

OCB 4633L: Marine Ecology Laboratory

Credits: 1

Semester By The Sea: Spring 2017

Instructor: Dr James Masterson **Office:** FAU-HBOI Marine Science Building II

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Office Hours: Harbor Branch (HBOI) campus, Marine Science II Room 217, Tue 10:00-11:00AM or by appointment

Teaching Assistant: TBD **Office:**

Email:

Offices Hours: By Appointment

Lab: Marine Education Building **Hours:** Every Other Wednesday 9AM - 4PM

Course Description: A hands-on laboratory course focusing on the ecology of marine organisms. Field sampling trips to local habitats complement laboratory-based activities. Six hours of lab every two weeks.

Course Objectives/Student Learning Outcomes: This laboratory course is designed to introduce and familiarize students with important biotic and physical processes that influence the structure and function of marine communities. Our focus will be primarily on coastal marine communities in the Indian River Lagoon, Florida. We will observe how physical factors alter community distribution and composition (e.g., benthic communities) and biotic interactions alter ecological processes, including animal-animal (e.g., invertebrate community), plant-animal (e.g., mangrove forest and gastropods) and plant-plant (e.g. seagrass species). We will also observe how biotic and physical processes interact to further change the responses of plant-animal interactions.

Note: As this lab is a full day, each lab will have a field component. We will work in the shallow areas of the estuary, which is typically waist deep or shallower. You will be informed of approximate conditions, prior to lab, but prepare to dress appropriately: water shoes, wet suits, rash guards, swim suits, towels, etc. (no sandals, open toed shoes, or bare feet). Feel free to bring a change of clothes for when we return to the laboratory. We will break for ~hour for lunch each lab between 11 to 1PM depending on field progress. Bringing snacks and water is encouraged.

Blackboard: All syllabi, handouts, data, analyses, etc. will be posted and available on Blackboard.

Course Co-requisite: OCB-4633

Course Prerequisites: CHM 2045 Minimum Grade of C-, and CHM 2045L Minimum Grade of C-, and CHM 2046 Minimum Grade of C-, and CHM 2046L Minimum Grade of C-

1. **Course Grading:** You grade for this course will be determined by in class participation and a series of short and long reports due throughout the semester.

| Percent of Grade | Assessment |
|-------------------------|-----------------------------------------|
| 30 | In Class Participation |
| 20 | Short Lab Reports (4 @ 5 points each) |
| 50 | Full Lab Reports (3 @ 16.7 points each) |

In Class Participation (30%): Class participation is an important part of your grade. This includes class attendance, being on time, as well as actively participating in each lab. Tasks in the lab can include fill out data sheets completely, constructing experimental equipment according to directions, as well as actively engaging in discussions about the lab, etc. Dr. Masterson and the teaching assistant will assess your overall participation for each lab. Each lab will be worth 10 points. *Scores will be assigned along the following lines:* 0 to 10, where 0 is not showing up, not recommending a grade, or disrupting class, and 10 indicating excellent participation in terms of engaging in discussions, care in gathering data, participating in design and construction of experimental units (cages, aquaria setup, etc.), making necessary observations, and enter data into electronic form, etc.

Short Lab Report (20%): Each student will write **four** short lab reports (due dates in schedule). Each report will give an overview of the key results and a discussion section. Results will require data analyses, which will be provided by the TA and briefly reviewed in class. The discussion will include your interpretation of these results and how they compare to other results and theory from the scientific peer-reviewed journals.

Report Format: Minimum 4 double spaced typed pages (not including figures), with a minimum 2 cited

scientific peer-reviewed journals (these must be outside ones discussed in lecture).

Short Reports:

Due February 1st, 2017: How are seagrass species distributed along a water depth gradient during winter from year to year?

Due March 17th, 2017: What is mangrove crab size distribution between different mangrove tree sizes and distance to water?

Due March 31st, 2017: What is the population size and dispersion of *Melampus coffeus* (coffee bean snail) in mangrove forests?

Due April 14th, 2017: Does the presence of different seagrass species alter seagrass fragment recruitment success?

Full Lab Reports (50%): Each student will write **three** full lab reports due at the end of the semester. Each report will include a full introduction, methods, results, and discussion section. Introduction will include background information on the theory of the lab, as well as hypotheses/objectives. Methods should detail the experimental and/or observational studies, including any developments in the field. Results will require data analyses. Data analyses for results sections of each lab will be done by the entire class as a group with Dr. Proffitt and the TA running the statistical programs and providing necessary suggestions for analysis (using statistical programs SAS 9.2 and Systat 12). Final results will be provided to the class. From all these results, students will individually choose the most appropriate (for the particular question) and interesting ones to present in the reports. The discussion will include your interpretation of these results and how they compare to other results and theory from the scientific peer-reviewed journals (*an example will be provided*).

Report Format: Minimum 8 to 12 double spaced **typed** pages (not including figures), with a minimum 4 cited scientific peer-reviewed journals (these must be outside ones discussed in lecture).

Full Reports: Due April 21st, 2017:

How does the presence of structural components alter benthic community composition?
How does nutrient enrichment alter *Aratus* sp. (mangrove crab) feeding preference of *Rhizophora mangle* (red mangrove) seedlings?

Does the presence of *Clibanarius* sp. (hermit crab) indirectly promote *Crassostrea virginica* (eastern oyster)s by altering the behavior of *Melongena corona* (Florida crown conch)?

d. **Grading Scale:** The following scale will be used for computing the final grade.

A = 92 - 100%

C+= 78 - 79%

A- = 90 - 91%

C = 70 - 77%

B+= 88 - 89%

D = 60 - 69%

B = 82 - 87%

F = less than 60%

B- = 80 - 81%

2. **Attendance Policy:** Attendance for exams is required. Although your attendance for normal lecture days is not required, it is advantageous for you to be present for the entire lecture as I-clicker quizzes may be given at any time, and multiple times, during a class period. Any student who is more than 15 minutes late to class may not be admitted. If a student cannot attend an exam on time due to circumstances beyond their control then the instructor may assign appropriate make-up work. Students will not be penalized for absences due to participation in University-approved activities, including athletic or scholastics teams, musical and theatrical performances, and debate activities. These students will be allowed to make up missed work without any reduction in the student's final course grade. Reasonable accommodation will also be made for students participating in a religious observance.

3. **Incomplete Grade:** A grade of Incomplete ("I") is reserved for students who are passing a course but have not completed all the required work because of exceptional circumstances. A grade of "I" will only be given under certain conditions and in accordance with the academic policies and regulations put forward in FAU's University Catalog. The student must show exceptional circumstances why requirements cannot be met. A request for an incomplete grade has to be made in writing with supporting documentation, where appropriate. As per university policy, an incomplete grade will only be given to a student who fulfills all of the following criteria:

a. misses multiple exams or the final examination due to a legitimately documented emergency as defined by the FAU Academic Policies and Regulations

(http://www.fau.edu/academic/registrar/09-10_catalog/academics.html)

b. has a grade of C or better

c. submits evidence of the emergency and signs an incomplete agreement.

4. **Safety:** No food or drinks are permitted in the lecture hall.

5. **Classroom Etiquette Policy:** University policy on the use of electronic devices states: "In order to enhance and maintain a productive atmosphere for education, personal communication devices, such as cellular telephones and pagers, are to be disabled in class sessions." You may be asked to leave the class session for noncompliance.

6. **Student Honor Policy:** Students at Florida Atlantic University are expected to maintain the highest ethical standards. Academic dishonesty, including cheating and plagiarism, is considered a serious breach of these ethical standards, because it interferes with the University mission to provide a high quality education in which no student enjoys an unfair advantage over any other. Academic dishonesty is also destructive of the University community, which is grounded in a system of mutual trust and places high value on personal integrity and individual responsibility. Harsh penalties are associated with academic dishonesty. For more information, see University Regulation 4.001

at http://www.fau.edu/ctl/4.001_Code_of_Academic_Integrity.pdf

Cheating is a serious offense. If you are caught cheating, you will receive an F in the course. In addition, you will be referred to the Dean of Student Services and charged with

an academic crime. Test procedures and rules will be stated at the beginning of each exam. Keep your eyes on your own exam.

Disabilities Statement: In compliance with the Americans with Disabilities Act (ADA), students who require reasonable accommodations due to a disability to properly execute coursework must register with the Office of Student Accessibility Services (SAS) and follow all SAS procedures. SAS has offices across three of FAU's campuses- Boca Raton, Davie, and Jupiter, however, disability services are available for students on all campuses.

Important Dates: The following dates are based upon the current university academic calendar. Changes to these critical dates have occurred in the past and you are responsible for checking the academic calendar on the university website for any changes during the academic term.

<http://www.fau.edu/registrar/pdf/acadcal1617.pdf>

| | |
|-------------------------------------------|---------------|
| Classes start | - January 9 |
| M.L.K. Jr. Holiday | - January 16 |
| Last day to withdraw w/o receiving an "F" | - April 8 |
| Spring Break | - March 6-12 |
| SEERS (Jacksonville U) | - April 25-26 |
| Reading days | - April 26-27 |
| Final Examination | - TBD |
| <i>University Final exam Schedule</i> | |
| TBD | |

Lab Schedule

Lab One: January 11, 2017

- **How are seagrass species distributed along a water depth gradient during winter from year to year?**
 - We will conduct seagrass transects along a water depth gradient in seagrass communities to assess species distribution, utilizing previously established transects at South HBOI. Data collected will also be compared with data collected in previous SBTS classes to observe annual changes in seagrass coverage.
- **How does nutrient enrichment alter *Aratus* sp. (mangrove crab) feeding preference of *Rhizophora mangle* (red mangrove) seedlings?**
 - We will conduct a multi-stage experiment. In the first stage, we will establish experiment examining the effects of nutrient enrichment on *R. mangle* seedlings. Seedlings will be collected from North HBOI and planted in solo cups in a kiddie pool in the lab. Seedlings will be fertilized every two weeks and growth measured throughout the semester.

Lab Two: January 25, 2017

- **Does the presence of *Clibanarius* sp. (hermit crab) indirectly promote *Crassostrea virginica* (eastern oyster)s by altering the behavior of *Melongena corona* (Florida crown conch)?**
 - *Melongena corona* is a known predator on *C. virginica*, however the hermit crab, *Clibanarius* sp. has been observed in *M. corona* shells. Research by Dr. Proffitt and Dr. Devlin has indicated that *Clibanarius* sp. may actively attack *M. corona* for shell

- resources, which may indirectly protect/promote *C. virginica*. We will conduct a mesocosm experiment in the lab to assess how presence and absence of *Clibanarius* alters *M. corona* and *C. virginica* interactions throughout the semester.
- **What is the population size and dispersion of *Melampus coffeus* (coffee bean snail) in mangrove forests?**
 - Population size and dispersion of *M. coffeus* will be observed in two ways:
 - *Mark-Recapture Study*: We will mark *M. coffeus* around three *Avicennia germinans* (black mangrove) and follow their movement between mangrove trees throughout the semester. These trees will be revisited later in the semester to observe *M. coffeus* dispersion.
 - *Density Distribution*: We will assess *M. coffeus* density in 20x20cm quadrats between all three species of mangroves at North HBOI.
 - **Project Maintenance:**
 - Record growth of *R. mangle* in nutrient enrichment experiment

Lab Three: February 8, 2017

- **Seagrass Species Distribution Short Lab Report Due**
- **How does the presence of structural components alter benthic community composition?**
 - We will conduct an experiment to observe how the presence of above and below ground structures, as mimicked by wooden dowels, alters the benthic community composition, as observed through sediment cores. We will establish these artificial structures in this lab and take initial cores to establish a baseline for changes in the benthic community.
- **Does the presence of different seagrass species alter seagrass fragment recruitment success?**
 - Seagrass species reproduce sexual and asexually (clonal). During disturbance events (e.g., grazing, prop scarring, storms, etc.) fragments of seagrass can become loose and can eventually float and recruit into new areas. We will examine how the presence of different seagrass species alters the success of seagrass fragments recruiting into new seagrass meadows. We will anchor fragments of *Halodule wrightii* into patches of different seagrass species (e.g., *H. wrightii* and *Thalassia testudinum*) to determine if interactions are primarily competitive (e.g., for space, shading) or facilitative (e.g., trapping) based on different structural differences between species.
- **Project Maintenance:**
 - Record growth of *R. mangle* in nutrient enrichment experiment
 - Observe *Melongena-Clibanarius-Oysters* interactions

Lab Four: February 22, 2017

- **How does nutrient enrichment alter *Aratus* sp. (mangrove crab) feeding preference of *Rhizophora mangle* (red mangrove) seedlings?**
 - We will conduct a multi-stage experiment. In the second stage, we will expose the different seedlings types to the mangrove crab (*Aratus*). We will capture mangrove tree crabs from North HBOI and conduct a feeding preference experiment (fertilized vs. non-fertilized mangrove seedlings) in the lab.
- **What is mangrove crab size distribution between different mangrove tree sizes and distance to water?**
 - When we collect the mangrove tree crabs, we will methodically observe their distribution in relation to mangrove tree sizes (biotic factor) and waterline (abiotic factor).
- **What is the population size and dispersion of *Melampus coffeus* (coffee bean snail) in mangrove forests?**

- *Mark-Recapture Study*: We will revisit the mangrove trees, where we marked *M. coffeus* earlier in the semester, and recapture as many as possible, measuring distance from original tree, waterline, etc.
- **Project Maintenance:**
 - Request volunteers to maintain experiments during Spring Break and Ocean Discovery Week
 - Observe *Melongena-Clibanarius-Oysters* interactions

Lab Five: March 8, 2017

- **Mangrove Crab Size Distribution Short Lab Report Due**
- **How does the presence of structural components alter benthic community composition?**
 - We will take final cores in each of the structures established in the field earlier in the semester and observed how the benthic community composition responded.
- **How does nutrient enrichment alter *Aratus* sp. (mangrove crab) feeding preference of *Rhizophora mangle* (red mangrove) seedlings?**
 - We will conclude the experiment to observe if nutrient enrichment of *R. mangle* seedlings altered *Aratus* sp. feeding preferences.
- **Project Maintenance:**
 - Observe *Melongena-Clibanarius-Oysters* interactions

Lab Six: March 29, 2017

- ***Melampus coffeus* Population Short Lab Report Due**
- **Does the presence of *Clibanarius* sp. (hermit crab) indirectly promote *Crassostrea virginica* (eastern oyster)s by altering the behavior of *Melongena corona* (Florida crown conch)?**
 - We will conclude the mesocosm experiment to assess how presence and absence of *Clibanarius* alters *M. corona* and *C. virginica* interactions.
- **Does the presence of different seagrass species alter seagrass fragment recruitment success?**
 - We will conclude the experiment on how the presence of different seagrass species alters the success of seagrass fragments recruiting into new seagrass meadows.
- **Data Analyses**
 - We will conduct data analyses for the experiments in lab.

Lab Seven: April 12, 2017

- **Seagrass Fragment Experiment Short Lab Report Due**
- **Remaining Data Analyses and Final Questions for Lab Reports**
- **How are seagrass species distributed along a water depth gradient during winter as compared to late spring?**
 - We will conduct seagrass transects along a water depth gradient in seagrass communities to assess species distribution, utilizing previously established transects at South HBOI. Data collected will also be compared with data collected at the beginning of the semester.

April 21, 2017: All Long Lab Reports Due