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 structure 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. Since 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 (Richard was away all of week 1)

3/29  16:08  +0.75 feet Low Tide
N  08:30  Lecture: Introduction to class, goals, and overview of Inverts
N  09:15  Lecture Phylum Porifera (Sponges)
N  11:00  Set up microscopes - begin looking at sponges
        13:15  Lab: Deciphering sponges
***  15:00  Field trip to south side of Sunset Bay (sponges)

3/31  17:30  +1.01 feet Low Tide
N  08:30  Lecture: Phylum Cnidaria
N  09:45  Lecture: Anthozoa
***  11:00  Field trip to floating docks (hydroids, jellies)
        13:15  Lab: anemones and corals

Week 2

4/5   08:11  +0.14 feet Low Tide (sunrise: 06:52)
***  07:15  Field trip to OIMB beach
R  09:30  Lecture: Hydrozoa
      11:00  Lab: little polyps and medusae
      13:15  Lab: little polyps and medusae
R  16:00  Lecture: Tides
4/7   09:24  +0.1 feet Low Tide (sunrise: 06:48)
***  08:00  Field trip to Portside mud flat (flat worms, nemerteans, polychaetes)
R  11:00  Lecture: Scyphozoa
      13:15  Lab: scyphozoans  Video: Jellies
N  14:30  Lecture: Platyhelminthes
      15:30  Lab: Flatworms

TURN IN LABORATORY NOTEBOOKS (I)
Week 3

4/12  14:03  +0.44 feet Low Tide  
R  08:30  Lecture:  Nemertea  
     09:45  Lab:  Nemertea  
N  13:15  Lecture:  Annelida (I)  
     14:30  Lab:  polychaete dissection  

4/14  15:57  +0.42 feet Low Tide  
N  08:30  Lecture:  Annelida (II)  
     10:00  Lab:  Annelid diversity  
N  13:15  Lecture:  Annelida (III)  
     14:30  Lab:  more worms

4/15  16:00  required OIMB seminar:  Dr. Sandra Brooke - “Deep Sea Coral Research”  
        (moved to May 20)  
        changed to  Annie Pollard - Ecology and Conservation of Ross Sea, Antarctica

Week 4

4/19  07:55  -1.84 feet Low Tide  
        (sunrise: 06:28)  
***  06:30  Field trip to Middle Cove  
R  10:30  Lecture:  Sipunculida  
       11:30  Lab:  peanut worms  
R  14:30  Lecture:  Lophophorates (I)  
        Phoronida, Brachipoda  
       15:30  Lab:  phoronids and lamp shells

4/21  09:34  -1.43 feet Low Tide  
***  08:00  Field trip to South Cove  
R  11:00  Lecture:  Lophophorates (I) -  Bryozoa  
       13:15  Lab:  bryozoans

Week 5

4/26  14:21  +1.07 feet Low Tide  
     08:30  MIDTERM EXAM I  
        (through 4/19 Lophophorate lecture, but not Bryozoa, 4/21)  
R  11:00  Lecture:  Ctenophora  
       13:15  Lab:  comb jellies  

4/28  16:00  +1.63 feet Low Tide  
N  08:30  Lecture:  Mollusca (I) Polyplacophora  
       10:00  Lab:  chitons  
N  13:15  Lecture:  Mollusca (II) Gastropoda  
       14:30  Lab:  snails and slugs

4/29  16:00  required OIMB Seminar:  Dr. Mike Hart - “Population connectivity in marine invertebrates”

Week 6  
(Went to Dome house Monday early to collect bivalves)

5/3  07:14  -0.44 feet Low Tide  
       (sunrise: 06:07)  
R  08:30  Lecture:  Bivalvia  
       10:00  Lab:  bivalves  
N  13:15  Lecture:  Mollusca (III) Cephalopoda  
       14:30  Lab:  squid dissection

5/5  08:26  -0.66 feet Low Tide  
       (sunrise: 06:05)  
***  07:30  Field trip south side of Sunset Bay  
R  10:00  Lecture:  Echinodermata (I):  Asteroida  
       11:15  Lab:  sea stars  

Video:  Incredible Suckers  
        (did not do this year)
R 13:15 Lecture: **Echinodermata (II): Ophiuroida**
14:15 Lab: sea stars cont’d and Lab: brittle stars

**Week 7**

5/10 12:21 +0.17 feet Low Tide

**08:30** MIDTERM II (through Asteroids)

R 13:15 Lecture: **Echinodermata (III) Echinoida**
14:30 Lab: sea urchins and sand dollars

5/12 14:17 +0.83 feet Low Tide

*** 08:00 RV Pluteus dredge trip (1/2 half day) (sack lunches)

R 14:00 Lecture: **Echinodermata (IV) Holothuroidea**
14:45 Lab: sea urchins and sand dollars

(N) 13:15 Lecture: **Ecdysozoa: Nematoda, Tardigrada, etc.**
14:45 Lab: Round worms and water bears) currently postponed and may be deleted

LABORATORY NOTEBOOKS DUE (II)

**Week 8**

5/17 06:54 -2.08 feet Low Tide (sunrise: 05:51)

*** 06:00 Field trip to Light House Island

N 10:00 Lecture **Arthropoda (I) Branchiopoda**
11:00 Lab: Branchiopoda

N 13:15 Lecture: **Arthropoda (II) Molting**
14:30 Lab: crab dissection

5/19 08:28 -1.96 feet Low Tide (sunrise: 05:49)

*** 06:30 Field trip to Cape Blanco

N 13:30 Lecture: **Arthropoda (III) Malacostraca**
14:30 Lab: malacostracan diversity

**Week 9**

5/24 12:27 +0.87 feet Low Tide

R 08:30 Lecture: **Arthropoda (IV) Cirripedia**
10:00 Lab: barnacles

*** 12:00 Oregon Coast Aquarium - get home late

5/26 14:09 +1.91 feet Low Tide

R 08:30 Lecture: **Phylum Chordata - Cephalochordata**
R 09:30 Lecture: **Subphylum Urochordata**
11:00 Lab: sea squirts
13:15 Lab: sea squirts, continued

**Week 10**

5/31 06:17 -0.57 feet Low Tide (sunrise: 05:40)

*** 06:00 Field trip to North Cove, Cape Arago (Hemichordates)

R 09:00 Lecture: **Hemichordata**
10:00 Lab: enteropneusts (acorn worms)

N 13:15 Lecture: **Phylum Rotifera**
14:30 Lab: rotifers

6/2 07:31 -1.08 feet Low Tide (sunrise: 05:39)
08:30 MIDTERM EXAM III
13:15 Lab clean up
17:00 LABORATORY NOTEBOOKS DUE (III)
6/3  19:00 recommended OIMB seminar: Dr. Steve Palumbi - “Death and Life of Monterey Bay”

FINALS WEEK
6/7  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 Tuesdays, Thursdays and at unscheduled times also. We will have field trips to local environments, sometimes during class time, but often earlier or later, depending on the tides. You are encouraged to go to the intertidal on your own whenever you find the time and tides. You will be most comfortable with a **good pair of rubber boots** (kneehighs or hipboots, no hipwaders), a waterproof windbreaker, hat, and maybe rainpants, 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. 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)
2) A lecture notebook
3) A separate laboratory notebook - a looseleaf 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."
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 one 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 2000) 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 zoo is a thriving current field of research, and introduce you in more depth to interesting inverts.

The first paper will be due on April 14, the second on May 5. Each should be about 2 pages, single spaced, plus references. You are always welcome to turn them in early....