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OFFICE HOURS: R Emler – please come by anytime; we'll talk immediately, or set a time.  
D. Daniel –Wednesday mornings -9:30 to 10:30 am in Maslakova Lab

### 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 and sample 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. Student presentations on world estuaries will be an opportunity for the class to learn about other estuaries – how they work, how they are used, and what their current state is.

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

### COURSE GOALS/LEARNING OUTCOMES      A 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 firsthand the superb estuarine habitats, including salt marshes, intertidal sand and mud flats, and subtidal regions that are particularly well represented in the Charleston/Coos Bay, Oregon coastal region.
  - Use the tools of field ecologists; analyze population variability and quantify abundance and distribution of organisms in different habitats.
  - Learn about estuaries around the world and some of their challenges both common and unique.

### REQUIRED READING for the course:

No required texts; there are reference books in the back of the classroom. I will suggest reading during lectures and strongly recommend that you read these.

### 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 HIP-WADERS are okay

- Old and warm clothing and hat are recommended for field trips.
- RAIN GEAR is also recommended, we will be working low tides when it may be raining (this is fall in 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 2023.

### Basis for Undergraduate Grading:

|                        |            |
|------------------------|------------|
| Organism quiz (wk 5)   | 50 points  |
| Midterm (wk 6)         | 100 points |
| Final exam (wk 11)     | 100 points |
| Lab/Field work         | 125 points |
| Estuarine Presentation | 75 points  |
| TOTAL:                 | 450 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.
- 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 score 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.
- World Estuary Presentation - For the class to learn more broadly about similarities and differences, I have compiled a list of estuaries from which I would like pairs of students to choose and then prepare a presentation – see description below.
- Missed work must be made up in a timely fashion that both student and instructor agree on. Many of the class assignments will be group efforts, so it is important that you contribute to your group's effort and not delay the work.
- 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 come to class and participate in the lectures, field trips and laboratory exercises. **Promptness is both expected and appreciated.** Attendance is required on all field trips, in all laboratory sessions, for all lectures and for student presentations. Contact the instructor in advance if you plan to be absent.

- This course is 5 credits. By UO registrar guidelines students are expected to work about 30hr/credit per term (<https://provost.uoregon.edu/credit-hour-and-student-workload-policies-policy>). That means Estuarine Biology is 150hr/10weeks or 15 hours per week. We will be using about 8hr/week in class, field trips and labs, so that leaves 7hr/week for you to: i) work after class on data analysis and prepare presentations, ii) study your notes, iii) read citations mentioned in class or references on reserve, iv) prepare for quizzes, midterm, and final.

- While there is no required textbook, I strongly encourage you to read citations mentioned in lecture and become familiar with references on reserve in the classroom. All students are expected to be able to access cited references on reserve or through resources of the OIMB Rippey Library. Please do not remove reference books from the class for more than 1 day and sign them out if you do borrow them.

- 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.

### ACCESS and ACCOMMODATIONS

The University of Oregon and I are dedicated to fostering inclusive learning environments for all students. We welcome students with disabilities into all UO educational programs. The Accessible Education Center (AEC) assists students with disabilities in reducing campus-wide and classroom-related barriers. If you have or think you have a disability (<https://aec.uoregon.edu/content/what-disability>) and experience academic barriers, please contact the AEC to discuss appropriate accommodations or support. Visit 360 Oregon Hall or [aec.uoregon.edu](https://aec.uoregon.edu) for more information. You can contact AEC at 541-346-1155 or via email at [uoaec@uoregon.edu](mailto:uoaec@uoregon.edu). The details of your disability will be kept confidential with the AEC and you are not expected to share this information with others. However, I invite you to discuss any approved accommodations or access needs at any time with me.

**BI 454/554**

**Estuarine Biology**

**Fall 2023 Course Schedule**

**ESTUARINE BIOLOGY (BI 454/554, 5 credits) Fall 2023 –**

**Class Schedule:** All weeks: Tuesdays, 0830 – 1715 OIMB campus (\*\*unless noted otherwise)

**Week 1 Introduction to estuaries – importance to society, marine relations, geological types**  
Sept 26 (Tuesday) 1632 +2.45 ft hLow (Sunset 1905)

#### **0800 OIMB orientation Dining Hall**

0915 Introduction to the class, goals, grading, expectations.

1000 Lecture: Overview of estuaries – importance, distribution in space and time.

1200 lunch

1315 more lecture

1400 break till field trip

1500 **Field trip to Portside mudflat – bring animals and sieved-sand back to lab for tanks.**

Back for dinner @ 1800

**Week 2 Circulation and Sedimentation (need bag lunches for group 2 – 5 students)**

Oct 3 0915 +2.56 ft hLow; 1518 +8.1 ft hHigh; 2217 -0.39 ft lLow (Sunset: 1854)

0830 Lecture: Types of estuaries and circulation, sedimentation

**1000 Field trip: Boat trip up Coos Estuary**- 30 stations for temp, salinity, sediments, etc  
Group 1 (5) depart at 10:00 am - sample lower estuary 1; disembark at Town dock ca. 11:30  
Group 2 (5) meet at 11:10 at van, drive to exchange site Town dock – 11:30 sample Isthmus S and lower Coos River to Forks

Group 3 (5) meet at 12:45 at van, drive to exchange site Forks – 13:15 sample upper Coos River ,back to Town dock

Group 4 (5) meet at 14:20 at van, drive to exchange site Town dock – 14:40 sample lower estuary 2 back to Charleston

Group 5 (4) meet at classroom 15:45 to walk to outer end of Char. Marina Dock B.

**(Richard gone Oct 7-9)**

**Week 3 – Estuarine gradients - ecotones**

Oct 10 0417 +0.94 ft lLow; 1053 +6.44 ft lHigh; 1638 +2.74 ft hLow; 2227 +6.63 ft hHigh

0830 Lecture - Gradients – Sedimentation, Ecotones, resources and boundaries

1000 Work up data from cruise.

i Prepare and weigh sediment samples from Coos Bay/ South Slough for drying

ii Download and process CTD data

iii Plot stations in Google Earth and calculate river distances in kilometers

1200 Lunch

1315 continue cruise data work up

1600 Lecture: Salt Marshes

**Week 4 Salt Marshes and Mangroves**

Oct 17 (Sunrise: 0733) 0758 +2.81 ft hLow; 1357 +8.04 ft hHigh ; 2053 -0.21 ft. lLow (Sunset: 1830)

**0800 Fieldtrip to Metcalf Marsh, plant identification, quantitative transects**

1100 Organize marsh samples for later processing

1200 Lunch

1330 Lecture: Mangroves - replacement of salt-marsh in the tropics

ca 1500 Initial laboratory work up of field samples (weigh and dry plant and sediment samples, measure soil salinity)

**Week 5 The estuarine environment and boundary layers**

Oct 24 0942 +6.65 ft lHigh; 1528 +2.65 ft hLow Tide (Sunset 1820)

**0830 Estuarine Organism Quiz (on mudflat, fouling and saltmarsh organisms)**

0900 Lecture - TBA

1030 Work up data from Coos Bay transect and continue salt marsh samples - dry weights

1200 Lunch

1315 Lecture – Lecture on boundary layers

**1500 field study on boundary layers**

### **Week 6 Seagrasses, Phytoplankton and Detritus**

Oct 31 0807 +2.93 ft hLow; 1402 +8.53ft hHigh (Sunset: 1810)

#### **0830 Midterm Exam I**

1100 Lecture: Seagrasses importance & ecology

1200 Lunch

1300 **Field trip trawling on "RV Megalopa" to collect subtidal organisms of the lower Coos estuary**

1530 – Look at and key out organisms collected on dredge trip

**(Nov 5 Daylight savings time ends)**

### **Week 7 Benthic Communities I**

**Estuarine sand and mudflats – physical and environmental conditions, patterning of organisms**

Nov 7 (NEW Pacific Standard Time) 1421 +3.14 ft hLow (Sunset: 1701)

0830 Lecture: Infaunal community interactions I.

1000 Lecture: Infaunal community interactions II.

1200 Lunch

1315 Saltmarsh lab work

1500-1700 First 4 presentations on World Estuaries

### **Week 8 Benthic Communities II and Estuarine Nekton**

Nov 14 1153 +8.51 ft hHigh; 1856 -0.87 ft lLow (Sunset: 1653!!!)

0830 Lectures: Infaunal community interactions II

1000 Estuarine Nekton

1200 Lunch

1315 – break in middle of day – late afternoon and evening low tide

**1615 Field trip to Dome House sand flat for quantitative sampling of infauna.**

### **Week 9 Sediments and Anoxia – (Thanksgiving week)**

Nov 21 1311 +2.87 ft hLow

0830 Lecture: Decomposition, sediment chemistry and biogeochemical cycling

1000 Laboratory: Work up samples/data from quantitative field trip. Sort gravel/shell hash, identify different species, measure juveniles and adult butter clams (others too?) Construct size frequency plots; attempt to age the butter clams.

1200 Lunch

1315 Lecture: Estuarine production, detritus and energy flows

1430-1630 Middle 4 presentations on World Estuaries

### **Week 10 Fouling Communities and Negative Estuaries**

Nov 28 1156 +8.75 ft hHigh; 1902 -1.32 ft lLow (Sunset: 1643)

0830 Lecture: Fouling communities and Introduced Species

1000 Lecture: Negative estuaries and other topics TBA

1200 Lunch

1315 lab cleanup

1500-1700 Last 4 presentations on World Estuaries

**Dec 5 Final Exam is Tuesday of exam week:**

**0830 Exam in classroom**