BI 454/554 Estuarine Biology Fall 2014 Course Syllabus

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OFFICE HOURS: Emlet – please come by anytime; we’ll talk immediately, or we can schedule a time.
Valley – 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 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 reserved 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 Blackboard 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.

- The lab and field work 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 text book, 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 for each paper and one 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.
**Purpose:** To provide entering (and continuing) students with the opportunity to develop or reinforce their writing skills. For many undergraduates, science courses do not allow opportunities to practice scientific writing. For graduate students, preparation of the Thesis Proposal and writing the Thesis are the first (or only) 2 writing exercises in graduate school. For many people writing does not come easy. You will have a chance to practice and get feedback on all aspects of your writing - including content, style and grammar.

**Approach for each paper:**

Pick a topic in Estuarine Biology, investigate this topic in detail by finding and reading the primary literature. Write an essay-style paper synthesizing the information that you read.

Your choice of topic is up to you, as long as it fits easily into the realm of estuarine biology. If you want to discuss the topic or want suggestions for where to start looking for relevant papers come see me. You may start with a topic and after some reading find it is too large to pursue, so you might have to narrow the scope of your topic.

Use the library. Find out what is in it - journals, reprints, dissertations and theses. You will also need to use the on-line databases for searching for references. Ask Barb Butler (our librarian) to help you access this information. I also have a number of books and a reprint collection of over 6000 references that you may use if you come see me. Our holdings here at OIMB are limited, but by planning early you can get papers from most (marine) journals mailed in here within a week of your request. Make your loan requests early and through Barbara.

**How should you write about what you read?**

You can write:

1) A synthesis (or review) of a topic (e.g. "The importance of recruitment in structuring marine populations").
2) A critic of an experimental method (e.g. "The problems with cage experiments").
3) A mock mini-proposal for research. (e.g. A proposal to examine the role of disturbance in boulder field communities").
4) Contrast studies. (e.g. similar processes in different environments such as "The relative importance of predation in temperate and tropical rocky intertidal habitats")
5) Other approaches are also possible, try running one by me.

Your paper should include citations where you are referring to published work. Cite these works as is done in journals such as Ecology or Biological Bulletin and include a section on "Literature Cited" in your paper. Use your own words whenever possible. If you use a direct quote then identify it with quotation marks "..." and give the citation with page number immediately afterwards.

**Format:** Papers should be 10-15 pages in length. Use 2.5 cm margins on all sides. Label each page with your name and page number (use a header). **Double space** all text, except References may be single spaced. Type only on one side of the paper.

Include a title page. In the main part of the paper use headings and subheadings if you find them helpful in guiding the reader through the paper. Use a heading for literature cited.
Schedule: Two papers are due on or before the following dates: Tuesday Oct 28 and Tuesday Nov 25. Rewrites, with the original, marked paper attached, are due 1 week after papers are returned.

**How I will mark your paper:** I expect strong efforts by all. I plan to go over each manuscript making detailed comments on content, style, and grammar. I will probably write all over it. My comments are meant to be instructive. You will be asked to rewrite the paper making corrections according to my comments. Your grade for the paper will be based on the initial version and the rewrite and will include separate scores for content (the thoroughness of your investigation of a topic), style (your expression and clarity of delivering the information), and grammar (spelling, punctuation, word usage, sentence structure, etc).

**Recommendation:** Purchase or borrow a copy of Strunk and White's *Elements of Style* (I have one). This is an excellent little reference for grammar and word usage. We have several copies on campus should you like to borrow to examine.

Also refer to various books listed below and in the library:


ESTUARINE BIOLOGY (BI 454/554, 5 credits)

Class Schedule: Tuesday, 8:30* - 17:00* and Fridays, 13:00-13:50  *See exceptions below

Week 1 Introduction to estuaries, tides and benthic organisms
Sept 30  10:31 +3.06 ft hLow
  09:00* Lecture: Introduction to the class, goals.
  09:30 Lecture: Overview of estuaries – importance, distribution in space and time.
  10:15 Field trip to Metcalf Marsh and surrounds (“low” tide) – collect salt marsh plant species
  11:30 Field trip to floating docks to see fouling communities/introduced species/water movement
  13:30 Lecture (from morning) continued…
  14:30 Discuss, plan, set-up, and deploy fouling plate studies…

Oct 3 13:00 Discussion: Week 1 readings

Week 2 Benthic organisms and physical properties of an estuary
Oct 7  05:39 +0.27 ft hLow (sunrise 07:21)  11:54 +8.25 ft hHigh  18:14 -0.22 ft lLow (sunset 18:47)
  08:30 Lecture: Types of estuaries and circulation, sedimentation
  10:00 Lecture: Tides
  11:15 - Field trip to Metcalf Marsh and surrounds (high tide)
  midday break because work into early evening
  15:30 Field trip to Portside mudflat - collect infaunal organisms, collect and sieve mud
  17:30* Set up aquaria of sediment and organisms

Oct 10 13:00 Discussion: Week 2 readings

Week 3
Oct 14  11:04 +3.31 ft hLow 16:56 +6.84 ft hHigh
  08:30 Lecture: Estuarine gradients, +/- oxygen, other physical characteristics
  10:00 Field trip: Boat trip up Coos Estuary – sampling stations for temp salinity, sediments
     Group 1 depart at 10:00 am, disembark at River Forks ca. 13:00
     Group 2 meet at 12:30 at van, drive to exchange site Coos River-Milliloma River forks by 13:00
     Groups 2 in Charleston by 15:45?

Oct 17 13:00 Discussion: Week 3 readings

Week 4 Saltmarshes
Oct 21  11:17 +7.47 ft hHigh 17:41 +1.04 ft lLow
  08:30 Lecture: Saltmarshes
  09:45 Groups work up data from Boat trip last week (worked on CTD data, bay mud, and gEarth station data)
  14:00 Fieldtrip to Metcalf Marsh, plant identification, quantitative transects
  16:30 Begin laboratory to work up field samples (weight and dry plant and sediment samples)
  TBA Lecture: Mangroves - replacement of salt-marsh in the tropics

Oct 24 13:00 Discussion: Week 4 readings

Week 5 The estuarine environment and boundary layers
Oct 28 09:29 +3.13 ft hLow  15:23 +7.69 ft hHigh
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 drying sample weights

Oct 31 13:00 Discussion: Week 5 readings

(DAYLIGHT SAVINGS TIME ENDS THIS WEEK END)

Week 6 Benthic Communities
Nov 4 09:41 +8.25 ft hHigh 16:16 -0.12 ft lLow
08:30 Midterm Exam I
10:30 Laboratory - weigh sediment and plant samples
11:00 Lecture: Infaunal community interactions I.
14:00 Field trip to Dome House sand flat for quantitative sampling of infauna.

Nov 7 13:00 Discussion: Week 6 readings

Week 7 More on Benthic Communities
Nov 11 08:43 +3.33 ft hLow 14:28 +7.38 ft hHigh
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.
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.

Nov 14 13:00 Discussion: Week 7 readings

Week 8 Seagrasses, Phytoplankton and Detritus Estuarine
Nov 18 08:53 +7.43 ft hHigh 15:34 +1.33 ft lLow
08:30 Lecture: Seagrass communities, importance & ecology
10:00 Lecture: Estuaries: Planktonic communities and patterns
11:00 Possibly work on sediment samples
13:15 Lecture: Lecture: Estuarine production, detritus and energy flows

Nov 21 13:00 Discussion: Week 8 readings

Week 9 Sediments and Anoxia
Nov 25 13:21 +8.37 ft hHigh 20:19 -0.91 ft 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 28 No discussion (Thanksgiving)

Week 10 Fouling Communities and Negative Estuaries
Dec 2 08:24 +8.15 ft hHigh 15:14 +0.28 ft lLow
08:30 Lecture: Fouling communities and Introduced Species
10:00 Collect fouling plate experiment and evaluate
13:00 Lecture: Negative estuaries and other topics TBA
14:00 Settlement plate presentations
16:00 Lab clean up
Dec 5 13:00 Discussion: Week 10 readings
Dec 9 Final Exam is Tuesday of exam week: 8:30 to 10:30 am in classroom.