Instructor: Dr. Blaine Griffen, Office: 615 EWS, email: bgriffen@biol.sc.edu
Office hours: By appointment only. I’m pretty flexible and I’m happy to meet with you. But I find that if I set regular office hours, no one comes to them. So send me an email and we’ll set up a time to meet.

Lecture: T, Th 10:05-11:20; PSC 002

Lab instructors:

Lab: Section 1 – M 3:30-6:30pm PSC 313
Section 2 – T 11:40-2:30pm PSC 313
Section 3 – T 2:50-5:40pm PSC 313
Section 4 – W 10:50-1:40pm PSC 313
Section 5 – W 2:20-5:10pm PSC 313
Session 6 – Th 11:40-2:30pm PSC 313

Texts:
1) Openstax College (2013) Biology. Rice University, 1486 pgs. (Required)
   This book is freely downloadable from the following website:
   http://openstaxcollege.org/textbooks/biology/pdf
   You have a high and low resolution option – either is fine. Click on the one you want. This will take you to a page where they collect funds. You are welcome to donate to the cause. This textbook option is an effort to provide textbooks to students at no cost (this one, for example, saved you $274 over the one that I used in previous years – you’re welcome!). Or you can skip the donation by simply clicking on the ‘continue without donating…’ link.

   The purpose of this text will be to gain general knowledge of basic biological concepts that form the background for topics that will be discussed in class. Readings from this text should be completed before coming to class each day. Overlap between reading and lectures will be minimal since the readings focus on biological concepts and lectures will focus on applying those concepts to the marine system. You will be responsible both for material presented in the text and in class.

   If you feel you need additional background information, this can be obtained from numerous online lectures for introductory biology classes provided free of charge by universities around the country (e.g., Berkley, MIT, etc.; simply Google “general biology lectures online”). These can be used to supplement the text if additional background or comprehension is required.

   This is a writing intensive course – particularly the lab component. Many students do not have experience in scientific writing. There are many good scientific writing guides available. The text listed below is one example. If you feel you need help in this area, I encourage you to get this or a similar text from Amazon.com or another outlet. This is completely optional.

Additional required material:

Podcasts – Class time will focus on learning the basic biology of marine organisms and on applying basic biological concepts to current environmental issues. I will post podcasts on blackboard (some audio, some video) that will introduce environmental issues and will help bridge from the basic biology presented in the textbook readings to the marine topics that we will discuss in class. *It is essential that you listen to/view these podcasts prior to coming to class so that you are prepared to discuss these topics.* The schedule for podcasts (i.e., which one goes with which lecture) is included below on the lecture schedule.

Twitter – It turns out that Twitter is a great way to keep up with environmental news (who knew!?). I will use Twitter to communicate information for this class on both the biology of marine organisms and on pertinent environmental issues. *You are required to read the material that I send out via Twitter – it is fair game for exams.* While are certainly welcome to follow me on Twitter @OceanEcologist, you actually don’t even need a Twitter account to complete the readings for this class. You can access the material on the Blackboard page for this course (there is a Twitter widget under Course Content). I do not tweet personal or miscellaneous information. All tweets will be ocean-related. You will be responsible for all tweets that contain the hash tag #MSCI311.

Learning Outcomes:

Students in this course will learn several topics and tools that will form the foundation for further coursework within the Marine Science Program and their education in general. As a result of this course, students will develop:

- a knowledge of the functional biology of marine organisms
- a general understanding of biological principles that relate to all living organisms, both marine and non-marine
- the ability to employ the scientific method to investigate the biology and physiology of marine organisms
- the ability to critically analyze data to test a hypothesis
- the ability to critically read and comprehend scientific literature
- the ability to write a manuscript that conveys scientific results in a format that is generally accepted by scientific journals
- a degree of proficiency with some widely used techniques for studying biological systems

These learning outcomes will be assessed throughout the course using exams, quizzes, and lab reports.

Course Goals: Students in MSCI 311 will study the biology of marine organisms from an ecological, physiological, behavioral, and evolutionary perspective, with an emphasis on physiological and ecological adaptations for life in a saltwater environment. Students will apply their knowledge of biology and of marine systems to address numerous current environmental issues that are important to the biology of the marine environment. Students will work together in groups to formulate and test hypotheses in laboratory investigations where they will learn to use online resources, freeware scientific programs, and basic scientific techniques to answer basic biological questions. Students will learn to report the results of scientific investigations by analyzing results and writing formal reports in scientific journal style.
Policies:
Grades: This is a 4-hour lecture/laboratory course; 75% of your grade will be based on performance in lecture, and 25% will be based on performance in the laboratory. The total points available in the course will be 1000, broken down as follows.

Lecture grades (750 pts total):
- three midterms (100 points each)
- final of 200 points (100 pts new material, 100 pts cumulative)
- daily lecture quizzes (250 pts total)

Laboratory grades (250 pts total). Specific breakdown to be determined by TA, but in general, grades will be based on:
- participation in the laboratory
- quizzes
- laboratory reports
- field Trip report

Daily quizzes will be administered using the iClicker system. **Students are required to have an iClicker 1 or an iClicker 2 (either one is fine).** You must register your iClicker for this course through Blackboard. Unless otherwise noted, we will use the frequency code ‘BD’ in this class. If you are not familiar with iClicker, this is how it works: I ask multiple choice questions and I tell the system what the correct answer is. Each student then answers the question by typing it into their own device. Your answer is then collected and graded by the system, and your score for that day is returned to me. Quiz questions will be dispersed throughout each class period (beginning, middle, and end). Each quiz question will be worth 1 single point, and there will be 10 quiz questions dispersed throughout each lecture. In addition, each student that answers (correctly or incorrectly) all 10 of the quiz questions for any given day will receive one additional participation point for that day. The purpose of these quizzes is to encourage attendance and participation throughout each class period, to encourage the completion of reading and podcast assignments prior to coming to class, to review material that has been covered, and to allow me to assess the general understanding of concepts to determine whether I need to cover them in more depth. Missed daily quizzes cannot be made up, but will be excused for official university-sponsored absences (e.g., field trips for other classes, etc.) for which I am informed ahead of time that you will be absent, and for illnesses (doctor’s note required). **Daily quizzes cannot be made up for any other reason.** Please take note especially of the following policies:
- Dead iClickers batteries will not excuse you from the quiz – I suggest putting a spare set of batteries in your backpack and leaving them there so that you have them if/when your iClicker batteries die.
- Lost or forgotten iClickers, or iClickers that are not working properly will not excuse you from the quiz. Quizzes MAY NOT be taken on paper if you forgot your iClicker for the day.
- Students will receive iClicker points only from the iClicker(s) that is registered to them (so don’t accidentally swap iClickers with your room mate who is also taking this class!).

Exams: Exams will be a mix of matching, multiple choice, true/false, short answer. Exam questions will come from material covered in class and class discussions, from readings in the textbook, and from podcasts. The three midterm exams will cover material that we have had since the last exam. The final exam will have two parts – the first half will cover the material since the last midterm and the second half will be cumulative on material covered throughout the semester. My goal with all exams is to test comprehension and understanding, not memorization. I am trying something new
with exams this year, as follows. Each exam will be given over a two day period. The first day will be conducted in an identical manner to the daily quizzes – it will be conducted using iClicker and you will be encouraged to discuss each problem with your friends. This portion of the exam will include 15 questions worth 2 points each, for a total of 30 points. This portion of the exam will include some difficult questions that apply the knowledge from each of the topics covered. You will have 3 minutes to discuss the question with your peers and to select your answer. The goals are to 1) make you think about how the course content applies to real world problems in the ocean, 2) encourage you to work collaboratively with your peers to derive the answers, and 3) allow me to assess problem areas in the general understanding within the class. When problem areas are detected, I will further explain this material briefly before moving on to the next question. Thus, this first portion of the exam serves simultaneously as an exam and as a review session. The remainder of the exam (70 points) will be administered via paper (short answer) on the following class day. Exam questions on these two days may potentially cover identical material.

Grading scale: 900=A 
850=B+ 
800=B 
750=C+ 
700=C 
650=D+ 
600=D 

I reserve the right to adjust this grading scale down if grades for the entire class are deemed to be too low (I will never adjust the scale up – so it is possible for everyone to get an A).

Attendance: Attendance will be monitored throughout the semester using the iClicker daily quizzes. There are no attendance points. However, daily quiz points require attendance. Without attendance, lost quiz points ensure that the highest grade possible is a C+. I have chosen to encourage attendance in this way because in previous years when I did not offer quizzes to encourage attendance, many students chose not to attend regularly, and a strong correlation existed between attendance and final grade in the course. So I am trying to help you get a good grade. Class time is your opportunity to ask question, clarify material, and to engage in classroom discussion with your peers. In short, class time is your opportunity to really master the material.

Labs: Attendance at lab is absolutely mandatory. If you know you will miss a lab, inform your lab instructor ahead of time. Attendance at laboratory sections other than the one to which you are assigned can be done only with prior permission from the lab instructor. At the end of the semester I will standardize the grades in each lab section by raising the average in each section to be equal to the highest section average. This will account for the fact that some TAs grade more harshly than other TAs.

Field Trip: Field experience during the MSCI core courses is an important aspect of your training as a marine scientist. Consequently, the field trip (Sept. 13, 14, 15; you must choose one of these days to attend) is required and one of your lab reports will come from data collected during the field trip. Excuse forms will be available for download from Blackboard for students whose instructors require them.

Undergraduate Research Assistance: Many of the USC graduate students or faculty can use volunteer help with their thesis projects or research. By getting involved, you can see what graduate school is like and gain scientific skills. Your work could lead to paid internships or fellowships as
well as independent study for up to 6 hours of major credit. It could also potentially lead to
authorship on scientific publications. All of these things can help greatly in graduate school
applications. Make appointments with faculty whose web pages interest you, and try to get
involved in someone’s research.

NOTE: all information and announcements concerning MSCI 311 will be available on
Blackboard. This includes Power-Point Lectures (as pdf files only), some supplemental
readings, and podcasts.
The podcasts listed below are available to download from the course blackboard website. These should be viewed/listened to before class.

**Lecture Schedule**

<table>
<thead>
<tr>
<th>Date</th>
<th>Lecture Number and Subject</th>
<th>Reading(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/18/16</td>
<td>1. Introduction and course overview</td>
<td></td>
</tr>
<tr>
<td>8/23/16</td>
<td>2. Tree of (ocean) life</td>
<td>Reading: Text Ch. 27, 28, 29&lt;br&gt;Podcast: A short history of the oceans</td>
</tr>
<tr>
<td>8/25/16</td>
<td>3. Evolution</td>
<td>Reading: Text Ch. 18, 19, 20&lt;br&gt;Podcast: Evolution under pressure</td>
</tr>
<tr>
<td>8/30/16</td>
<td>4. Feeding</td>
<td>Podcast: Overfishing</td>
</tr>
<tr>
<td>9/1/16</td>
<td>5. Digestion, absorption, energy budgets</td>
<td>Reading: Text Ch. 34&lt;br&gt;Podcast: Ocean Currents_Whale fall community on sea floor (first half only)</td>
</tr>
<tr>
<td>9/6/16</td>
<td><strong>Exam 1</strong></td>
<td></td>
</tr>
<tr>
<td>9/8/16</td>
<td>6. Energy metabolism</td>
<td>Reading : Text Ch. 2, 3 &amp; 6&lt;br&gt;Podcasts: Perspectives from Leaders in the Algae Industry - Dr. Greg Mitchell, Scripps</td>
</tr>
<tr>
<td>9/13/16</td>
<td><strong>Field trip</strong></td>
<td></td>
</tr>
<tr>
<td>9/15/16</td>
<td><strong>Field trip</strong></td>
<td></td>
</tr>
<tr>
<td>9/20/16</td>
<td>7. Energy metabolism</td>
<td>Reading : Text Ch. 7</td>
</tr>
<tr>
<td>9/22/16</td>
<td>8. Gas exchange: invertebrates</td>
<td>Reading: Text Ch. 39&lt;br&gt;Podcast: Making Waves_Ocean Acidification</td>
</tr>
</tbody>
</table>
9/29/16  10. Circulation  
Reading: Text Ch. 40

10/4/16  11. Diseases in marine organisms  
Reading: Text Ch. 42  
Podcast: From plastic to poo – the lowdown on ocean pollution; On the Line_The case of the dead dolphin;  
Marine mammal conservation

10/6/16  **Putting into practice what we have learned**

10/11/16  **Exam 2**

10/13/16  **Fall Break**

10/18/16  12. Osmoregulation  
Reading: Text Ch. 41

10/20/16  13. Thermoregulation  
Podcast: Naked Oceans_Climate change and the oceans

10/25/16  14. Animal movement and muscles  
Reading: Text Ch. 38  
Podcast: ThankYouOcean_West-Coast-Ship-Strikes; Encyclopedia of life_Red Knot Migration

10/27/16  15. Skeletons  
Reading: Text Ch. 38  
Podcast: Ocean acidification – the other CO2 problem

11/1/16  16. Nervous system and sense organs  
Reading: Text Ch. 35, 36  
Podcast: NOAA Fisheries_LISTENING TO fin whales

11/3/16  17. Hormones  
Reading: Text Ch. 37  
Podcast: NOAA podcast - Pharmaceuticals in the Environment

11/8/16  **Election Day – no classes**

11/10/16  **Exam section 3**
<table>
<thead>
<tr>
<th>Date</th>
<th>Topic</th>
<th>Reading: Text Ch.</th>
<th>Podcast:</th>
<th>Additional Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>11/15/16</td>
<td>18. Reproduction</td>
<td>10, 11, 43</td>
<td></td>
<td>Sex on the sea bed</td>
</tr>
<tr>
<td>11/17/16</td>
<td>19. Reproduction</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11/22/16</td>
<td>20. Genetics</td>
<td></td>
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<tr>
<td>11/24/16</td>
<td>Thanksgiving – no class</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>11/29/16</td>
<td>21. Putting it all together</td>
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<tr>
<td>12/1/16</td>
<td>Putting into practice what we have learned</td>
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<tr>
<td>12/8/16</td>
<td>Final exam (9AM)</td>
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</table>

*If you have trouble accessing this reading on blackboard, it can be accessed on the web at [http://www.americanscientist.org/issues/id.8779.y.2010.no.2.content.true.page.1.css.print/issue.aspx](http://www.americanscientist.org/issues/id.8779.y.2010.no.2.content.true.page.1.css.print/issue.aspx)*
## Lab Schedule

IMPORTANT: READ THE LAB MANUAL BEFORE COMING TO LAB EACH WEEK!

<table>
<thead>
<tr>
<th>Week of</th>
<th>Subject (lab number as given in lab book)</th>
</tr>
</thead>
<tbody>
<tr>
<td>8/22/2016</td>
<td>Lab 1: Introduction and annotated bibliography (computer lab)</td>
</tr>
<tr>
<td>8/29/2016</td>
<td>Lab 8: Ecobeaker: Darwinian snails</td>
</tr>
<tr>
<td>9/5/2016</td>
<td><strong>Labor Day holiday – no labs</strong></td>
</tr>
<tr>
<td>9/12/2016</td>
<td>Lab 3: Field trip to marsh</td>
</tr>
<tr>
<td>9/19/2016</td>
<td>Lab 3: Analyze data from field trip</td>
</tr>
<tr>
<td>9/26/2016</td>
<td>Lab 2: Energetics in natural systems and introduction to R</td>
</tr>
<tr>
<td>10/3/2016</td>
<td>Lab 4: Circulatory response to diving</td>
</tr>
<tr>
<td>10/10/2016</td>
<td><strong>Fall break – no labs</strong></td>
</tr>
<tr>
<td>10/17/2016</td>
<td>Lab 5: Experimentation: assimilation efficiency</td>
</tr>
<tr>
<td>10/24/2016</td>
<td>Lab 5: Experimentation: assimilation efficiency</td>
</tr>
<tr>
<td>10/31/2016</td>
<td>Lab 5: Analyze data from assimilation efficiency experiment</td>
</tr>
<tr>
<td>11/7/2016</td>
<td><strong>Election day – no labs</strong></td>
</tr>
<tr>
<td>11/14/2016</td>
<td>Lab 6: Urchin reproduction</td>
</tr>
<tr>
<td>11/21/2016</td>
<td><strong>Thanksgiving week – no labs</strong></td>
</tr>
<tr>
<td>11/28/2016</td>
<td>Lab 7: Whale genetics</td>
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</tbody>
</table>