

Invertebrate Zoology (BI451/551, 8 credits)
Tuesdays and Thursdays (8:30 am - 5:30 pm)
Earlier than 8:30 am on many morning field trips

Spring Quarter 2018 (ver 3-22-2018)

Instructors: Richard Emlet (remlet@uoregon.edu)

Maya Watts (mwolf1@uoregon.edu)

TA: MacKenna Hainey (mackenna@uoregon.edu)

Class Schedule

Week 1

4/3 09:08 PDT -0.06 feet LL

08:00 Field Trip – S. side of Sunset Bay

RE 10:30 Introduction to class

MW 11:00 Lecture: Phylum Phylum Cnidaria Intro. and Anthozoa

13:15 Set up scopes

13:45 Lab: Anthozoan anatomy and diversity

4/5 10:35 PDT 0.40 feet LL

RE 08:30 Lecture: Class Hydrozoa

09:45 Lab: Hydrozoan diversity

RE 13:15 Lecture: Classes Scyphozoa, Cubozoa & Staurozoa

14:30 Docks maybe?

15:30 Lab: Scyphozoans

Week 2

4/10 15:25 PDT 1.07 feet LL

RE 08:30 Lecture: Phylum Porifera

09:45 Lab: Phylum Porifera

MW 13:15 Lecture Phylum Ctenophora

14:30 Lab: Ctenophores

Out of class: Jellies video

4/12 16:54 PDT 0.82 feet LL

MW 8:30 Lecture: Phylum Platyhelminthes (Turbellarians)

- 10:00 Lab: Platyhelminthes Lab (Turbellarians)
 MW 13:15 Lecture: Platyhelminthes (Parasitic Classes)
 16:00 Discussion of the Barcode Project (give protocol and list of potential annelids to read over by next week, form groups)
Turn in Lab Notebooks

Week 3

4/17 08:01 PDT -0.57 feet LL

06:30 Field Trip – South Cove, Cape Arago

- RE 10:00 Lecture: Nemertea
 11:00 Lab: Nemertea
 13:15 Lab: Nemertea (continued)
 16:00 Demo of how to use the camera, if we've found anything we want to photograph and preserve, go through the protocol and labeling instructions.

4/19 09:33 PDT -0.91 feet LL

08:00 Field trip to Portside mudflat

- MW 11:00 Lecture: Phylum Annelida I – intro
 MW 13:15 Lecture: Annelida II
 14:30 Lab: Annelida Dissection
 16:00 Review session

Week 4

4/24 14:46 PDT 0.00 feet LL

08:30 Midterm Exam I

- MW 11:00 Lecture: Annelida III
 13:15 Lab: Annelida Diversity and Identification
 16:00 Time for initial pictures/tissue preservation for anyone ready

4/26 16:37 PDT 0.30 feet LL

- RE 09:00 Lecture: "Phylum" Sipunculida
 10:30 Laboratory – Sipunculids – peanut worms
 RE 13:15 Lecture: Phylum Mollusca Intro + Class Polyplacophora
 15:30 Lab: Chiton Diversity

Week 5

5/1 08:05 PDT -0.70 feet LL

06:30 Field trip to s. Sunset Bay or Middle Cove, Cape Arago

- MW 11:00 Lecture: Class Gastropoda
 13:15 Lab: Gastropod Diversity
 RE 15:30 Lecture: Mollusca, Class Bivalvia

- 5/3 09:21 PDT -0.37 feet LL**
07:45 Field trip to Dome House Mudflat
 11:00 Lab: Bivalve Diversity, Behavior and Dissection
 MW 13:15 Lecture: Mollusca, Class Cephalopoda
 14:30 Lab: Squid Dissection and Video
 (+ TA crab pots out)
16:00 Check-in for Barcoding project to prep for mailing next week

Week 6

- 5/8 13:26 PDT 1.08 feet LL**
 MW 08:30 Lecture: Phylum Arthropoda + Chelicerata
 RE 10:00 Lecture: Arthropoda, Introduction to Crustacea I (Class: Branchiopoda)
 11:00 Lab: Crustacea I, Branchiopoda (Artemia, Cladocera) (order in advance)
16:00 Finish processing and mail off specimens for Barcoding project

- 5/10 15:13 PDT 1.23 feet LL**
 08:30 Midterm II
 MW 11:00 Lecture: Arthropoda, Crustacea II - Intro. Malacostracans + Decapods
 10:00 Lab: Crab Dissection
 13:15 Lab: Decapod diversity

Week 7

- 5/15 07:00 PDT -1.17 feet LL (05:52 PDT Sunrise)**
06:00 Field trip to Middle Cove or s. Sunset
 RE 11:00 Lecture: Arthropoda IV: (Classes Copepoda, Ostracoda, Cirripedia)
 15:00 Lab: Cirripedia + crustaceans in plankton
 18:30 post dinner Midterm review session

- 5/17 08:31 PDT -1.80 feet LL**
06:30 Field trip to Qochyax ("Quay-Kee-awk") Island
 MW 11:00 Lecture: Phylum Ctenophora
 13:15 Lab: Phylum Ctenophora
15:00 Sequence Blasting session in library
 Lab Notebooks due (II)

Week 8

- 5/22 13:10 PDT -0.11 feet LL**
 RE 08:30 Lecture: Phylum Echinodermata Intro. + Stellerioidea
 10:00 Laboratory: Asteroid (start this lab)
 MH 13:15 Lecture: Echinodermata, Classes: Ophiuroidea
 14:30 Laboratory: Asteroid (cont'd) and Ophiuroid Diversity

5/24 15:09 PDT 0.76 feet LL

08:00 RV Pluteus boat trip

RE 13:15 Lecture: Echinodermata, Classes Echinoidea & Holothuroidea
14:30 Lab: Echinoidea and Holothuroidea Diversity, Holothurian Dissection
more Echinoderm lab (cuke dissection)

Week 9

5/29 07:08 PDT -0.92 feet LL (05:41 PDT Sunrise)

06:00 Field trip- Lighthouse

RE 10:00 Lecture: Phylum Chordata, Subphylum Tunicata (=Urochordata)
13:15 Ascidian diversity

5/31 08:21 PDT -0.82 feet LL

RE **07:30 Field trip to North Cove at Cape Arago**

11:00 Lecture: Phylum Hemichordata
13:15 Lab: Hemichordate (draw one ☺)

Week 10

6/5 11:40 PDT 0.63 feet LL

08:00 RV Pluteus boat trip (alternate)

MW 8:30 Lecture: "Lophophorates" Intro. and Bryozoa
10:00 Laboratory: Bryozoa

MW 13:15 Lecture: Phyla Phoronida and Brachiopoda
14:30 Lab: Phoronida (1 or 2 species)

14:30 Final Barcoding project hand in, meeting with Maya and Richard

6/7 13:19 PDT 1.24 feet LL

09:30 Midterm III
13:15 Lab cleanup
Notebooks due

Week 11 (Finals Week)

6/12 no class, no final

Syllabus for INVERTEBRATE ZOOLOGY (BI 451/551, 8 credits), Spring 2018

COURSE GOALS/LEARNING OUTCOMES Student will:

- 1) Learn to use marine invertebrates as models to understand general biological processes
- 2) Develop an understanding of the unifying features across organisms while appreciating the unique morphological, physiological and ecological diversity of organisms.
- 3) Learn to evaluate relationships between structure and function by examining how organisms accomplish activities such as locomotion, feeding, growth, respiration, excretion and reproduction.
- 4) Develop working knowledge of Oregonian and northeastern Pacific marine invertebrates accessible in their local habitats and environments.

Required Textbook = J.A. Pechenik. 2015. Biology of the Invertebrates, 7th edition. McGraw-Hill Publisher.

You will have access to the lab 24/7. We will be in the lab Tuesdays and Thursdays and likely on other occasions as well. You are welcome to drop by our offices/labs (Richard in Tyler lab and Maya in library beside Clara) if you have questions. If we are unavailable at that time, we can make an appointment to meet you. We will have field trips to local habitats, often starting early in the morning depending on the tides.

Course Requirements and Evaluations:

Your final grade will be determined by a combination of three midterm exams, your laboratory notebook, and participation and report for the barcoding project. Material covered on midterms will include lectures, lab materials, and assigned readings (see above schedule). Attendance is required on all field trips, in all laboratory sessions, for all lectures and for student presentations.

Notebooks – 30% (3 evaluations, Only 1st one can be modified for a re-grade)

Midterms – 55% (3 midterms at 15, 15 and 20% respectively)

Barcoding project – 15%

You need to have:

- 1) textbook (specifics above)
- 2) A lecture notebook
- 3) A separate lab notebook – loose leaf notebook with unlined paper in 3-ring binder.
- 4) Rite-n-Rain notebook for field notes (in office)
- 5) Dissecting tools – forceps, scissors, scalpel, disposable blades, probe, plastic ruler
- 6) Memory stick
- 7) Full raingear and rubber boots

Lab Notebook

We will not have a formal lab manual that guides you through each lab but will typically have a lab handout to give some guidance (e.g. helpful diagrams for dissections, recommendations for organisms to look at). You will be drawing a variety of organisms for most taxonomic groups, combined with notes on any exercises we do in lab. You don't have to draw everything you see in lab but drawing thorough examples of different groups for each phylum is important.

Your lab notebook should include:

1. Drawings, descriptions, and notes on observations of animals you examine in lab
2. Accurate labeling of anatomy of live and dissected animals
3. Classification for each animal (starting with Phylum and working down to Genus and species- all accurately spelled)
4. Some indication of size scale for each drawing (field of view and magnification)
5. Notes on lab exercises
6. Field information for the organisms you describe (e.g. habitat, ecological associations etc.)

Mackenna Hailey's lab notebook is on display in the back of the lab as an A+ sort of notebook. But note, artistic ability is not graded, just thoroughness!

The notebook will be graded on:

1. Number of animals drawn (a representative number for each taxonomic group available in lab)
2. Description of organism/correct anatomical labeling
3. Classification and scale for each specimen drawn
4. Observations (e.g. ecology, habitat collected from, lifecycle, if pertinent)
5. Detailed notes on all fellow student talks

Western Association of Marine Labs Barcoding Project:

The Smithsonian National Museum of Natural History (NMNH) and the Western Association of Marine Labs are collaborating on a genomics initiative project to gather and catalog specimens and gene sequences from hundreds of target species (those we have no genetic info for) on the west coast of the U.S. We will be the first invertebrate zoology class to participate in the initiative (with other invertebrate zoology classes at our and other marine labs to follow in summer)! Our class will focus on the Phylum Annelida (segmented worms). As a participant of this project, each of you will collect, identify, photograph, catalog and preserve a minimum of two species of target annelids as voucher specimens and for DNA extraction and sequencing. We want you to work in pairs, so each pair does at least 4 species. We will send off our preserved specimens and tissue samples to scientists at NMNH, who will handle the DNA

extraction and genetic sequencing for us and return a DNA sequence (Cytochrome Oxidase Subunit 1 (CO1) amplified from mitochondrial DNA). With this sequence we can search and compare our sequences to other annelids sequences in GenBank using [BLAST](#) (Basic Local Alignment Search Tool). For each annelid species you will need to write a one-page report on the species including the metadata about collecting and preservation and how the photos and specimens were cataloged as well as your sequence and results of aligning your sequence with those in GenBank.