

INVERTEBRATE ZOOLOGY (BI 451/551, 8 credits)

Mondays and Wednesdays (8:30 AM - 5:30 PM)

Earlier than 8:30 am on many morning field trips

University of Oregon
Institute of Marine Biology
Charleston

Spring Quarter 2012
Instructors: Richard Emlet (remlet@uoregon.edu)
Cynthia Trowbridge (cdt@uoregon.edu)
T.A.: Kira Treibergs (kirat@uoregon.edu)

Congratulations! You are about to study the fantastic diversity of life as illustrated by marine invertebrates in one of the most ideal places in the world for such a study, the Pacific Northwest — or more precisely, the edge of the Eastern Pacific. Invertebrates are beautiful. They are also excellent models to understand general biological processes and to appreciate the unifying features and the unique morphological, physiological and ecological diversity of organisms. This course will provide you with a comprehensive introduction to the major invertebrate phyla through a combination of lectures, laboratories and field trips. We will focus on the relationships between structures and functions such as locomotion, feeding, respiration, excretion and reproduction. Some embryology and larval biology will be included, as well as discussion of taxonomy, behavior and life history. Because invertebrates comprise roughly 97% of animal species on the planet (a few too many to cover in one term!), we will emphasize marine invertebrates, especially live ones locally available.

Week 1

4/2 03:42 PM / 0.69 ft LL

R 09:15 Lecture: Introduction to class, goals, and overview of Inverts (why do they matter?)

R 10:00 Lecture: Phylum **Porifera** (Sponges)

R 11:15 Set up microscopes - begin looking at sponges

13:15 Lab: Deciphering sponges

4/4 11:03 AM / 7.04 ft LH 05:15 PM / 0.52 ft LL

C 08:30 Lecture: Phylum **Cnidaria** (anemones, corals, jellyfish)

C 09:45 Lecture: **Cnidaria Class Anthozoa**

*** **11:00 Field trip to floating docks (hydroids, jellies)**

13:15 Lab: anemones and corals

Week 2

4/9 09:00 AM / -1.53 ft (sunrise: 06:44 AM)

*** **07:15 Field trip to South Jetty or South Cove**

R 11:00 Lecture: **Cnidaria Class Hydrozoa**

13:15 Lab: little polyps and medusae

R 16:00 Lecture: **Tides**

4/11 10:49 AM / -0.91 ft

R 08:30 Lecture: **Cnidaria Class Scyphozoa**

*** **09:30 Field trip to Portside mud flat (flat worms, nemerteans, polychaetes)**

C 01:15 Lecture: Phylum **Ctenophora** (comb-jellies)

02:30 **Video: Jellies**

03:00 Lab: scyphozoa and comb jellies

TURN IN LABORATORY NOTEBOOKS (I)

Week 3

- 4/16** 03:58 PM / 0.89 ft
C 08:30 Lecture: Phylum **Platyhelminthes** (flat worms)
10:00 Lab: Flatworms
C 01:15 Lecture: Phylum **Nemertea** (ribbon worms)
02:30 Lab: Nemerteans
4/18 05:25 PM / 1.41 ft
08:30 MIDTERM I
C 11:00 Lecture: Phylum **Annelida (I)** (segmented worms)
C 01:15 Lecture **Annelida (II)**
02:30 Lab: polychaete dissection

Week 4

- 4/23** 08:23 AM / -0.24 ft (sunrise: 06:21)
*** 06:30 **Field trip to Middle Cove**
C 10:30 Lecture **Annelida (III)**
01:15 Lab: Annelid diversity
4/25 09:37 AM / 0.02 ft
*** 08:15 **Field trip to southside of Sunset Bay**
R 11:00 Lecture: Phylum(?) **Sipuncula** (peanut worms)
01:15 Lab: peanut worms
R 03:00 Lecture: Lophophorates (I) Phyla **Phoronida & Brachiopoda**
04:00 Lab: phoronids and lamp shells

Week 5

- 4/30** 01:52 PM / 0.89 ft
R 08:30 Lecture: Lophophorates (II) - Phylum **Bryozoa** (moss animals)
09:30 Lab: bryozoans
C 01:15 Lecture: Phylum **Mollusca (I)** & Class **Polyplacophora**
02:30 Lab: chitons
5/2 03:42 PM / 1.14 ft
C 08:30 Lecture: **Mollusca (II)** Class **Gastropoda**
09:30 Lab: snails and slugs
R 01:15 Lecture: **Mollusca (III)** Class **Bivalvia**
02:30 Lab: bivalves

Week 6

- 5/7** 07:55 AM / -2.23 ft (sunrise: 06:01 AM)
*** 06:00 **Field trip to Squaw Island or Light House Island**
C 10:30 Lecture: **Mollusca (III)** Class **Cephalopoda** Video: Incredible Suckers
01:15 Lab: squid dissection
5/9 09:36 AM / -1.76 ft
*** 06:30 **Field trip of Cape Blanco**
R 01:15 Lecture: Phylum **Echinodermata (I)** & Class **Asteroidea**
02:30 Lab: sea stars

Week 7

- 5/14 02:16 PM / 1.18 ft
08:30 MIDTERM II (through Asteroids)
- R 11:00 Lecture: **Echinodermata (II) Class Ophiuroidea**
01:15 Lecture: **Echinodermata (III) Class Echinoidea**
02:30 Lab: brittle stars & sea urchins and sand dollars
- 5/16 03:58 PM / 1.99 ft
***** 08:00 R/V Pluteus dredge trip (1/2 half day) (sack lunches)**
- R 02:00 Lecture: **Echinodermata (IV) Class Holothuroidea**
02:45 Lab: Sea cucumbers and Lab on Dredge trip animals
LABORATORY NOTEBOOKS DUE (II)

Week 8

- 5/21 **07:28 AM / -0.64 ft** (sunrise: 05:46)
***** 07:00 Field trip to Metcalf Marsh**
- C 10:00 Lecture: Phylum **Arthropoda (I) Branchiopoda**
11:00 Lab: Branchiopoda
- C 13:15 Lecture: **Arthropoda (II) Molting**
14:30 Lab: crab dissection
- 5/23 **08:38 AM / -0.59 ft**
***** 07:00 Field trip to Charlie's Grotto (south of Dairy Queen & north of Jan's)**
- C 11:00 Lecture: **Arthropoda (III) Malacostraca**
01:15 Lab: malacostracan diversity

Week 9

- 5/28 **MEMORIAL DAY NO CLASS**
- 5/30 01:58 PM / 1.43 ft
- R 08:30 Lecture: **Arthropoda (IV) Cirripedia**
10:00 Lab: barnacles
- R 01:15 Lecture: Phylum **Chordata** - Subphylum **Urochordata**
02:30 Lab: sea squirts
- *** TBA Field trip to floating docks**

Week 10

- 6/4 **06:54 AM / -2.33 ft** (sunrise: 05:38)
***** 06:15 Field trip to North Cove, Cape Arago or north of Empire (for Hemichordates)**
- R 10:00 Lecture: **Hemichordata**
11:00 Lab: enteropneusts (acorn worms)
- C 13:15 Lecture: **Nematoda & Tardigrada, etc.**
14:45 Lab: Round worms and water bears)
- 6/6 **08:30 AM / -2.2 ft**
08:30 MIDTERM EXAM III
13:15 Lab clean up
17:00 LABORATORY NOTEBOOKS DUE (III)

FINALS WEEK

- 6/11 **08:30 No Final Exam**

Required textbook is **Ruppert, Fox and Barnes, *Invertebrate Zoology* 7th edition (2004)**. There will also be other excellent books on reserve in the Invert Lab; please feel free to browse and compare texts and figures.

You will have access to the laboratory day and night, 7 days a week. We will be in the invert lab Mondays and Wednesdays and at unscheduled times also. Cynthia will be in the invert lab on Monday evenings and Tuesday day and evening. We will have field trips to local environments, sometimes during class time, but often earlier, depending on the tides. You are encouraged to go to the intertidal on your own whenever you find the time. You will be most comfortable with a **good pair of rubber boots** (knee-highs or hip boots, please no chest waders), a waterproof windbreaker, hat, and maybe rain pants, depending on the weather.

COURSE REQUIREMENTS AND EVALUATION

The final grade will be determined by an evaluation of three quizzes, your lab notebook, and class participation. Material covered on quizzes will include lecture notes, lab and field trip material, and readings in Ruppert et al. Attendance on all field trips, in all laboratory sessions, and all lectures is required. Aerobic metabolism in lab and on field trips will be subjectively measured!

Grading: 3 quizzes (@20% ea)	60%
lab notebook	35%
class participation	5%

You need to have:

- 1) The textbook: *Invertebrate Zoology* (Ruppert, Fox and Barnes, 7th edition)**
- 2) A lecture notebook**
- 3) A separate laboratory notebook – a loose-leaf notebook with unlined paper**
- 4) Basic dissecting tools: forceps, medium tipped; scissors, scalpel, disposable blades, probe, plastic ruler.**

Items 1-4 are available in the office.

LAB NOTEBOOK

"I always detested the idea of a formal 'lab manual' where a student is confronted with complete artistic drawings of the animal to be studied (leaving little for the student but to identify the parts), and a detailed set of instructions on what to do. Detailed instructions are the death of originality and imagination."
Don Abbott, 1985, *Observing Marine Invertebrates*

Your lab notebook will be most helpful to you if it contains the following:

1. sketches, descriptions, observations of live animals observed in the lab.
2. classification for each animal.
3. accurate labeling of the drawings, including size reference.
4. notes on specific lab exercises.
5. field information on animal habitats and ecological relationships.

Please organize phylogenetically, not day by day.

You aren't expected to sketch everything that you observe in lab – but you might want to. Brief written observations and descriptions are appropriate, but not pages copied or paraphrased from a textbook. Your sketches need not include detail of the entire organism. You may want to focus on specific structures (e.g. appendages in crustaceans, parapodia or head structures in polychaetes). Pick a good orientation – don't have the animal standing on its head, and indicate direction. Comparisons and creativity are appropriate. **Most importantly, include what YOU see, and try to capture the essence of the organism that will best recall it to your memory.**

Your notebook will be graded on accuracy and thoroughness rather than on artistic merit. Neatness and organization are also important.

GRADUATE CREDIT BI 551 “Getting to know you”

In addition to the requirements listed above, those taking Invert for graduate credit will be expected to write two papers. One will focus on the natural history and life history of a single organism, perhaps the species that is the focus of your graduate research. This one will have a fairly extensive bibliography. The other paper will be a critique of a recent publication (since 2005) dealing with an organism from a phylum we study in class. You will need instructor’s approval of your choice of publication. Both of these papers will give you opportunities to delve into the primary literature, discover that invert zoology is a thriving, current field of research, and introduce you in more depth to interesting inverts.

The first paper will be due by **April 14**, the second by **May 5**. Each should be about 2 pages (not counting references), single spaced, plus references. Font size should 10 or 12 pt. and margins should be 1 inch on all sides. References should be formatted as in Invertebrate Biology or The Biological Bulletin. You are always welcome to turn them in early....