherwise.

12. Never leave an experiment unattended unless proper safety precautions are in place.

13. Read all labels on chemicals twice before using them in the lab. Read all instructions twice for the operation of any equipment or machinery.

14. Properly and safely dispose of all waste materials.

15. Treat sharps and broken glassware containers carefully.

a) Broken glass should be disposed of in properly marked safety containers. All sharps (needles, razor blades, etc.) used for any purpose must be disposed of in specially labeled SHARPS containers.

b) Do not place contaminated glass in the broken glassware container. Consult your supervisor.

c) Waste chemicals and contaminated PPE should be discarded as directed.

16. When using a reagent, replace the lid immediately. Never return unused reagents to stock bottles. Take only the amount needed for your experiment.

17. All chemicals and biological samples/media are to be disposed of in appropriately labeled containers. Specific instructions for each material will be provided. Pay attention to waste container labels before adding the material to be discarded.

18. Use good personal hygiene. Keep your hands and face clean. Wash hands thoroughly with soap and water after handling any chemical or biological agent.

19. Keep the work area clean and uncluttered with chemicals and equipment. Clean up the work area on completion of an operation or an experiment. Before leaving the laboratory, you are responsible for making sure your lab area is clean and organized.

20. Never store a chemical or biological specimen in an unlabeled container.

20. Always have your College of Charleston identification and insurance information with you when working in a laboratory. MedicAlert identification must be worn if you have any potential life-threatening chemical sensitivities or medical conditions.

21. Report any accident or injury, however minor, to your teaching assistant, instructor, or lab supervisor immediately. An accident report form must be completed and forwarded to the department chair, dean, and to the Director of Environmental Health and Safety.

If you have questions/concerns about safety in the lab please first consult your instructor. If these are not answered, please see the department chair. Finally, you may consult the director of Environmental Health and Safety, Randy Beaver at 3-6802 or beaverr@cofc.edu

Adopted: March 7, 2012

CougarAlert

The College of Charleston has an agreement with the Blackboard Connect Inc. [formerly The NTI Group, Inc. (NTI)] to use its Connect-ED communication software to provide an emergency notification system that is capable of reaching students, faculty, staff and parents within minutes of a campus crisis. This system is called **CougarAlert**.

Information for Students

The CougarAlert emergency notification system will contact up to six phone numbers for the student. Students may include family member numbers in their address and phone number information.

All students should log onto [MyCharleston](#) to review their address and telephone information and update as needed.

To access the address and telephone information, follow these steps:

1. Log on to [MyCharleston](#)
2. Click on the Academic Services tab
3. Click on the Banner Self-Service link in the third column
4. Click on the Personal Information link
5. Click on the Update Address and Phones and Cougar Alert link

The CougarAlert system will pull the phone number in the following order – cell phone with text messaging option, cell phone without text messaging option, residence hall room phone number, mailing phone number, home phone number, parent phone number and parent 2 phone number.

If you do not have one of these numbers in your student record, the system will select the next number on the list. To avoid issues related to timely communication of emergency messages to the proper places, every student must update his or her contact information in [MyCharleston](#) with current accurate information.

CougarAlert Display Information

When you receive an emergency message from the College of Charleston's CougarAlert System, the return e-mail address will be displayed as cougaralert@cofc.edu, and Caller ID will be displayed as 843.725.7246 (this is the College's Emergency Information Hotline).

Testing and Implementation

Testing will be conducted each semester to verify all systems are operating properly. The campus community will be notified via e-mail and web page postings when testing of the system will be conducted.

Blackboard Connect Software

[Blackboard Connect](#) is an emergency communication software that sends notification before, during and after an emergency. With this new system, the College will be able to communicate in many modes, including voice messages to home, work and cell phones; text messages to cell phones, PDAs and other devices; written messages to e-mail accounts; and messages to teletypewriters and telecommunication devices (TTY/TDD) for the hearing impaired. In combination with our existing communications methods and emergency response plans, this new notification system will significantly enhance the College of Charleston's ability to maintain a learning environment in which students are safe, secure and comfortable.

In an emergency, communications to the campus will be issued in the following priority order:

1. Message to the [Blackboard Connect](#) Emergency Notification System (phone and e-mail).
 2. Recorded message to the College's Emergency Information Hotline, 843.725.7246.
 3. Update to the Website.
 4. Printed update sheets to be distributed and posted on campus (if necessary).
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The CougarAlert system will only be used to notify you in the event of a campus crisis or emergency.