

BIOLOGY 341/341L
Section 01
GENERAL ECOLOGY
Spring 2020
College of Charleston, Department of Biology

Lecture: MWF 9:00 am to 9:50 am in Rita 241

Lab: M 1:00 pm to 5:00 pm in Rita 241

Instructor: Dr. Christopher Freeman

Email: freemancj@cofc.edu

Office: Rita 201

Office (for students) hours: M: 11 am to 12:30 pm

W: 11 am to 12 pm

or by appointment

Teaching and Laboratory Assistant: Alexander Parry

Email: parryai@g.cofc.edu

Office hours: by appointment

Classroom Communication:

I will answer emails quickly (generally within 24 hours during the week) and on or potentially before Monday if you send me an email after 5 pm on Friday. Email is the best way to get into contact with me and I encourage students to come to office hours and communicate with me as much as possible. We will use OAKS and email for assignments, schedules, handouts, announcements, etc. PDF copies of lectures will be posted on OAKS before they are given. Students are expected to frequently (daily) check the course OAKS site.

Course Description

Ecology is the scientific study of interactions between organisms and their environment. It examines questions at various scales from organisms to populations and from communities to ecosystems and the biosphere. Specifically, in this class we will explore the abiotic (physical factors) of the earth that set the stage for the structure of ecosystems. Then we will examine communities, and the fundamentals of population biology: the evolution, growth, and regulation of populations in nature. The course will finish with the concepts of community ecology and global ecology. The fundamental concepts and models in the field of ecology will be introduced through lecture, reading, discussion, writing, fieldwork, and problem-solving activities. There will be a strong emphasis on understanding the process of science through reading and critical evaluation of the primary scientific literature, writing scientific papers, and conducting field ecology projects and field observations. Students will be tested on their understanding of the meaning and applications of different concepts through exams and written assignments.

Prerequisites

BIOL 111, BIOL 111L, BIOL 112, BIOL 112L, BIOL 211, BIOL 211D

Co- or pre-requisite

BIOL 305, MATH250

Learning Objectives

Students will:

1. Develop a strong understanding of the fundamental concepts and principles in ecology;
2. Understand how biological and physical factors influence ecological systems and the distribution of biodiversity on Earth;
3. Recognize the major ecological patterns in nature and the factors that cause them;
4. Apply models to understand population and community growth and change;
5. Distinguish the many approaches scientists use to studying ecology;
6. Engage in critical thinking, discussion of primary scientific literature in ecology, and scientific writing
7. Document ecological patterns and processes through field observations and experiments
8. Make informed predictions about how different organisms will respond to environmental conditions and biotic interactions;
9. Apply scientific process to ecological questions;
10. Explain the relationships between ecology and human society in the Anthropocene.

Course structure

This course involves two components:

Lecture: will introduce students to key concepts in ecology and examples of research testing these concepts.

Laboratory: will allow students to experience science through ecological experimentation and field observations. These field trips and research projects will allow students to document and assess ecological patterns, develop practical skills used in ecology, and write scientific papers.

Required Materials

Suggested (highly) textbook – *Ecology: Evolution, Application, Integration*, Second Edition by David T. Krohne
Other required readings will also be available as pdf files placed on OAKS.

Interesting journals to target for writing assignments: *Ecology*, *American Naturalist*, *Applied Ecology*, *Oecologia*, *Scientific Reports*, *Limnology and Oceanography*, *Trends in Ecology and Evolution*, *Marine Ecology Progress Series*, and *PLOSONe*

Each student is required to have a field notebook to take notes during fieldtrips and when conducting the research project. This must be a hardbound notebook (not spiral bound) and be sturdy enough to stand up to the elements.

Assignments

All assignments will be completed on a word processor or other necessary software (e.g. Excel, PowerPoint) or as outlined below. All the software needed for this class can be accessed in the College of Charleston computer labs throughout campus. If you do not know how to use any of the applications that is required for the class, please arrange tutoring with the instructor or TA.

Key dates

Last day of drop/add: January 15,

Last day to drop with Grade of "W": March 13

Mid-term exams: Feb 12, Mar 6, Apr 3

Final Exam: Friday April 24, 8:00 am - 11:00 am in Rita 241

Grading breakdown

Lecture

Mid-term exams: 300 Points (100 points each)

Cumulative final exam: 200 Points

Class participation, attendance, and discussion: 100 Points

600 Points

Lab

Field trip notebook and reports: 100 points total

Short field experiment reports: 200 points total

Final original research project (paper) and presentation: 200 points

Research paper (Caribbean sponge ecology and life history strategies): 100 points

600 Points

Total: 1200 Points

$\geq 93\% = A$	90-92 = A-	87-89 = B+	83-86 = B
80-82 = B-	77-79 = C+	73-76 = C	70-72 = C-
67-69 = D+	63-66 = D	60-62 = D-	$\leq 59 = F$

0 due to academic dishonesty = XXF

I do not curve grades on exams, assignments, or final scores in the class, but there are opportunities (other tests, participation, lab work, assignments, and extra credit) to make up points if you do poorly on a single test or assignment. If, at the very end of the semester, your final grade is near (<0.5 points) a letter grade threshold, I will round up. As an example, if you have a 79.6, I will round up to an 80 and you will have a B- in the class. In comparison, if you have a 79.5 or below, your grade will remain a C+. This cutoff system is the only way that I can maintain a consistent treatment of grades across students, so there will be no exceptions.

Course Work Details-Lecture

Lecture exams

We will have three mid-term exams and a final cumulative exam. Topics covered in the lecture period and in the assigned readings will be fair game for exams. Format will be mixed and may include: multiple choice, matching, fill-in, short answer, drawing, and longer answer. Exams will focus on reasoning, problem solving, interpreting graphs, and understanding and applying concepts from lecture.

Discussion of primary literature

The purpose of the journal article readings, discussions, and final presentation is to get students reading primary scientific literature, to expose students to a variety of subjects, and to let students enhance their reading, presentation and critical evaluation skills. Over the course of the semester, students will read and discuss (students will also lead these) articles during the lecture sessions. Grades will be based on attendance, active participation, intellectual engagement and completion of any additional assignments in class.

Class manuscript

Marine sponges in the Caribbean have diverse life history strategies and unique traits (some are chemically defended, fast growing, high fecundity, host abundant microbial symbiont communities, dense tissue with lots of organic matter, distinct growth forms, utilize different resources, have photosymbionts, etc...). Scientist have spent the last 30 years compiling these data, but no one has yet completed a synthesis and developed conclusions about the ecological and evolutionary significance of these differences across species and the tradeoffs that shape them. To fill this gap in our understanding, the class will organize these data, conduct analyses, and write a manuscript that will be peer-reviewed and submitted for publication later in 2020.

Laboratory components:

1. Laboratory notebook demonstrating day-to-day work and participation in laboratory and an active knowledge of the scientific method (see Laboratory Field Trips below). This is due in class on March 23rd.

****For lab, please dress for the weather and you must wear closed shoes on field trips. You will not be allowed to participate if you wear sandals, crocs, flip-flops, Tevas, etc. Use of tobacco products are not permitted on field trips and cell phones only in the van. Some of the sites that we will visit are remote, so please bring snacks, water, sunscreen, and anything else that you will require.**

2. Original research project carried out with 1 to 3 people. Results will be **reported as an oral group and individually as a written report**. Grading will be based on your question, methods, data, analysis, group presentation to your peers and your individual written report.

Laboratory Field Trips and Experiments

We will be visiting a number of habitats and conducting three manipulative ecological experiments during the course of the semester. A significant part of your lab grade will be based on the quality of your laboratory notebook, a journal that documents your participation in lab and shows me that you observed some aspect of nature and thought about the results from these experiments.

There are three parts to a laboratory report (5 of these total) that will be required for each location we visit:

1. The first part of a lab report should consist of your field notes written in your notebook while on the trip. These will obviously be rough notes jotted down "on the fly", but should be thorough.
2. The second section of a report should be a detailed summary of the field trip using field notes and other information (where, what, descriptions, species lists, drawings, photographs, etc). This should be written every week before the next lab.
3. The third part is a short report based on your observations and peer reviewed literature (at least 2 articles per report with complete bibliography for each trip) that discusses some ecological process that was encountered or observed on the trip (e.g. evidence of succession, zonation, competition, predation, life history of a curious animal or plant, etc). This should be written every week before the next lab. **The total report for each site should be between 600-800+ words and documented with outside references.**

For field experiments (3 of these total):

Your final reports for each experiment must include a 1) a brief methods section, 2) results section with clear and complete (labeled with units on axes and descriptive caption) figures and a brief outline of the results supported by proper statistical analyses, and 3) a brief (one paragraph) discussion outlining conclusions about these results and how your results tie into general ecological theories or processes (with at least two references cited). As a reminder, you will complete these assignments as a class, but each student must turn in their own reports (with original text and figures)

IMPORTANT: Your notebook **MUST** be a hardbound notebook (i.e. Grade school marbled finish type) and you must bring it on all fieldtrips. Your field notes **MUST** be hand written. Detailed field trip summaries, short reports, and field experiment reports **MUST** be typed. The reports **MUST** be in sequence with the three sections comprising a lab report for the week's outing with no more than one page between reports. The format of typed pages and figures **MUST** fit the page size of your notebook and must be permanently mounted to pages in the notebook in the proper order as described above or you will not get full credit for the notebook. The complete notebook is due on or before March 23rd at the start of lab.

Research Project

For the second half of the semester, the laboratory is devoted to a field project done individually (or teams of 2 students). Students will experience the process of generating and implementing an ecological research question and project, and then present scientific information in the form of a scientific manuscript and an oral presentation to your peers. A short proposal describing the question, goals, and methodology of the project **is due on March 23rd in lab** and the student/team MUST discuss the plan with the instructor before carrying out the project, otherwise no credit will be given for the work. Students will also practice peer review and constructive criticism of writing, data analysis, interpretations and conclusions.

Course Policies

Attendance

Attendance and participation will contribute to your grade. You are expected to attend every lecture; you will learn more by attending and participating in lectures. Attendance of all activities pertaining to the laboratory section is **required** and **mandatory**. Participation on both independent and group aspects will count toward your grade. Although group activities are assessed at the group level, non-participation will influence the student's individual grade.

If extreme circumstances necessitate an absence, you are responsible for obtaining the materials and information covered and referred to in class during your absences. *Online lectures are a supplement, not a substitute for attending lectures.* If you know you will be missing a class, it is your responsibility to inform and make arrangements with the instructor in advance.

Make-up or early exams will only be given if you speak with the instructor at least 2 weeks prior to the exam with a valid reason. **Make-up for fieldtrips is not possible.**

Policy on electronic devices

Laptops can be used during class and laboratory time as long as they do not disturb anyone in the class and as long as you are using them **for our class only**. Cell phones should not be used in class or lab and cannot be used during examinations. You will be asked to leave the classroom if your phone goes off or you text excessively during class or lab.

Honor Code and Academic Honesty

All students are expected to follow the College of Charleston's Honor Code and Academic Honesty. Lying, cheating, attempted cheating, and plagiarism are in violations of our Honor Code that, when identified, are investigated. Each incident will be examined to determine the degree of deception involved.

While peer-collaboration and exchange of ideas is highly encouraged in this course, all written projects and assignments submitted for a grade must be strictly individual and your own. Students should be aware that unauthorized collaboration – working together without permission – is a form of cheating. Unless the instructor specifies that students can work together on an assignment, quiz and/or test, no collaboration during the completion of the assignment is permitted. Please be sure that you understand the distinction between collaborating and copying and **ask instructor if you have any doubts. Identical copies of text or figures count as copying so please turn in your own work.** Suspicions of unauthorized collaboration will be dealt with according to the Honor Code.

Other forms of cheating include possessing or using an unauthorized study aid (which could include accessing information via a cell phone or computer), copying from others' exams, fabricating data, and giving unauthorized assistance. Research conducted and/or papers written for other classes cannot be used in whole or in part for any assignment in this class, even if the work is revised.

Students can find the complete Honor Code and all related processes in the Student Handbook at <http://studentaffairs.cofc.edu/honor-system/studenthandbook/index.php>.

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 (this is a serious challenge in scientific writing). The Honor Code forbids plagiarism, both intentional and unintentional. Please consult the instructor if you have any questions or concerns about how to use and cite sources to avoid plagiarism.

Disability Accommodation

The College abides by section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act that stipulates no student shall be denied access to an education “solely by reason of a handicap.” Disabilities covered by law include, but are not limited to, learning disabilities and hearing, sight or mobility impairments. If you have a documented disability that may have some impact on your work in this class and for which you may require accommodations, please see an administrator at the Center of Disability Services, Lightsey Center suite 104, 843.953.1431 and the instructor so that such accommodation can be arranged. If there is a student in this class who has a documented disability and has been approved to receive accommodations through SNAP Services, please set up an appointment to discuss accommodations with the instructor.

Late Work

All assigned work must be turned in by the assigned due time on the respective due date. Work submitted past this time (even on the due date) will have **5%** of the total available points deducted for that day and for each subsequent calendar day, including weekend and holiday days, except in extremely unusual circumstances (advance arrangement required). Zero points will be allocated for an assignment if it is not turned in before the assignment is passed back, discussed in class or key posted.

Classroom and Fieldtrip Code of Conduct

You are expected to be engaged with the class, demonstrate respect for the course instructor and your peers, to be on time and present for the entire duration of each session. You can use electronic devices to take notes (although, taking notes by hand is highly recommended), but you should refrain from texting, using social media, watching videos or doing anything else that would distract you and your classmates from learning. No such devices may be used during exams. For the fieldtrip, please dress for the weather and wear closed shoes.

Getting help outside of class

Students are encouraged to meet with the instructor and/or the TA to ask questions. I am always willing to take time to help you better understand the materials. In addition, the Center for Student Learning (<http://csl.cofc.edu/>) offers a variety of helpful resources, including study strategies, workshops and tutoring.

Name and Pronoun Preference

I will gladly honor your request to address you by the name and gender pronouns of your choice. Please advise me of this early in the semester via your college-issued email account or during office hours so that I may make the appropriate notation on my class list.

Physical and Mental Health Resources

At the college, we take every students' mental and physical wellbeing seriously. If you find yourself experiencing physical illnesses, please reach out to student health services (843.953.5520). And if you find yourself experiencing any mental health challenges (for example, anxiety, depression, stressful life events, sleep deprivation, and/or loneliness/ homesickness) please consider contacting either the Counseling Center (professional counselors at <http://counseling.cofc.edu> or 843.953.5640) or the Cougar Counseling Team (certified volunteers through texting "4support" to 839863 or visit <http://counseling.cofc.edu/cct/index.php>). You can also visit both on campus on the 3rd floor of Robert Scott Small. These services are there for you to help you cope with difficulties you may be experiencing and to maintain optimal physical and mental health.

Life-College Balance and Self-Care

Whether it is family and relationship problems, working nearly full-time, depression, anxiety, problems related to alcohol or other drug use, sexual assault and/or the death of family and friends, the professor is aware of and sympathetic to the fact that college students experience these and other challenges that make it difficult to focus on academics.

If you experience one or more of these things during our class and you are struggling to complete coursework, please communicate with me early. There are numerous resources that I can recommend to you at: <https://sites.google.com/cofc.edu/self-care-hoffmann/home?authuser=1>

Depending on what you are going through and the extent to which it is affecting your life, withdrawing from the class is sometimes the best option—Friday, March 13th is the deadline for withdrawing from full semester classes. Regardless of your circumstances, please reach out to us or somebody else for support.

Food and Housing Resources

Many CofC students report experiencing food and housing insecurity. If you are facing challenges in securing food (such as not being able to afford groceries or get sufficient food to eat every day) and housing (such as lacking a safe and stable place to live), please contact the Dean of Students for support (<http://studentaffairs.cofc.edu/about/salt.php>). Also, you can go to <http://studentaffairs.cofc.edu/student-food-housing-insecurity/index.php> to learn about food and housing assistance that is available to you. In addition, there are several resources on and off campus to help. You can visit the Cougar Pantry in the Stern Center (2nd floor), a student-run food pantry that provides dry-goods and hygiene products at no charge to any student in need.

Weather Closing

If the College of Charleston closes and members of the community are evacuated due to inclement weather, students are responsible for taking course materials with them in order to continue with course assignments consistent with instructions provided by faculty. In cases of extended periods of institution-wide closure where students have relocated, the instructor may articulate a plan that allows for supplemental academic engagement despite these circumstances.

Course and Professor Evaluations

Course evaluations will be completed in class towards the end of the semester

Tentative Lecture and Lab Schedules

The topics and assignments below are tentative and may change over the semester. Check OAKS and/or email daily for changes or newly uploaded articles or information. Readings and articles include chapters in the textbook, files uploaded to OAKS or emailed to students, or articles handed out in class.

Chapter assignments or articles should be read prior to lecture for that topic. Articles to read will be uploaded to OAKS under the folder for that topic or handed out in lecture.

Date	Chapters	Topic
Section #1: Biosphere, Adaptations, Communities, Energy, and Nutrients		
8 th January	-	First Day: introductions and review of syllabus
10 th January	4, 5	The physical environment, biosphere, and climate
13 th January	4, 5	The physical environment, biosphere, and climate
15 th January	3, 10	Adaptations and life history strategies
17 th January	3, 10	Adaptations and life history strategies
20th January		MLK Day NO CLASS
22 nd January	14, 15, 16	Communities, diversity, and succession
24 th January	14, 15, 16	Communities, diversity, and succession
27 th January	14, 15, 16	Communities, diversity, and succession
29 th January	17	Productivity, ecosystems, thermodynamics, limiting factors
31 st January	17	Productivity, ecosystems, thermodynamics, limiting factors
3 rd February	17, 18	Ecosystems and biogeochemical cycles
5 th February	18	Biogeochemical cycles
7 th February	18	Biogeochemical cycles
10 th February	-	Buffer day-content, review, etc...
12th February	-	EXAM #1 (material up to and including February 10th)
Section #2: Evolutionary Ecology and Speciation		
14 th February	2	Genetics, evolution and natural selection
17 th February	2, 7	Genetics, evolution and natural selection
19 th February	2, 7	Evolution and natural selection
21 st February	2, 6	Evolution and natural selection, behavior
24 th February	6	Behavior
26 th February	10	Life history strategies
28 th February	10	Life history strategies
2 nd March	TBD	Micro- and macroevolution
4 th March	TBD	Micro- and macroevolution
6th March	-	EXAM #2 (material from February 14th to March 4th)
Section #3: Populations, competition, interactions,		
9 th March	8, 9	Demography and population ecology
11 th March	8, 9	Demography and population ecology
13 th March	8, 9	Demography and population ecology

16th March		SPRING BREAK No class
18th March		SPRING BREAK No class
20th March		SPRING BREAK No class
23 rd March	9	Population ecology
25 th March	9	Population ecology
27 th March	9, 11	Population ecology and competition
30 th March	11, 12	Competition and exploitative interactions
1 st April	11,12	Competition and exploitative interactions
3rd April	-	EXAM #3 (material from March 9th to April 1st)
6 th April	13	Mutualisms
8th April	-	Formal lecture canceled; meet to review class manuscript
10th April	-	Formal lecture canceled; meet to review class manuscript
13 th April	13	Mutualisms
15 th April	16	Island biogeography and species diversity
17 th April	16	Island biogeography and species diversity
20 th April	16	Island biogeography and species diversity
22 nd April (Wednesday)	-	LAST DAY of CLASS and REVIEW; Course evaluations
23rd April (Thursday)	-	READING DAY-no class
24th April (Friday)	-	Final Exam; 8 am to 11 am in lecture room

Tentative Ecology Lab Schedule

Week	Dates	Class activities and assignments
1	January 6 th	First week of class (No lab)
3	January 13 th	Introductions and field trip to Grice Marine Lab to set up settlement tile experiments.
4	January 20 th	Monday, January 20th-MLK Day-No lab
5	January 27 th	Trip to Stono Preserve to set up decomposition experiment <i>*Observation period in coastal ecosystems and ponds for field notebook</i>
6	February 3 rd	Trip to Folly Beach maritime forest, beach, and bridges <i>* Observation period for field notebook</i>
7	February 10 th	Trip to Grice Marine Lab to monitor and photograph original experiment and set up predation experiment. <i>*Observation period for field notebook</i>
8	February 17 th	Trip to Beidler Forest* (old growth cypress swamp). *\$6.00 admission charge per student <i>*Observation period for field notebook</i>
10	February 24 th	Class will meet in Rita 241 to compile data, review results, and assign additional roles for review manuscript
11	March 2 nd	Trip to Stono Preserve to take down experiments <i>*Observation period in longleaf pine forests for field notebook</i>
12	March 9 th	Trip to Grice Marine Lab for experiment takedown of original experiment and data analysis <i>*Observation period for field notebook (can be combined with observation period on 2.10.20)</i>
13	March 16 th , 18 th , and 20 th	NO CLASS-Spring Break
14	March 23 rd	Student project experimental design and questions
15	March 30 th	Project Time

16	April 6th	Project Time
17	April 13th	Project Time
18	April 20th	Project Time
18	April 22nd (Wednesday)	Project Reports: Oral presentations and written papers due at time of presentations

EXTRA CREDIT:

Extra credit options are of minor point value. They are available for a **maximum of 20 points (1.5 % added to your final grade!)**. Some extra credit questions may also occasionally appear on the exams for a couple of extra points. Note that your time is better spent studying the material than doing extra credit.

Option #1 (10 points each): Read a peer-reviewed, published scientific article on a subject that interests you (**not one from class or that we talk about in class**). Write a one-page (double spaced) summary of the article. For full credit, make sure to outline why the authors did the research, what their hypotheses or predictions were, the methods they used to test their hypotheses, and their results and conclusions. Also make sure to mention why you were interested in the article and attach a copy of the article to your summary to receive full credit. **The article and summary must be handed in to me (by email or hard copy) by 5 pm on April 22nd.**

Option #2 (10 points each): Go to: <http://www.iucnredlist.org> and find an organism that is of interest to you. Write a one page (double spaced) summary of the organism and why it is of interest to you. For full credit, only include an organism that has been evaluated by the IUCN and discuss what its status is, how that status was determined, what the major threats to its survival are, where it is found and its current/historical range, how many of the species are left in the world, its common and scientific name, and what, if anything is being done to protect it. **This must be handed in to me (by email or hard copy) by 5 pm on April 22nd.**

Option #3 (10 points each): Watch a TED Talk: <https://www.ted.com/talks> on some sort of Biological Science/Conservation Biology/Ecology/Biodiversity/Chemistry subject and write a one page (double spaced) summary of it. For full credit, include a link to the talk, discuss who gave it, why they decided to give it and/or why they were the best person to talk about the subject, give a summary of the main take home messages, how it relates to a subject we talked about in class, and why it is important to be discussing right now. **This must be handed in to me (by email or hard copy) by 5 pm on April 22nd.**

Option #4 (10 points each): Go to a department (<http://biology.cofc.edu/departamental-seminars/>) or Grice Marine Laboratory (<http://gricemarinelab.cofc.edu/research/marine-science-seminar/index.php>) seminar. To receive credit you must hand in a typed 5 sentence summary of the seminar that you participated in which also includes a description of what you learned from this seminar.