

**Biodiversity, Ecology and Conservation Biology  
Biology 211  
College of Charleston, Department of Biology  
Fall 2015**

**Lecture: 211 (sections 01, 02)**

Tuesday and Thursday 12:45-2:00, HWWE 213

**Discussion:**

**211-D01** Tuesday 2:10-5:10 pm room HWWE 305 - Sotka

**211-D02** Thursday 2:10-5:10 pm room HWWE 305 - Sotka

**Instructor: Dr. Erik Sotka**

**Professor, Department of Biology**

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**Office hours:** 11-12 Tuesdays HWWE 309 and by appointment

**Course overview:** The **goals** of this course are to examine the whole organism, how organisms interact with the environment, develop an understanding of evolutionary and conservation biology principles, build a framework for understanding biodiversity on Earth, develop critical thinking and writing skills, develop your toolbox of scientific methods (including hypothesis generation, data organization and data analyses), participate in **a CUREs** (Course Based Research Experiences) as well as become familiar with primary literature in biology.

This semester we will examine topics such as:

- 1) ecology and evolutionary biology of populations,
- 2) interactions between species,
- 3) large scale patterns in biology,
- 4) phylogeny as a way of understanding how groups of organisms are related,
- 5) an introduction to biodiversity on planet  
bacteria, archaea, protists, fungi, animals and 10 plants
- 6) how 1-5 relate to and apply to conservation biology, current events and recent advances.

We will include conceptual and quantitative aspects of relevant theory from historic basis to modern application.

The first two thirds of the course are conceptual and quantitative. Many of these topics you may have encountered briefly in 111 or 112. We take these ecological and evolutionary principles to the next level engaging quantitative and modelling aspects to inquiry. We emphasize reading and writing graphs to develop conceptual and quantitative components of evolutionary and ecological topics and how they relate to conservation biology. Learning in this portion of the course will include understanding models, writing models, working with data, working with models to make predictions as well as grounded in historical development of modern hypotheses and examining the body of evidence for our current understanding. We provide problem sets, worked problems in class and quizzes as ways to develop these skills.

In the third section of the course, we will introduce you to the diversity of life on the planet. As conservation of biodiversity includes phylogenetic understanding we emphasize reading, building and

creating phylogenies. To be able to bring these concepts to upper division comparative courses, this component of the course also requires a concerted effort in developing skills for learning large body of material and synthesizing this material in a united framework. Many of these organisms you may have never encountered before – let's explore them together and link back how they are critical to ecology of our planet. These skills and understanding of relationships among organisms are essential for future biology major courses as well as careers across the spectrum of biology from conservation to medicine. In discussion we spend time developing the skills to read/draw phylogenies. In class, we spend time discussing and observing through video and images the key characteristics of these organisms. Coming to class having already taken notes on the sections from each group from the text will put you on the path to success and understanding of the broad themes of biology of organisms on Earth.

We also will focus on a number of skill sets that will be important throughout your college career and are important to professional biologists:

- 1) critical thinking and writing skills for biology
- 2) formulate questions and testable hypotheses
- 3) graphing and analyzing data; working with quantitative models
- 4) evaluating statistical and biological hypotheses
- 5) working independently and in collaborations with other students
- 6) finding and reading primary literature
- 7) writing and citing scholarship appropriately in ecology and evolutionary subfields of biology
- 8) presenting findings in written, poster and oral formats

These skills will be primarily developed in the discussion sections with reinforcement in lecture.

We believe strongly in the art of note taking. This is an essential skill -- regardless of your post graduate plans. There is abundant evidence that suggest that posting powerpoint slides on line does not aid in student learning. We will however provide tools for success in learning note-taking 1) providing posted outline of the topics/material as well as graphs/figures presented during lecture you may choose to print these out and bring them to class so that you can draw all over the figures, 2) office hours during which you're welcome to come and ask questions including re-examine the slides, 3) study guides with lists of terms, practice quantitative problem sets, concepts and example questions to prepare you for the type of learning we expect to prepare for each of the two different exams. Coming to class having already read *and taken notes* on the material presented in the text will make the classroom experience much more interactive and engaging. We'll also emphasize skills of success in the types of activities that successful students engage in regarding the course material outside of class. Don't expect that coming to class is sufficient to learn the content/conceptual/quantitative attributes in biology for our course. Students who succeed develop skills in learning how to study that matches their learning style outside of the classroom – we'll help you identify and develop those skills. We'll emphasize skills and approaches to help you develop good study skills that go beyond the biology classroom.

**Discussion sessions:** The discussion sections are a **critical** component of this course. Discussion is where we will build many of the tools of how scientists do science. Particularly we will spend time working on data analysis, presentation and scientific writing. Students will work both independently and in groups (as scientists do in their daily lives). In the discussion sections, we will investigate several multi-week research projects. We will develop skills for examining, visualizing and analyzing data. We will examine the primarily literature extensively and investigate published data. (see separate discussion syllabus)

**Prerequisites** for this course include Biology 111, Biology 111L, Biology 112 and Biology 112L. Successful completion of these courses is required for enrollment in 211.

Suggested Math knowledge: through algebra or pre-calculus.

**Text:** Biological Science 5<sup>th</sup> edition (one with the Chinese water dragon), Freeman

### Course Policies

**Lecture attendance:** Attendance in lecture will set you on the road to success in this course. In lecture we set the topics into recent literature and share current findings much additional examples and details of material not in the text is explored. During lecture, we will describe evolutionary, ecological and conservation principles and share examples from the recent literature. Coming prepared to lecture, by having read the assigned chapter will be an asset towards understanding the topics covered. Lecture is an excellent time to ask questions and participate in an active discussion of topics. We adhere to the College of Charleston Absence Policy, as described in the student handbook. Miss lecture? Get notes and handouts from another student (note, exam questions come primarily from lecture not all topics are extensively complemented in the text). If you will have a planned absence on the day of an exam – you must notify us BEFORE the exam is given. Any make up (with a documented reason) must be completed before the exam is returned to the class (1-5 d from scheduled exam time). All excuses must be documented via the Dean of Undergraduate Study.

**Note-taking: See note above.** We consider note taking an important skill to develop as a student.

Stay tuned for announcements in class about on-line availability of hand outs, study guides, practice problems etc. in OAKS.

**Discussion attendance:** Attendance to discussion sections is a **required** component of this course, and is **mandatory**. Your group members will be counting on your presence, effort and intellectual engagement in the project. You must attend your assigned section. Participation in both independent and group aspects will contribute to your grade. Students who in the past have not come to discussion and have not handed in assignments result in doing very poorly in the overall course – as the *writing assignments in discussion are a large component of the overall course grade*. You lose much more than the minor participation points associated with that week. If you miss a discussion section, it is the student's responsibility to contact the professor – work must be made up. If one of the discussion projects is not completed, it is likely that you will *fail the course*.

**Assignments and late policy:** Assignments will be turned in on time to be considered for full credit. A loss of **5%** will be deducted per school day for **any** late assignment. Zero points will be recorded for an assignment if it is not turned in before the assignment is passed back, discussed in class or key posted. All assignments should be turned in to their dropbox folder in OAKS by the start of class unless announced otherwise.

**Texting: Over the years we have found that texting in class is annoying to your classmates and to the instructor. Don't do it. Emergency? Please step out of the classroom.**

**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, Google document, etc.). 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, put cell phones and other devices that beep in silent mode (do not talk on the phone or text message, IM, use Facebook or conduct web searches not associated with assignments during discussion or lecture), 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. The section adjacent to the door can be loud from hallway noise – don't sit there. **Bring your enthusiasm – it is contagious.**

**Academic honesty:**

**College of Charleston Honor Code and Academic Integrity**

Lying, cheating, attempted cheating, and plagiarism are violations of our Honor Code that, when identified, are investigated. Each incident will be examined to determine the degree of deception involved.

Incidents where the instructor determines the student's actions are related more to a misunderstanding will be handled by the instructor. A written intervention designed to help prevent the student from repeating the error will be given to the student. The intervention, submitted by form and signed both by the instructor and the student, will be forwarded to the Dean of Students and placed in the student's file.

Cases of suspected academic dishonesty will be reported directly by the instructor and/or others having knowledge of the incident to the Dean of Students. A student found responsible by the Honor Board for academic dishonesty will receive a XF in the course, indicating failure of the course due to academic dishonesty. This grade will appear on the student's transcript for two years after which the student may petition for the X to be expunged. The F is permanent. The student may also be placed on disciplinary probation, suspended (temporary removal) or expelled (permanent removal) from the College by the Honor Board.

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. 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 without obtaining prior permission from the instructor.

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, INCLUDING FROM WIKIPEDIA, WILL RESULT IN A ZERO ON THE ASSIGNMENT, AND POSSIBLE FAILURE IN THE COURSE AS WELL AS HONOR BOARD REFERRAL.**

Classroom Disruption information:

<http://deanofstudents.cofc.edu/policies-and-procedures/classroom-disruption.php>

### **Lecture Schedule**

The material in this syllabus is subject to scheduling changes as necessary.

| <b>Date</b>   | <b>Topic</b>  | <b>Readings</b>             |
|---------------|---|-----------------------------|
| Aug 25 – Tu   | Introductions   | Ch 1                        |
| Aug 27 – Th   | Rare and invasive species: humans on planet Earth; Conservation Biology | Ch 57                       |
| Sept 1 – Tu   | Evolving populations & Natural Selection                                | Ch 25                       |
| Sept 3 – Th   | Evolutionary mechanisms   | Ch 26                       |
| Sept 8 – Tu   | Population genetics   | Ch 26                       |
| Sept 10 – Th  | Evolutionary Processes & Ecological genetics and Conservation Genetics  | Ch 26                       |
| Sep 15 – Tu   | Population Ecology  | Ch 52 & 54                  |
| Sep 17 – Th   | Population Ecology – population growth                                  | Ch 54                       |
| Sep 22 – Tu   | Human Population growth and impacts                                     | Ch 54                       |
| Sep 24 – Th   | Species Interactions: Competition and Predation                         | Ch 55                       |
| Sep 29 – Tu   | <b>EXAM I</b>   |                             |
| Oct 1 – Th    | Species Interactions: Herbivory, Parasitism and Mutualism               | Ch 55                       |
| Oct 6 – Tu    | Communities; Succession   | Ch 55                       |
| Oct 8 – Th    | Productivity; Stability; Ecosystems                                     | Ch 52 & 56                  |
| Oct 13 – Tu   | Ecosystems; Origins of Biodiversity                                     | Ch 56 and 28                |
| Oct 15 – Th   | Speciation and phylogeny  | Ch 27, 28 and Bioskills B:7 |
| Oct 20 – Tue  | <b>FALL BREAK</b>   |                             |
| Oct 22 – Thur | Phylogeny, history of life Intro to Domains, Bacteria and Archaea       | Ch 28 & 29                  |
| Oct 27 – Tue  | Bacteria and Archaea  | Ch 29                       |
| Oct 29 - Thur | Intro to Eukaryotes; Protista   | Ch 30                       |
| Nov 3 - Tue   | <b>EXAM II</b>  |                             |
| Nov 5 – Thur  | Protists, Green algae and plants  | Ch 30 and 31                |
| Nov 10 - Tue  | Protists, Green algae and plants  | Ch 30 and 31                |
| Nov 12 – Thur | Plants: the invasion of land and co-evolution with animals              | Ch 31                       |
| Nov 17 - Tue  | Fungi   | Ch 32                       |
| Nov 19 – Thur | Animal body plans and basal animals                                     | Ch 33                       |
| Nov 24- Tue   | Protostomes   | Ch 34                       |
| Nov 26 – Thur | <b>Thanksgiving</b>   |                             |

|              |                                   |       |
|--------------|-----------------------------------|-------|
| Dec 1 – Tue  | Protostomes and Deuterostomes     | Ch 35 |
| Dec 3 - Thur | <b>LAST CLASS</b> – Deuterostomes | Ch 35 |

**FINAL EXAM: THURSDAY December 10th, in the same classroom, 1245pm-345pm**

### Discussion Section

\*\*Discussion sections start August 25/27. These are a mandatory component of this course. Please see separate syllabus and hand outs for further details of written assignments.

### Course requirements & Course Points

- Two in Class Exams: 300 Pts.
- Final Exam (half cumulative): 250 Pts.
- Discussion projects, participation, quizzes and assignments 450 Pts.
- **Total points:** 1000 Pts

**Grading Policy:** A: 93-100, A-: 90-92; B+: 87-89, B: 83-86, B-: 80-82, C+: 77-79, C: 73-76, C-: 70-72, D+: 67-69; D: 63-66, D-: 60-62, F: <59, other aspects of grading follow the CofC standards. Last day of drop/add Jan 14, to drop with Grade of "W" Oct 23rd.

Email is an excellent way to contact us. Please use your C of C email account to contact us. Other emails (e.g. yahoo, private gmail) are often filtered with the campus filter system, and may not reach us.

### Extra Credit

We will offer potential extra credit options all of minor point value. A maximum of 21 points may be awarded. NOTE: These extra credits are a token to encourage general campus/civic involvement. *Your time is better spent studying for an exam than doing extra credit!!*

We will announce in lecture the seminars with content appropriately associated with 211 – but times generally include:

Option 1) Biology Department Seminars: Dates and times will be announced in class

Option 2) Ft. Johnson Marine Seminars: Friday 4-5 pm seminars at Ft. Johnson MMRI Auditorium (next to CofC Grice Marine Lab) <http://gricemarinelab.cofc.edu/research/marine-science-seminar/index.php>

Directions to the CofC Marine lab

<http://gricemarinelab.cofc.edu/about-the-laboratory/directions/index.php>

Option 3) Study skills seminars. Check the website updates <http://csl.cofc.edu/study-skills/workshop-schedule/index.php>

To receive credit for options 1-3 you must hand in a typed one page summary of the seminar that you participated in which also includes a description of what you learned from this seminar in the dropbox folder in Oaks. We encourage you to be involved in these seminars to get jazzed up by the enthusiasm of other professional biologists, even after you have exhausted your extra credit options. Three points of extra credit for each seminar write up.

Option 4) Fill a gallon size Ziplock (or other brand or equivalent volume in a recycled bag) full of trash from below the high tide line at Folly Beach – and a typed paragraph on the human impact of this trash on the Folly Beach biological environment. Three points of extra credit.

## DISCUSSION SYLLABUS

### Biology 211 Fall 2015

Discussion section includes weekly in-class activities and longer-term research projects on major themes from throughout the course in Ecology, Evolution, Conservation and Biodiversity. Assignments will include both independent and group work. Please see lecture syllabus for general overview of goals, policies and points for projects for discussion sections. The syllabus schedule is subject to change (particularly if *Arabidopsis* are growing slowly), amendments will be announced. Find materials for readings of papers on OAKS.

Suggested supplies/equipment for class: 3 ring binder with tabs for different projects. You may also consider an in-binder 3 ring punch, or sheet protectors. Laptop with MS Excel loaded.

| <u>Week</u> | <u>Date</u>     | <u>Discussion Activity</u>  | <u>Due in Discussion</u>  |
|-------------|-----------------|---|---|
| 1           | Aug 25 & 27     | Welcome<br>Introduction to majors/minors in biology<br>Asking biological questions  |   |
| 2           | Sept 1 & 3      | Bumpus data working<br>statistics introduction<br><b><i>Arabidopsis project</i> Background</b>  | Watch excel video, complete data management quiz on OAKS<br>Answering a question assignment   |
| 3           | Sept 8 & 10     | Introduction to <b><i>Arabidopsis project</i></b><br>Collecting early life history plant data<br>Data and metadata notebook skills<br>How to critique a paper<br><b>NOTE: class in SSMB</b> | Read: <i>Arabidopsis</i> background material, complete quiz & survey<br>Submit Bumpus reports |
| 4           | Sept 15 & 17    | Citizen science<br>Discuss paper  | Read Rasher & Hay<br>Discussion questions   |
| 5           | Sept 22 & 24    | <b><i>Invasive Macroalgae Project</i></b>   | Read Byers et al. paper. Population ecology and Byers et al. quiz on OAKS                     |
| 6           | Sept 29 & Oct 1 | Hypotheses and how to find articles (librarians)<br>Answering a question powerpoint   | Answering a question powerpoint (upload to OAKS)  |
| 7           | Oct 6 & 8       | Second measurement of <i>Arabidopsis</i><br><b>NOTE: class in SSMB</b>  | Report from Invasive Macroalgae   |
| 8           | Oct 13 & 15     | <i>Stats and graphing week Arabidopsis</i>  | Data entry for excel to class   |



|    |             |   |   |
|----|-------------|---|---|
| 9  | Oct 20 & 22 | <b><u>FALL BREAK WEEK</u></b>   |   |
| 10 | Oct 27 & 29 | <b><u>Arabidopsis project:</u></b> oral results per pair; peer review of draft; link to prior year results (working with databases) | Arabidopsis 2 slide PPT (submit on OAKS)<br>Draft Arabidopsis project (Intro, Methods, Results) |
| 11 | Nov 3 & 5   | <b><u>Hot spot diversity/phylogeny</u></b><br>Phylogeny week: puzzles   | Final Arabidopsis project due Lab report  |
| 12 | Nov 10 & 12 | <b><u>Hot spot diversity/phylogeny</u></b>  | HWK: announced in class   |
| 13 | Nov 17 & 19 | <b><u>Hot spot diversity/phylogeny</u></b>  | HWK: announced in class   |
| 14 | Nov 24 & 26 | <b><u>Thanksgiving week</u></b>   | HWK: announced in class   |
| 15 | Dec 1 & 3   | <b><u>TBD</u></b>   | HWK: announced in class   |

Typed Discussion Questions: Hand in a typed copy of three questions (no extensions) based on the reading. All other assignments are due at the beginning of class or uploaded on OAKS and will otherwise be considered late. Powerpoint presentations are due on OAKS 30 minutes prior to the class start-time. Email is not an acceptable method for handing in homework.

Details of projects and all associated handouts will be provided during discussion. Quizzes will also be on OAKS and will be announced in lecture and/or discussion.

Note, this schedule may change. Any updates to the syllabus will be announced!