BI 454/554 Estuarine Biology Fall 2015 Course Syllabus

Instructor: Richard Emlet, Professor of Biology (remlet@uoregon.edu)
Office: Tyler Research Building, OIMB campus phone ext: 211
Teaching Assistant: Ella Lamont (elamont@uoregon.edu)
Office: Tyler Research Building, OIMB campus phone ext: 213

OFFICE HOURS: Emlet – please come by anytime; we'll talk immediately, or we can schedule a time.
Lamont – same as for Emlet

DESCRIPTION OF COURSE

Estuaries are complex aquatic ecosystems situated at the interface with the coastal ocean and the terrestrial environment. Through a combination of lectures, field trips, and field and laboratory exercises, students will learn about various habitats and components of these biologically rich systems. Lectures will cover a broad range of topics on how estuaries function physically and biologically and their importance to living organisms including humans. Factors that control the abundance, distribution, production, and diversity within estuarine habitats will be identified and explored. Field trips to various habitats will let students see patterns of abundance and diversity. Field and laboratory work will teach students how organisms work, how they modify their environments and interact with other organisms. Organism identification, methods for sampling and quantifying patterns, and preparation of data will also be parts of field and laboratory exercises. A weekly discussion focused around 1 or 2 scientific articles will allow students to learn how estuarine research is conducted and conclusions are reached.

This course is taught at the Oregon Institute of Marine Biology in Charleston Oregon. Each week it meets for one full day and for 1 hour on Friday.

COURSE GOALS/LEARNING OUTCOMES Student will:

- Become proficient in describing the various estuarine habitats, in explaining physical and biological factors in those habitats that influence the abundance and distribution of organisms, and in understanding energy flows in and between estuarine environments.
- Explore first hand the superb estuarine habitats, including salt marshes, sand and mud flats, rocky intertidal sites and subtidal regions that are particularly well represented in the Charleston/Coos Bay, Oregon coastal region.
- Use the tools of research ecologists; analyze population variability and quantify abundance and distribution of organisms in different habitats.
- Learn to critically read and discuss the primary research literature in the area of Estuarine Biology.

REQUIRED READING for the course:

1) A set of readings of scientific papers that will be part of weekly discussions. These papers are listed in the course schedule (attached) and will be posted on Canvas for students to access.

FIELD TRIPS AND RECOMMENDED ATTIRE

- We will take a number of field trips in this course. Many will involve intertidal exploration, others will be aboard small and medium sized OIMB vessels.
-You should have a good pair of (knee-high) GUM BOOTS or a pair of HIP-WADERS
- Old and warm clothing is recommended for field trips.

- RAIN GEAR is also recommended, we will be working low tides when it may be raining (this is Oregon).
- Laboratory equipment will be supplied, but if you have a dissecting kit bring it along to lab. Also bring your calculator.
- FIELD NOTEBOOK -taking notes on field trips & in lab is strongly recommended. This will help you carry out the assigned work and should be reviewed in preparation for exams.

ANTICIPATED SCHEDULE OF INSTRUCTIONAL TOPICS BY WEEK
See the attached Course Schedule for Fall 2014.

Basis for Undergraduate Grading:

Organism quiz (wk 5)	50 points
Midterm (wk 6)	100 points
Final exam (wk 11)	100 points
Lab/Field work	150 points
Discussion	100 points
TOTAL:	500 points

EXAMINATIONS -
- An Organisms Quiz will be given on week 5 as a tool to get students to learn names and be able to identify some important members of estuarine habitats.
- MIDTERM I about 1.5 hours long will be given during week 6. The midterm will cover lectures, labs and discussions for Weeks 1 through 5. A sample exam will be made available before the midterm.
- FINAL EXAM will be cumulative and also cover lecture, lab and discussion materials. A sample exam will be made available before the Final..
- Midterm I scores will be replaced by the FINAL EXAM score if the latter is better.

OTHER WORK
- The lab and fieldwork component of the grade will be based on participation in these parts of class AND on individual or small group assignments that will be collected and graded.
- The discussion component of the grade will be based on the instructor's evaluation of individual's participation in the weekly group discussions on assigned scientific papers. Students who have difficulty talking in group discussions can choose to turn in a write-up (1 page, typed) of the paper that described the content and main points as well as raises questions of interest to that student.

- Scores for all parts of the course will be available to students who wish to discuss their performance.

STUDENT WORKLOAD EXPECTATIONS
- Students are expected to do all reading assignments (listed in course schedule) and this material may be on exams even if it is not directly covered in class. While there is no required textbook, students are expected to be able to access cited references on reserve or through resources of the OIMB Rippey Library.

- Students are expected to thoroughly read the discussion papers and prepare notes for the weekly class discussion. Reading and preparation is essential for high performance in this part of the course.

- Some field and laboratory assignments will require students to work up data and prepare graphs or statistical analyses. To the extent these are not completed during class times, students will be responsible for completion of the work outside of class. Work will be collected after class or a reasonable interval and evaluated.

DIFFERENTIATION OF GRADUATE VS UNDERGRADUATE WORKLOAD

For undergraduate credit the course will consist of the exams and the grading scheme described above. However, undergraduates have the option of choosing a modified graduate student scheme. Instead of testing undergraduates can choose to write 2 term papers in lieu of midterm and final exams. These will be evaluated and graded according to the scheme for graduate students. Once the first midterm has been given, the choice of grading scheme cannot be changed.

For graduate students, 2 literature-based research papers (approx. 10 typed pages, double-spaced) will be assigned in lieu of the midterm. A description of the Research paper is attached. Each paper will be critically read and marked by the instructor and graded for content, style, and grammar. Then the paper will be returned to the student for a complete rewrite. The paper will then be regraded. This write/rewrite scheme is meant to give (graduate) students critical feedback and an opportunity to improve writing skills. Graduate students will still be required to take the Organism Quiz (week 5) and the Final exam and participate in lab and discussion. The 200 points normally assigned to the Midterm and Final will be split equally into 3 parts, one part for each paper and one part for the Final.

For students with disabilities:

The University of Oregon is working to create inclusive learning environments. Please notify me [Emlet] if there are aspects of the instruction or design of this course that result in barriers to your participation. You may also wish to contact Disability Services in 164 Oregon Hall at 346-1155 or disabsrv@uoregon.edu.

ESTUARINE BIOLOGY (BI 454/554, 5 credits)

Class Schedule: Wednesdays, 830* - 1700* and Fridays, 1130-1230 ***See exceptions below**

Week 1 Introduction to estuaries and benthic organisms

Sept 30 08:10 +0.86 ft hLow; 14:19 +8.72 ft hHigh

08:00* Field trip to Portside mudflat to collect samples and sediments

11:00 Lecture: Introduction to the class, goals.

Lecture: Overview of estuaries – importance, distribution in space and time.

13:15 Lecture (from morning) continued…

14:00 Field trip to Metcalf Marsh and to floating docks to see fouling communities/introduced species/water movement.

Discuss, plan, set-up, and design fouling plate studies…

Oct 2 11:30 Discussion: Week 1 readings (Lotze et al 2006 Science; Elliott and Whitfield 2011)

Week 2 Physical properties of an estuary

Oct 7 03:00 +0.86 ft lLow; 09:40 +6.39 ft lHigh; 15:30 2.64 ft hLow

08:30 Lecture: Types of estuaries and circulation, sedimentation

09:45: Labortory: set up aquaria with organisms to see animal sediment interactions.

11:00 Lecture: Tides

13:15 Laboratory: Groups on settlement plate deployments to go out this PM

Oct 9 11:30 Discussion: Week 2 readings (Roegner and Shanks 2001; Rand et al 2006)

Week 3

Oct 14 07:27 +2.14 ft hLow; 13:28 +7.79 ft hHigh; 20:02 +0.39 ft lLow

08:30 Lecture: Estuarine gradients, +/- oxygen, other physical characteristics

10:00 Field trip: Boat trip up Coos Estuary – sampling stations for temp, salinity, sediments, etc

Group 1 depart at 10:00 am - sample lower estuary I; disembark at Town dock ca. 11:30

Group 2 meet at 11:00 at van, drive to exchange site Town dock – 11:30 sample Isthmus Sl

Group 3 meet at 12:30 at van, drive to exchange site Town dock – 13:00 sample upper Coos River

Group 4 meet at 14:00 at van, drive to exchange site Town dock – 14:30 sample lower estuary II

TBA – activities for groups when not on boat trip.

Oct 16 11:30 Discussion: Week 3 readings (Miller and Sadro 2003; Hering et al 2010)

Week 4 Saltmarshes

Oct 21 13:13 +3.29 ft hLow; 18:59 +6.41 ft hHigh

08:30 Lecture: Saltmarshes

09:45 Continue to work on mud samples

10:30 Lecture: Mangroves - replacement of salt-marsh in the tropics

13:00 **Fieldtrip to Metcalf Marsh, plant identification, quantitative transects**

16:00 Begin laboratory to work up field samples (weight and dry plant and sediment samples)

Oct 23 11:30 Discussion: Week 4 readings (Hacker and Bertness 1999; Sala et al 2008)

Week 5 The estuarine environment and boundary layers
Oct 28 07:01 +1.4 ft hLow (07:47 Sunrise); 13:05 +9.09 ft hHigh; 19:48 -1.48 ft lLow
08:30 Estuarine Organism Quiz (on fouling and mudflat organisms)
09:00 Lecture on boundary layers
10:00 **Field trip to measure boundary layers**
13:30 Work up boundary layer data, more CTD and salt marsh drying sample weights

Oct 30 11:30 Discussion: Week 5 readings (Woodin et al 2010; Volkenborn et al 2012)

(DAYLIGHT SAVINGS TIME ENDS THIS WEEK END)

Week 6 Benthic Communities
Nov 4 07:01 +6.57 ft hHigh; 13:00 +3.05 ft hLow
08:30 Midterm Exam I
10:30 Laboratory - weigh sediment and plant samples
11:00 Lecture: Estuarine animals & infaunal community interactions I.
13:15 Field trip TBA

Nov 6 11:30 Discussion: Week 6 readings (Michelli 1997)

Week 7 More on Benthic Communities
Nov 11 16:56 PST Sunset; 18:06 -0.01 ft lLow
08:30 Lecture: Infaunal community interactions II.
10:00 a) weigh ashed sediment and vegetation samples
b) begin to sort the gravel/shell hash samples from last Tuesday to isolate small (tiny!) clams.
11:00 Lecture: Infaunal community interactions III.
Break until field trip
15:30* Field trip to Dome House sand flat for quantitative sampling of infauna.

Nov 13 11:30 Discussion: Week 7 readings (Lenihan et al 2001; Seitz et al 2009)

Week 8 Seagrasses, Phytoplankton and Detritus Estuarine
Nov 18 10:43 +3.37 ft hLow; 16:20 +6.53 ft lHigh
08:30 Lecture: Seagrass communities, importance & ecology
10:00 Lecture: Estuaries: Planktonic communities and patterns
13:00 Work up samples/data from quantitative field trip continue lab work of mudflat or saltmarsh data
Sort gravel/shell hash, identify different species, measure juveniles and adult butter clams (others too?) to construct size frequency plots; attempt to age the butter clams.
16:00 Lecture: Lecture: Estuarine production, detritus and energy flows

Nov 20 11:30 Discussion: Week 8 readings (Marguillier et al 1997; van derHeide et al 2007)

Week 9 Sediments and Anoxia
Nov 24 10:12 +8.95 ft hHigh; 16:45 PST Sunset; 17:01 -1.16 feet lLow;

08:30 Lecture: Decomposition, sediment chemistry and biogeochemical cycling
10:00 Field trip trawling on "RV PLUTEUS" to collect subtidal organisms of the Coos estuary
13:15 Convene in lab, look at and key out organisms collected on morning dredge trip.

Nov 26 No discussion (Thanksgiving)

Week 10 Fouling Communities and Negative Estuaries
Dec 2 11:09 +3.27 ft hLow
08:30 Lecture: Fouling communities and Introduced Species
10:00 Collect fouling plate experiments and evaluate
13:00 Lecture: Negative estuaries and other topics TBA
14:00 Settlement plate presentations
16:00 Lab clean up

Dec 4 11:30 Discussion: Week 10 readings

Dec 9 Final Exam is Wednesday of exam week: 8:30 to 10:30 am in classroom.