

# *Marine Adaptations: Invertebrate Physiology*

## *FAS 6154 (3 credits) Fall 2018*

### **Course Description**

This course will examine and compare the physiological adaptations of marine, coastal, and estuarine invertebrates to environmental conditions. The processes examined will span several levels of organization, from ecological and organismal to cellular and molecular. Examples will be drawn from rocky intertidal, salt marsh, coral reef, and deep sea habitats, among others.

**Prerequisites:** BSC 2010 and 2011 or equivalent; courses in animal physiology and ecology are recommended.

### **Instructor**

Dr. Shirley Baker

Email: [sbaker25@ufl.edu](mailto:sbaker25@ufl.edu)

Telephone: 352-273-3627 (office)

Office: Fisheries and Aquatic Sciences, 7922 NW 71<sup>st</sup> St, Gainesville, 32653

Office hours: By appointment on main campus or at FAS

### **Teaching assistant**

TBA

### **Student Learning Outcomes**

At the end of this course, each student will be able to:

- Describe the basic principles and key mechanisms of physiological adaptation in a variety of invertebrate phyla
- Compare the physiology of invertebrate organisms adapted to marine, coastal, and estuarine environments
- Apply critical thinking in evaluating literature of the discipline
- Analyze the underlying importance of physiology in ecological patterns observed in communities and ecosystems

### **Course Meeting Times**

**Face-to-face delivery:** T 7-8 (1:55-3:50), R 7 (1:55-2:45)

**Distance delivery:** Lectures will be recorded and posted to the course Canvas site. Lectures and discussions will be streamed for optional live participation.

**Location** McCarty Hall D (MCCD) G001

## **Required Texts/Readings**

1. There is no required textbook for this course. However, the following textbook is highly recommended; reading appropriate sections before the corresponding lecture will help clarify the topics discussed. This book can be purchased new, used, as an e-book, or as a rental, from a variety of online vendors.

Willmer, Pat, Graham Stone, and Ian Johnston. 2005. *Environmental Physiology of Animals*, 2<sup>nd</sup> Edition. Wiley-Blackwell.

2. Relevant readings from journals or other media will be required for discussion sessions.

## **Required software**

Word, Excel, PowerPoint, and Adobe Acrobat Reader. Suggested subscription: Netflix.

## **Class Format, Policies on Attendance and Assignments**

### **Contacting the instructor and/or TA:**

Please use the Canvas message system. Messages sent by email or posted in the Canvas discussion area may not come to our attention.

### **Course format:**

This course will consist primarily of lecture and discussion sessions. Students are expected to have read assigned materials prior to class.

### **Late assignment policy:**

Late materials will have 10% of the total possible points deducted for every day late.

### **Quiz policy:**

Quizzes are open for a generous amount of time. Once a quiz closes, it will NOT be reopened.

## **Please check *Announcements* in Canvas on a regular basis**

## Assignments

**Introduction: 3 points.** Distance (DE) and Face-to-Face (F2F) graduate students will introduce themselves by asynchronously sharing an audio/video on *VoiceThread*, as well as watching and commenting on other student's introductions.

**Critical reading questions: 13 @ 3 points each.** A critical thinking writing assignment associated with the discussion paper will be due at noon on *Discussion* days (see schedule). Questions will be posted on Canvas the week prior to their due date and must be submitted in Canvas.

**Discussion participation: 13 @ 3 points each.** The class will discuss papers from the primary literature, which will be made available on Canvas during the week prior to the discussion. Students will be expected to read the papers prior to class and to *actively participate in every discussion*. There will be 15 discussion weeks. During two of the weeks, the student will be graded as a Discussion Leader; these weeks will not double-count. During weeks 15 and 16, Discussion participation will involve interacting with graduate student presenters. Further expectations will be provided.

Distance students may select from two participation options:

**Synchronous** – DE students may join the F2F classroom discussion via *LiveStream* and “Chat” on Canvas. Typically, the discussions take place on Tuesdays.

**Asynchronous** – DE students may discuss the literature with their peers, the TAs, and the instructor via “Discussions” on Canvas.

**Discussion Leadership: 2 @ 6 points each.** Twice during the semester, students (individuals or pairs, depending on class size) will be expected to lead the literature discussion session. A schedule of assigned leadership weeks will be posted in Canvas.

**Quizzes: 7 @ 6 points each.** Quizzes will be administered through Canvas (see schedule). Quizzes will consist of multiple choice, short answer, and short essays. Questions will be “open notes” but will require critical thinking, integration, and application of interdisciplinary concepts. Quizzes will open and close on the dates noted.

**Assignments: 30 points.** Students will develop a “**Species Profile**” over the course of the semester. Each of four assignments must be submitted to Canvas by midnight on the due date (see schedule). Assignment #1: The instructor will approve the species selected and provide feedback. Beginning with Assignment #2, writing will be edited by the instructor/TA, and returned via Canvas. When submitting the following assignment (e.g., Assignment #3), students are expected to submit the new section as well as correct the previous section (e.g., Assignment #2). Each assignment will add to the Species Profile. Primary scientific literature must be cited; **a limited number of web sites may be used**. Further details and a grading rubric will be provided.

- Assignment #1: Species selection, brief outline, and list of potential resources, **3 pts**
- Assignment #2: Introduction to species – taxonomy and species characteristics, **9 pts**
- Assignment #3: Adaptation to a physiological challenge, **12 pts**
- Assignment #4: Final submission, **6 pts**

**Presentation: 18 points.** Graduate students will present their Species Profile to the class as a presentation of *15 minutes*. Students must also submit an un-narrated PDF file of the PowerPoint used in their presentation. A presentation schedule will be posted in Canvas.

**F2F Students:** Students will present their paper in class, followed by synchronous and asynchronous discussions.

**DE Students:** Students will present asynchronously via *VoiceThread*, followed by asynchronous discussion.

## Evaluation of Student Learning

Graduate <i>VoiceThread</i> introduction	3 points
Critical reading questions, 13 @ 3 points each	39 points
Discussion participation, 13 @ 3 points each	39 points
Discussion leadership, 2 @ 6 points	12 points
Quizzes, 7 @ 6 points each	42 points
Writing assignments, 4 @ variable points	30 points
Graduate presentation	18 points
<b>TOTAL</b>	<b>183 points</b>

## Grading Scale

Final grades will be assigned based on the percentage of total points earned. For additional information on UF grading policies, see

<https://catalog.ufl.edu/ugrad/current/regulations/info/grades.aspx>

A (93-100%), A- (90-92%), B+ (86-89%), B (82-85%), B- (78-81%), C+ (74-77%), C (67-73%), C- (63-66%), D+ (59-62%), D (55-58%), D- (51-54%) and E (<50%).

<b>Schedule</b>			
<b>Week</b>	<b>Date</b>	<b>Topic</b>	<b>Assignments</b>
<b>1</b>	23 August	<b>Introduction to the course</b>	
<b>2</b>	28	<b>Metabolism</b> <i>Discussion wk 2</i>	<b>Reading Q wk 2</b> <i>Due noon</i> <b>Voicethread Intro</b> <i>Due midnight</i>
	30	<b>Assignment expectations</b>	<b>Quiz wks 1 &amp; 2</b> <i>Opens midnight</i>
<b>3</b>	4 September	<b>Adaptations in context: Invertebrate phyla and habitats</b> <i>Discussion wk 3</i>	<b>Reading Q wk 3</b> <i>Due noon</i>  <b>Quiz wks 1&amp; 2</b> <i>Closes midnight</i>
	6		
<b>4</b>	11	<b>Life in Fluid</b> <i>Discussion wk 4</i>	<b>Reading Q wk 4</b> <i>Due noon</i>  <b>Assignment #1</b> <i>Due midnight</i>
	13		<b>Quiz wks 3 &amp; 4</b> <i>Opens midnight</i>
<b>5</b>	18	<b>Sensory adaptations</b> <i>Discussion wk 5</i>	<b>Reading Q wk 5</b> <i>Due noon</i>  <b>Quiz wks 3 &amp; 4</b> <i>Closes midnight</i>
	20		
<b>6</b>	25	<b>Feeding and digestion</b> <i>Discussion wk 6</i>	<b>Reading Q wk 6</b> <i>Due noon</i>
	27		<b>Quiz wks 5 &amp; 6</b> <i>Opens midnight</i>
<b>7</b>	2 October	<b>Symbioses</b> <i>Discussion wk 7</i>	<b>Reading Q wk 7</b> <i>Due noon</i>  <b>Quiz wks 5 &amp; 6</b> <i>Closes midnight</i>
	4		
<b>8</b>	9	<b>Respiration</b> <i>Discussion wk 8</i>	<b>Reading Q wk 8</b> <i>Due noon</i> <b>Assignment #2</b> <i>Due midnight</i>

	11		<b>Quiz wks 7 &amp; 8</b> <i>Opens midnight</i>
<b>9</b>	16	<b>Thermal adaptations</b> <i>Discussion wk 9</i>	<b>Reading Q wk 9</b> <i>Due noon</i>  <b>Quiz wks 7 &amp; 9</b> <i>Closes midnight</i>
	18		
<b>10</b>	23	<b>Salt and water balance</b> <i>Discussion wk 10</i>	<b>Reading Q wk 10</b> <i>Due noon</i>
	25		<b>Quiz wks 9 &amp; 10</b> <i>Opens midnight</i>
<b>11</b>	30	<b>Deep Sea</b> <i>Discussion wk 11</i>	<b>Reading Q wk 11</b> <i>Due noon</i>  <b>Quiz wks 9 &amp; 10</b> <i>Closes midnight</i>
	1 November		
<b>12</b>	6	<b>Oxygen limitation</b> <i>Discussion wk 12</i>	<b>Reading Q wk 12</b> <i>Due noon</i>  <b>Assignment #3</b> <i>Due midnight</i>
	8		<b>Quiz wks 11 &amp; 12</b> <i>Opens midnight</i>
<b>13</b>	13	<b>Climate change</b> <i>Discussion wk 13</i>	<b>Reading Q wk 13</b> <i>Due noon</i>  <b>Quiz wks 11 &amp; 12</b> <i>Closes midnight</i>
	15		
<b>14</b>	20	<b>Extreme habitats</b> <i>Discussion wk 14</i>	<b>Reading Q wk 14</b> <i>Due noon</i> <b>Grad presentations</b> <i>Due midnight</i>
	22	<i>Thanksgiving</i> <i>No class</i>	<b>Quiz wks 13 &amp; 14</b> <i>Opens midnight</i>
	25		<b>Grad presentations</b> <i>Due midnight</i>
<b>15</b>	27	<b>Grad presentations</b> <i>Discussion wk 15</i>	<b>Quiz wks 13 &amp; 14</b> <i>Closes midnight</i>
	29		
<b>16</b>	4 December	<b>Grad presentations</b> <i>Discussion wk 16</i>	<b>Assignment #4</b> <i>Due midnight</i>

Note that this schedule may be changed due to hurricane days, needing to spend more time on a particular topic, etc. Students will be given ample notification. **Please check Announcements in Canvas on a regular basis.**

## Additional References

Background material for two of the lectures, *Life in Fluid* and *Symbioses*, is not available in the recommended Willmer et al. text book. Therefore, it is suggested that the following materials be read before the corresponding lectures to help clarify the topics. These books can be purchased new, used, as an e-book, or as a rental, from a variety of online vendors. Older editions may be available in the UF library.

1. Levinton, Jeffrey S. 2009. *Marine Biology; Function, Biodiversity, Ecology*, 3<sup>rd</sup> Edition. Oxford University Press.
2. Nybakken, James W. and Mark D. Bertness. 2005. *Marine Biology; An Ecological Approach*, 6<sup>th</sup> Edition. Pearson Benjamin Cummings.

## Other Information

### Academic Honesty, Software Use, UF Counseling Services, Services for Students with Disabilities

In 1995 the UF student body enacted an [honor code](#) and voluntarily committed itself to the highest standards of honesty and integrity. When students enroll at the university, they commit themselves to the standard drafted and enacted by students.

In adopting this honor code, the students of the University of Florida recognize that academic honesty and integrity are fundamental values of the university community. Students who enroll at the university commit to holding themselves and their peers to the high standard of honor required by the honor code. Any individual who becomes aware of a violation of the honor code is bound by honor to take corrective action. The quality of a University of Florida education is dependent upon community acceptance and enforcement of the honor code.

**The Honor Pledge: We, the members of the University of Florida community, pledge to hold ourselves and our peers to the highest standards of honesty and integrity.**

On all work submitted for credit by students at the university, the following pledge is either required or implied: **"On my honor, I have neither given nor received unauthorized aid in doing this assignment."**

The university requires all members of its community to be honest in all endeavors. A fundamental principle is that the whole process of learning and pursuit of knowledge is diminished by cheating, plagiarism and other acts of academic dishonesty. In addition, every dishonest act in the academic environment affects other students adversely, from the skewing of the grading curve to giving unfair advantage for honors or for professional or graduate school admission. Therefore, the university will

take severe action against dishonest students. Similarly, measures will be taken against faculty, staff and administrators who practice dishonest or demeaning behavior.

Students should report any condition that facilitates dishonesty to the instructor, department chair, Student Honor Council, or Student Conduct and Conflict Resolution in the Dean of Students Office.

*(Source: 2011-2012 Undergraduate Catalog)*

It is assumed all work will be completed independently unless the assignment is defined as a group project, in writing by the instructor.

This policy will be vigorously upheld at all times in this course.

### **Software Use:**

All faculty, staff and students of the university are required and expected to obey the laws and legal agreements governing software use. Failure to do so can lead to monetary damages and/or criminal penalties for the individual violator. Because such violations are also against university policies and rules, disciplinary action will be taken as appropriate.

### **Campus Helping Resources**

Students experiencing crises or personal problems that interfere with their general well-being are encouraged to utilize the university's counseling resources. The Counseling & Wellness Center provides confidential counseling services at no cost for currently enrolled students. Resources are available on campus for students having personal problems or lacking clear career or academic goals, which interfere with their academic performance.

- *University Counseling & Wellness Center, 3190 Radio Road, 352-392-1575, [www.counseling.ufl.edu/cwc/](http://www.counseling.ufl.edu/cwc/)*  
Counseling Services  
Groups and Workshops  
Outreach and Consultation  
Self-Help Library  
Training Programs  
Community Provider Database

- *Career Resource Center, First Floor JWRU, 392-1601, [www.crc.ufl.edu/](http://www.crc.ufl.edu/)*

### **Students with Disabilities**

The Disability Resource Center coordinates the needed accommodations of students with disabilities. This includes registering disabilities, recommending academic accommodations within the classroom, accessing special adaptive computer equipment, providing interpretation services and mediating faculty-student disability related issues.

0001 Reid Hall, 352-392-8565, [www.dso.ufl.edu/drc/](http://www.dso.ufl.edu/drc/)