

## Physiological and behavioral ecology of marine animals

Fall 2018

**Justification:** A physiological ecology course is justified as currently there is only one animal physiology course at FIU and none offered for this rapidly expanding field linking physiology with ecology and behavior. Physiological and behavioral ecology will investigate how animals have adapted to the marine environment as well as understand the link between behavior and physiology. Marine animal behavior may be tailored towards optimizing certain physiological functions, and physiology can provide a limitation to certain behaviors. The course will focus on all marine animal, but with a particular interest in large marine predators, which I hope will make it of interest to biology and marine biology majors. In addition to being an important component of animal ecology in general, this course will also serve as an elective for the Marine Biology degree.

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Instructor:

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Hours: Tuesday 2 p.m. – 4 p.m. or by appointment

### Time and Place:

- *Lecture:* T/TH 11 – 12:15 TBD

### Reference Materials (Recommended):

- Animal Physiology; Hill, Wise and Anderson 4<sup>th</sup> edition Ed. (ISBN: 978-0-87893-559-8)
- Metabolic ecology: a scaling approach, Wiley-Blackwell (suggestion only)

### Course Description:

All marine organisms must cope with a variety of natural and anthropogenic challenges to survive, grow, and ultimately reproduce. Physical conditions (such as environmental temperature, salinity, dissolved oxygen) vary dramatically across habitats, and animals must possess the appropriate suite of physiological adaptations for success. In this class, we will emphasize conserved physiological principles that are broadly used across animal groups as well as highlight the many unique adaptations used by specific taxa. We will focus on the interaction between physiology and behavior, for example, how the animals may select habitats (e.g. temperature) to optimize their physiology. We will see how physiological and behavioral ecology is an integrated discipline that includes physiology, behavior, biomechanics, theoretical biology and more. We will also highlight the methods scientists are currently using to study the physiology of marine animals in the field and how an understanding of physiology is an important component of marine conservation.

### Blackboard:

Here you will find the course website, which includes updated syllabus and schedule, course announcements, lecture PowerPoints, supplemental resources, discussion board, and gradebook. Go to [fiu.blackboard.com](http://fiu.blackboard.com)

**Objectives and Outcomes:** By the end of the course you should acquire the following:

- 1) An understanding of how marine animals have physiologically or behaviorally adapted to life in the marine environment.
- 2) An understanding of how animals may behave to optimize physiological functions or how physiology may limit an animal's behavior or habitat use.
- 3) An understanding of how physiological ecology can make important contributions to conservation biology of marine animals.

**Assigned Readings:**

We will be discussing a lot of scientific literature throughout the course. You will be annotating scientific manuscripts during each class. A major goal is to learn to understand and interpret the scientific literature.

**Grading and Grading Policy:**

<b>Task</b>	<b>Percentage</b>
Midterm (x3)	20% each. I will keep the two highest scores
Class Participation	20 %
Class presentation	5%
Assignment	5%
Final Exam	30%
Extra credit: Iclicker scores	5%

A	=	90-100%
B	=	80-89%
C	=	70-79%
D	=	60-69%
F	=	<60%

I round up to the nearest percentage. For example, an 89.5% will be considered an A, while 89.4% is a B.

**Exams:**

**Midterms:** There will be three midterms, however I will only use the scores from the two highest exams (your lowest scoring exam will be discarded). You will have the full 75 minutes for the midterms. Each midterm will consists of multiple choice and short answer questions

**Final:** The final exam will include all material covered throughout the semester. You will have 2 h for the final, which will be a mix of multiple choice and short answer questions.

You will need a calculator for all exams.

Iclickers: class participation will be based on iclickers.

**Missed Exam**

The first missed Exam will be the score that is dropped. There will be no make-up opportunity for the first missed Exam. If a second Exam is missed and the documents supporting why you missed are accepted by the Instructor, a make-up exam will be scheduled within 2 weeks of the missed exam. The make-up Exam will consist of 100% essay questions. There is no make-up opportunity for the Final Exam. The Final Exam is not optional.

**No makeup exams will be given.** A student that misses an exam must request a makeup exam in writing *prior to* the exam time. If the reason for missing the exam is acceptable, a makeup exam may be given during the finals week (date and time to be arranged). The makeup exam will

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not be the same exam as given to the rest of the class. Anyone who misses an exam and fails to arrange for a makeup exam will receive 0 points for the exam.

All assignments are due at the beginning of lecture on the day they are due. **Assignments turned in after the due date and time will not receive credit.**

### **Honor and safe place policies:**

As scientists and scholars, we hold ourselves to the highest standards of integrity. The FIU honor policy will apply fully to our work in this class. Any cheating on exams or plagiarism on written work will result in a grade of F for the assignment and the course. We will use turn-it-in.com to ensure that no inadvertent plagiarism creeps into your writing.

Likewise, as a progressive learning community, FIU does not tolerate sexual harassment or any other civil rights violation against any student or course personnel.

See the FIU Student Code of Conduct at: [http://www2.fiu.edu/~jms/standards\\_of\\_conduct.htm](http://www2.fiu.edu/~jms/standards_of_conduct.htm)

FIU's discrimination and sexual harassment policies are available at: <http://regulations.fiu.edu/regulation>

**Students with Disabilities:** Students with disabilities are encouraged to contact the instructor for a confidential discussion of their individual needs for academic accommodation. It is the policy of Florida International University to provide flexible and individualized accommodation to students with documented disabilities that may affect their ability to fully participate in course activities or to meet course requirements. To receive accommodation services, students must be registered with the Disability Student Services.

*This syllabus information, including course requirements and grading, may change at any time to better meet the needs of the group, or due to unforeseen circumstances. The most current version will be kept updated on Blackboard, so check there if in doubt.*

**Tentative Lecture Schedule** (*Topics and schedule subject to change – i.e., due dates of assignments and exams not available currently*)

Date	Week	Day	Topic	Book chapter
8/21/17	1	T	Course fundamentals: What is physiological ecology? Basic physiological principles	1, 2
8/23/17		Th	Fundamentals of genomics, proteomics, and epigenetics	2, 3, 4
8/28/17	2	T	Transport of solutes	5
8/30/17		Th	Energy metabolism	7
9/4/17	3	T	Aerobic and anaerobic metabolism	8
9/6/17		Th	Energetics of aerobic activity	9
9/11/17	4	T	Midterm 1	
9/13/17		Th	Digestive physiology	6
9/18/17	5	T	Optimal foraging and digestion	6
9/20/17		Th	Thermal physiology: ectotherms	10

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9/25/17	6	T	Thermal physiology: homeotherms	NA
9/27/15		Th	Adaptations to the pelagic environment	14, 15
10/2/17	7	T	Sensory physiology in the marine world	12, 15
10/4/17		Th	Nervous system and biological clocks	16
10/9/17	8	T	Endocrinology of feeding and reproduction in marine animals	NA
10/11/17		Th	Practical: accelerometers and their use in ecology	
10/16/17	9	T	Midterm 2	17
10/18/17		Th	Reproductive ecology and strategies	
10/23/17	10	T	Stress physiology	
10/25/17		Th	Osmoregulation and behavior	NA
10/30/17	11	T	Biomechanics	NA
11/1/17		Th	Movement ecology and search patterns	18
11/6/17	12	T	Animal Navigation	NA
11/8/17		Th	Social biology and the role of physiology	
11/13/17	13	T	Midterm 3	22, 23, 24
11/15/17		Th	Oxygen physiology	26
11/20/17	14	T	Diving physiology in marine mammals ( <b>assignments due</b> )	27, 28
11/22/15		Th	Student presentations	
11/27/17	15	T	Student presentations	
11/30/17		Th	Thanksgiving	

**Assignments:**

*Class Activities*

Problem sets, discussion questions, and other types of classroom activities will be given throughout the quarter. You will be reading and annotating scientific papers during most classes. Dr Melissa McCartney will discuss the methods during the first week of class.

*Class Presentation*

Students will give a 5 min describing a study from a peer-reviewed publication. I will discuss closer towards the date tips on how to give a good presentation.

*Class Assignment*

You will write a 1-2 page paper detailing an experiment you would like to perform to answer a question in physiological ecology. You will need to describe the question, why it's important and briefly the methods you could use to answer the question. You can assume you would have as much scientific funding as you want for the experiment!