Biology 450 Marine Biology and Ecology
Spring 201x Course Syllabus

Course Coordinators
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Instructors
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Dr. Annette Olson, Instructor, Dept. of Integrative Biology, olsona@onid.oregonstate.edu
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Teaching Assistants
Vanessa Constant, PhD Student, Dept. of Integrative Biology, constanv@science.oregonstate.edu
Miram Gleiber, PhD Student, Dept. of Integrative Biology, gleiberm@science.oregonstate.edu
Chenchen Shen, PhD Student, Dept. of Integrative Biology shenc@science.oregonstate.edu

Location
Hatfield Marine Science Center, Education Building, Lecture room 30/32, Lab room 31.

Course Credits
Bi 450 is a 15-credit course devoted to classroom, laboratory, and field work. On average, the students spend 30 hours per week on classroom, laboratory, and fieldwork instruction and assignments, resulting in 300 hours of instruction.

Course Description and Outcomes
Subject Matter and Format:
Marine Biology and Ecology (BI 450) is an intensive, term–long course based at Hatfield Marine Science Center (HMSC). The prerequisite for the course is Bi 370 and ST 351 or equivalent. The course is divided into 6 topics or sections that include:

1) Marine invertebrate biology and natural history/natural history of the Oregon coast
2) Marine fish biology and natural history
3) Marine macroalgae and natural history
4) Marine community ecology
5) Marine conservation and policy
6) Small group research projects

The material is presented in a variety of ways including lectures, discussions, laboratory work, and field trips. Two weeks are devoted to conducting small group research projects. This is a Writing Intensive Course (WIC) and there are a number of formal and informal writing assignments (see below).

Learning Outcomes:
Student goals or outcomes include the ability to comprehend, interpret, and subsequently synthesize information on the topics described above.

Students will learn to conduct a research project from start to finish including writing a research proposal, designing and executing an experiment, collecting, analyzing, and graphing data, writing a scientific research paper (~4,000 words), and giving a scientific talk.

Specific WIC outcomes include:
1) Develop and articulate content knowledge and critical thinking in biology through frequent practice of informal and formal writing.
2) Demonstrate knowledge and understanding of audience expectations, genres, and conventions appropriate to communicating in biology.
3) Demonstrate the ability to compose a document of at least 2,000 words through multiple aspects of writing, including brainstorming, drafting, using sources appropriately, and revising comprehensively after receiving feedback on a draft.

Student Expectations and Assessment
Grades:
Grades will be based on 100 points received each week of the course with a total of 1000 points possible. Points will be distributed in the following way: Marine Invertebrates – 200 pts, Marine Fishes – 150 pts, Marine Macroalgae – 150 pts, Marine Community Ecology – 180 pts, Marine Conservation – 100 pts, Research Projects – 220 pts. Points within each section will be distributed based on each instructor’s discretion but will include lecture and laboratory exams, reading discussions, writing assignments, and class participation. Most sections involve an exam and/or paper at the end. The last day of class is the Friday before finals week and there is no final exam. IMPORTANT NOTE: ALL ASPECTS OF THE COURSE ARE REQUIRED. FAILURE TO PARTICIPATE WITHOUT BEING EXCUSED BY THE INSTRUCTOR WILL RESULT IN A PENALTY.

Research Projects:
Research projects will be conducted mostly during the last few weeks of the course under the supervision of Drs. Henkel and Hacker and the TAs. Students will work in groups of 3 people or fewer and be solely responsible for the design, implementation, analysis, and presentation of their research project, both as a seminar and written paper. The project should be a total group effort with the exception of the research paper, which will be written by each student individually. We will host a research symposium where groups will present their research to the class and other invited scientists.

Blog:
We will maintain a course blog over the term (http://www.marinebio450.blogspot.com/). A different group of ~2 students will make entries to the blog each week (and be graded for their work). The blog should document what happened in the course each week, what memorable species or habitats were seen, and contain a few good photos taken by the group or others in the class. We will give you an additional handout describing the blog in more detail.

Writing Intensive Course Assignments:
As a WIC, this course has a significant writing component aimed to 1) help students better learn the course material through writing, 2) help students to become better writers, and 3) help students better learn the kinds of writing important to the scientific profession in which they are entering. There are a number of writing assignments in the individual sections all of which culminate in a final research paper based on the small group research projects described above. The writing assignments are designed to help with writing the final research paper, as well as exposing students to formal and informal types of scientific writing used in the profession. The writing assignments will result in more than 10,000 words of writing and make up roughly 400 pts or 40% of the overall grade for the course.
Below is a list and brief description of the writing assignments in the course. The instructor of each section will provide further instructions for these writing assignments.
1) Marine Invertebrate Biology and Natural History:
   • Favorite Marine Invertebrate Paper (~500 words): This is a one-page paper designed to help with writing a formal introduction to a scientific paper. The assignment includes creating an annotated bibliography (15 pts).
• Laboratory Notebooks (~750 words): These notebooks include drawings and written descriptions of marine invertebrate organisms. This writing assignment is designed to hone scientific observation skills (50 pts).
• Blog (~1,000 words): An electronic journal (blog) is maintained throughout the course. This assignment helps with informal descriptive and narrative writing skills (20 pts).

2) Marine Fish Biology and Natural History:
• Subtidal Fish Species Report (~500 words): This is a one-page paper designed to help with writing a formal introduction to a scientific paper. The assignment includes creating an annotated bibliography (15 pts).
• Group Tidepool Fish Project Report (~750 words): This short paper helps students with hypothesis testing, scientific data presentation, and results reporting from field surveys (25 pts).
• Field and Laboratory Notebook (~750 words): This notebook includes drawings and written descriptions of fishes found in the field or examined in the laboratory. This writing assignment is designed to hone scientific observation skills (25 pts).

3) Marine Macroalgae and Natural History:
• Specimen Identification Cards (~750 words): Students develop flash cards for an assigned group of macroalgae, describing in a concise written manner the important characteristics needed for identification of each alga in the field and/or lab. These cards will be printed for group lab demonstrations and may be posted on-line as study guides. (25 pts)

4) Marine Community Ecology:
• Community Structure Presentation (~750 words): The presentation helps with hypothesis testing, scientific data presentation, and results reporting from community surveys (50 pts).

5) Marine Conservation and Policy:
• “Op-Ed” Newspaper Article (~750 words): This short article helps students learn one way for which scientist can voice their opinion to the public about timely topics. The assignment includes creating an annotated bibliography (40 pts).

6) Small Group Research Projects:
• Research Project Proposal (~1,000 words): This is a short 3-page formal proposal that describes the research to be conducted. Please see the projects instructions for details (50 pts).
• Final Research Paper (~3,000 words): This is a formal research paper that reports on the results of small group research projects. The paper is in the format of a scientific journal article (100 pts).

Learning Resources, Textbooks, Supplies, and Equipment
Canvas:
We will use Canvas available on the OSU website (https://oregonstate.instructure.com) to post syllabi, lecture notes, presentations, readings, announcements, grades, etc. Most instructors will rely heavily on lecture notes that you will need to download from Canvas prior to their section.

Research Materials:
The Guin Library at HMSC has a number of journals and books on reserve and online that will serve as sources of research material for the course.

Textbooks/Guidebooks (Available online)
1. Marine Invertebrate Section: Highly recommended but optional field guide
2. Marine Fishes Section: Required one of the following field guides of your choice
Bi 450 Syllabus, Spring 2016


3. Marine Macroalgae Section: Required one of the following field guides of your choice

4. Other optional field guides:
   b. Mac’s (Laminated) Field Guides, Mac’s Field Guide to the Northwest Coastal Invertebrates. The Mountaineers, Seattle, WA.

Supplies

1. ONE 10X hand lens. For use in lab and field, a plastic 5X + 5X lens with wide field of view is optimal (e.g., #23202-3 http://www.indigo.com/magnify/gphmgnfy/plastic-geology-lens.html).
2. TWO plain white paper notebooks (8.5” x 11”) for drawings of organisms in the lab; heavy drawing paper works best.
3. ONE waterproof notebook (such as Rite in the Rain; http://www.rainwriter.com/Rite-in-the-Rain-393-All-Weather-Journal-Notebook-p/ritr-393.htm) for field notes.

Field Gear and Equipment:

1. Required (online or at Englund’s Marine Supply in Newport):
   1. Raingear (jacket and pants)
   2. Sturdy rubber boots (with thick treads such as Bogs or XtraTuf) and warm socks

2. Recommended:
   1. Bib waders (preferably “form fitting” neoprene types such as Hodgman) or neoprene wetsuit
   2. Fleece coat or warm jacket
   3. Polypropylene long underwear
   4. Warm hat/gloves
   5. Rubberized garden gloves for wet work
   6. Backpack, pocketknife, sunglasses, camera, sunscreen, water bottle, etc.

Acknowledgement of Risk and Waiver of Liability

We require every student to sign an Acknowledgement of Risk and Waiver of Liability form that covers activities that might incur risk and liability such as field trips or laboratory work. These forms must be filled out by the first day of class.

University and Departmental Policies

Students with Disabilities: Accommodations for students with disabilities are determined and approved by Disability Access Services (DAS). If you, as a student, believe you are eligible for accommodations but have not obtained approval please contact DAS immediately at 541-737-4098 or at http://ds.oregonstate.edu. DAS notifies students and faculty members of approved academic accommodations and coordinates implementation of those accommodations. While not required, students and faculty members are encouraged to discuss details of the implementation of individual accommodations.”
Diversity Statement: The College of Science strives to create an affirming climate for all students including underrepresented and marginalized individuals and groups. Diversity encompasses differences in age, color, ethnicity, national origin, gender, physical or mental ability, religion, socioeconomic background, veteran status, sexual orientation, and marginalized groups. We believe diversity is the synergy, connection, acceptance, and mutual learning fostered by the interaction of different human characteristics.

Religious Holiday Statement: Oregon State University strives to respect all religious practices. If you have religious holidays that are in conflict with any of the requirements of this class, please see me immediately so that we can make alternative arrangements.

Rules on Student Conduct: The Department of Integrative Biology follows the university rules on student conduct. A full account of the conduct code can be found at: http://oregonstate.edu/studentconduct/offenses. Below are the offenses proscribed by the University.

Offenses Proscribed by the University
A Student or Student Organization found to have committed any of the following proscribed acts is subject to sanctions under these rules:
(1) Obstruction or disruption of teaching, learning, research, administration, disciplinary procedures, or other institutional activities, including the institution’s public service functions or other authorized activities on institutionally-owned or controlled property. Disruptive behavior may include but is not limited to the following, where it has the effect of obstructing or disrupting the University activities listed above:
(a) Repeatedly leaving and entering the classroom without authorization;
(b) Making loud or distracting noises;
(c) Arriving late or leaving early;
(d) Persisting in speaking without being recognized;
(e) Behavior that would cause a reasonable person to fear for his or her safety. The instructor has authority to manage the classroom environment, which may include requiring a Student to leave when the Student’s behavior disrupts the teaching or learning environment. If the Student refuses to leave, the instructor may call the Department of Public Safety for assistance and should submit an Incident Report Form to SCCS to initiate disciplinary proceedings.
(2) Academic or Scholarly Dishonesty:
(a) Academic or Scholarly Dishonesty is defined as an act of deception in which a Student seeks to claim credit for the work or effort of another person, or uses unauthorized materials or fabricated information in any academic work or research, either through the Student’s own efforts or the efforts of another.
(b) It includes:
(A) CHEATING — use or attempted use of unauthorized materials, information or study aids, or an act of deceit by which a Student attempts to misrepresent mastery of academic effort or information. This includes but is not limited to unauthorized copying or collaboration on a test or assignment, using prohibited materials and texts, any misuse of an electronic device, or using any deceptive means to gain academic credit.
(B) FABRICATION — falsification or invention of any information including but not limited to falsifying research, inventing or exaggerating data, or listing incorrect or fictitious references.
(C) ASSISTING — helping another commit an act of academic dishonesty. This includes but is not
limited to paying or bribing someone to acquire a test or assignment, changing someone's grades or academic records, taking a test/doing an assignment for someone else by any means, including misuse of an electronic device. It is a violation of Oregon state law to create and offer to sell part or all of an educational assignment to another person (ORS 165.114).

(D) TAMPERING — altering or interfering with evaluation instruments or documents.

(E) PLAGIARISM — representing the words or ideas of another person or presenting someone else's words, ideas, artistry or data as one's own, or using one's own previously submitted work. Plagiarism includes but is not limited to copying another person's work (including unpublished material) without appropriate referencing, presenting someone else's opinions and theories as one's own, or working jointly on a project and then submitting it as one's own.

(c) Academic Dishonesty cases are handled initially by the academic units, following the process outlined in the University's Academic Dishonesty Report Form, and will also be referred to SCCS for action under these rules.

(3) Obstruction or disruption that interferes with freedom of movement, either pedestrian or vehicular, on institutionally-owned or controlled property.

(4) Hazing, defined as any action that endangers the physical, emotional, mental health or safety of an individual, or destroys or damages personal property for the purpose of initiation, membership, admission or participation in a group or organization. Expressed or implied consent of the person subject to hazing is not a defense. Apathy and acquiescence in the presence of hazing are not neutral acts; they are violations of this rule. Acts that constitute hazing when they endanger the physical, emotional, mental health or safety of an individual, or destroy or damage personal property, include but are not limited to:

(a) Acts that are prohibited under any applicable law, including but not limited to ORS 163.197, under which hazing is a criminal violation;
(b) Interfering with a Student’s academic performance by denying sufficient time for class, study or other academic activities;
(c) Compelling ingestion of any substance;
(d) Compelling participation in physical activities such as calisthenics, exercise, or other games or activities requiring physical exertion;
(e) Compelling exposure to weather elements or other physically or emotionally uncomfortable situations;
(f) Compelling excessive fatigue from sleep deprivation, physical activities, or exercise;
(g) Committing any act of physical brutality against another including but not limited to paddling, striking with fists, open hands or objects, and branding;
(h) Kidnapping or transporting another with the intent of stranding him or her;
(i) Compelling conduct that can be reasonably expected to embarrass or adversely affect the dignity of another, including the performance of public stunts and activities such as scavenger hunts;
(j) Intentionally creating work or labor for another;
(k) Compelling another to commit any sexual act or engage in lewd behavior
(l) Compelling any act that results in the destruction, defacement or removal of private or public property

(5) Harassment, defined as conduct of any sort directed at another that is severe, pervasive or persistent, and is of a nature that would cause a reasonable person in the victim's position substantial emotional distress and undermine his or her ability to work, study or participate in his or her regular life activities or participate in the activities of the University, and actually does cause the victim substantial emotional distress and undermines the victim's ability to work, study, or participate in the victim's regular life activities or participate in the activities of the University. Stalking behavior that meets this definition constitutes Harassment within the meaning of this rule.
(6) Sexual Harassment, as defined in the University’s Policy on Sexual Harassment.
(7) Discriminatory Harassment, as defined in the University’s Policy on Discriminatory Harassment.
(8) Possession or use of explosives, dangerous chemicals, or other dangerous instrumentalities on institutionally-owned or controlled property, in contravention of law or institutional rules.
(9) Illegal use, possession, or distribution of drugs or illegal substances on institutionally-owned or controlled property.
(10) Alcohol violations, including possession or consumption of alcohol by persons less than 21 years of age, furnishing alcohol to persons less than 21 years, or consumption of alcohol by a Student of any age in violation of the University’s rules or policies on alcoholic beverages on University owned or controlled property or at University sponsored or supervised activities.
(11) Rape, sexual assault, or unwanted sexual contact of any kind, and the threat of such contact, are prohibited, as is any physical abuse. Sexual contact shall be considered "unwanted" or without consent if no clear consent is freely given; if inflicted through force, threat of force, or coercion; or if inflicted upon a person who is unconscious or otherwise without the physical or mental capacity to consent. If sexual contact is inflicted on someone who is intoxicated or impaired in the exercise of their judgment by alcohol or drugs, it may be considered without consent.
(12) Detention or physical abuse of any person or conduct that threatens imminent bodily harm or endangers the health of any person on any institutionally-owned or controlled property.
(13) Invasion of another’s privacy, where that person has a reasonable expectation of privacy, including but not limited to the use of electronic devices to make an unauthorized audio or video recording of any person while on University owned or controlled property without his or her prior knowledge, or without his or her effective consent, when such a recording is of information or of images taken from or of a person at a time and place where she or he has a reasonable expectation of privacy and where the recording is reasonably likely to cause injury or distress.
(14) Unauthorized recording of a class or of organizational or University meetings. To obtain the required authorization, the Student or Student Organization must obtain expressed permission from the faculty member, Student Organization, or University representative or official in charge of the class, meeting, or activity.
(15) Malicious damage, misuse or theft of institutional property, or the property of any other person where such property is located on institutionally-owned or controlled property or, regardless of location, is in the care, custody, or control of an institution.
(16) Refusal by any person while on institutional property to comply with an order of the President or appropriate authorized official to leave such premises because of conduct proscribed by this rule when such conduct constitutes a danger to personal safety, property, or educational or other appropriate institutional activities on such premises.
(17) Unauthorized entry to or use of institutional facilities, including buildings and grounds.
(18) Smoking in unauthorized areas in violation of OAR 576-040-0010.
(19) Falsification or misuse of University information, including but not limited to records, permits, documents, computer resources, identification cards, etc.; or the furnishing of false or misleading information to the University or its representative; or refusal to provide one’s name, class, school, and local address when requested by a University official, provided the official is identified and indicates legitimate reason for the request.
(20) Unauthorized use of University computing resources in violation of the University’s Acceptable Use of Computing Resources Policy.
(21) Inciting others to engage in any of the conduct or to perform any of the acts prohibited herein. Inciting means that advocacy of proscribed conduct which calls on the person or persons addressed for imminent action, and is coupled with a reasonable apprehension of imminent danger to the functions and purposes of the institution, including the safety of persons and the protection of its
(22) Violating the State Board of Higher Education’s Policy on Intercollegiate Athletics as described in Section 8 of its Internal Management Directives, specifically including the subsection thereof entitled Code of Ethics.

(23) Violation of any federal or state law or city or local ordinance or University rule or policy that applies to the Student.

Disclaimer:
The schedule, policies, and assignments in this course are subject to change in the event of extenuating circumstances or by mutual agreement between the instructor and the students.
SCHEDULE

PART 1: Marine Invertebrates and Natural History of the Oregon Coast (Instructor: Dr. Sally Hacker; TA: Vanessa Constant)

March 28 (M)
09:00-12:00 Course Introduction, HMSC Tour, IT Issues, Housing, Library Tour
12:00-13:00 Lunch Break
13:00-13:30 Lecture 1: Why Study Marine Biology?
13:30-15:00 Lecture 2: Natural History of the Oregon Coast (Reading: Komar pgs. 1–61)
15:00-15:30 Lab orientation/setup tanks

March 29 (T)
08:30-09:30 Lecture 3: Introduction to Marine Invertebrates
09:30-10:00 Break
11:00-14:00 Field Trip 1: Collection of Invertebrates at Boiler Bay (Low tide (LT): 0.31 m @ 11:00)
14:00-18:00 Laboratory Work
18:00-20:00 Dinner Break
20:00-21:00 Evening Discussion of Komar Reading

March 30 (W)
08:00-09:00 Lecture 4: The Sponges: Phylum Porifera
09:00-10:00 Lecture 5: The Anemones, Corals, and Jellies: Phyla Cnidaria, Ctenophora
10:00-10:30 Break; Donuts
10:30-14:30 Field Trip 2: Collection of Invertebrates at Tokatee Klootchman (LT: 0.35 m @ 12:00)
14:30-15:00 Break
15:00-17:00 Laboratory Work

March 31 (Th)
09:00-10:00 Lecture 6: The Worms, Part 1 (Acoelomates and Pseudocoelomates): Phyla Platyhelminthes, Nemertea, Nematoda
10:00-11:00 Lecture 7: Revenge of the Worms (the Coelomates): Phyla Annelida, Sipuncula
11:00-12:00 Lunch Break
12:00-14:00 Field Trip 3: Collection of Invertebrates at Yaquina Bay (LT: 0.36 m @ 13:00)
14:00-17:00 Laboratory Work
17:00 Citation exercise DUE

April 1 (F)
08:00-13:00 Field Trip 4: Viewing Coastal Headlands, Estuaries, and Dunes (Cascade Head)
13:00-14:00 Break
14:00-17:00 Laboratory Work
17:00 Check of working draft of notebooks DUE

WEEKEND (APRIL 2, 3)

April 4 (M)
09:00-10:30 Lecture 8: The Crustaceans and a Cute Relative: “Phylum” Arthropoda, Phylum Tardigrada
10:30-11:00 Break
11:00-12:00 Lecture 9: Assorted Snails, Bivalves, and Octopuses: Phylum Mollusca
12:00-13:00 Lunch Break
13:00-16:00 Laboratory Work
16:00-17:00  Guest Lecture: Sylvia Yamada, *Will the European Green Crab persist in Pacific NW Estuaries?*
17:00-18:00  **Field Trip 6: Collect crabs in Yaquina Bay** (LT: 0.01 @ 16:50)

**April 5 (T)**
09:00-10:00  Lecture 10: *The Lophophorates: Phyla Bryozoa, Phoronida, and Brachiopoda*
10:00-11:00  Guest Lecture: John Chapman, *Species invasions on the Oregon coast*
11:00-12:30  **Field Trip 7: Collection at the Newport Docks**
12:30-14:00  Lunch Break
14:00-17:00  Laboratory Work

**April 6 (W)**
09:00-10:00  Lecture 11: *The Spiny Skinned Critters: Phylum Echinodermata*
10:00-10:30  Break; Donuts
10:30-11:00  Lecture 12: *Our Closest Non-vertebrate Relative: Phylum Chordata*
11:00-19:30  Presentation Prep/Laboratory Work/Dinner Break
19:30-22:00  **11th Annual Marine Invertebrate Presentation and Dessert Extravaganza!**

**April 7 (Th)**
09:00  Marine Invertebrate paper DUE
09:00-10:00  Study Session for Exam
All day  Study Independently, Finish Notebooks

**April 8 (F)**
09:00-13:00  Study Independently, Finish Notebooks
13:00-14:00  **Final Exam: Marine Invertebrates and Natural History of the Oregon Coast**
14:00-14:30  Break
14:30-16:00  **Marine Invertebrate Laboratory Practicum (Notebooks are DUE)**
16:00  Clean up (required)

**WEEKEND (April 9, 10)**

**PART 2: Marine Fishes and Natural History (Instructor: Dr. Su Sponaugle; TA: Miram Gleiber)**

**April 11 (M)**  *(LT: -1.0 m @ 10:14)*
08:00-09:30  Lecture 1: Introduction to Marine Fishes section
09:30-09:45  Field trip prep
09:45-13:00  **Field Trip: Tokatee Klootchman State Park: Tidepool fishes**
13:00-14:00  Lunch Break
14:00-15:00  Lecture 2: Fish Functional Anatomy
15:00-17:00  Laboratory: Fish Identification
17:00-18:00  Laboratory: *Notebook time & prep for field trip*
18:00-  *Reading assignment: Boehlert & Mundy (1987)*

**April 12 (T)**  *(LT: -0.5 m @ 11:11)*
09:00-10:00  Lecture 3: Fish Habitats: Estuaries & Tidepools
10:00-10:15  Break
10:15-12:30  **Field Trip: Yaquina Bay: Beach seine collection of estuary fishes**
12:30-13:30  Lunch Break
13:30-14:30  Lecture 4: Reproduction
14:30-14:45  Break
14:45-16:15  Laboratory: Fish identification & *Notebook time*
16:15-16:30  Break
16:30-17:30  Lecture 5: Early Life History & Recruitment
17:30-      Reading assignment: Rooper et al. (2003)

April 13 (W) (LT: 0.0 m @ 12:13)
09:00-10:00  Lecture 6: Fish Habitats: Rocky Reefs & Kelp Beds (Guest Lecture: Dr. Robert Cowen)
10:00-10:30  Break (Donuts in Staff Lounge)
10:30-11:30  Lecture 7: Age & Growth
11:30-12:30  Lunch Break
12:30-15:30  Field Trip: Oregon Coast Aquarium: Subtidal Fish Species Report
15:30-17:00  Discussion: Reading discussion, hypothesis development, & scientific writing lecture
17:00-17:30  Cruise prep
17:30-      Assignment: Subtidal Species Report & Bibliography

April 14 (Th) (LT: 0.5 m @ 13:20)
08:00-13:00  Field Trip: Yaquina Bay beam trawling (Guest Scientist: Dr. Waldo Wakefield, NOAA)
13:00-14:00  Lunch
14:00-15:00  Lecture 8: Swimming, Schooling, & Migration
15:00-15:30  Break
15:30-17:30  Laboratory: Trawl data analysis & Notebook time
17:30-18:00  Field Trip: Deploy light & minnow traps from dock (1st quarter moon)
18:00-       Assignment: Trawl Report

April 15 (F) (LT: 0.8 m @14:29)
08:15        (SUBTIDAL FISH SPECIES REPORT & BIBLIOGRAPHY DUE)
08:15-09:00  Field & laboratory: Retrieve light & minnow trap samples
09:00-10:00  Lecture 9: Feeding & Food Webs
10:00-10:30  Break
10:30-11:30  Lecture 10: Fish Sensory Systems
11:30-12:30  Lunch
12:30-13:30  Lecture 11: Plankton Ecology (Guest Lecture: Dr. Christian Briseño)
13:30-14:00  Break
14:00-16:00  Laboratory: Larval fish & plankton sample processing & Notebook time
16:00-17:00  Clean up
17:00-       Reading assignment: Barcelo et al. (2015)

WEEKEND (APRIL 16, 17)

April 18 (M)
09:00        (TRAWL REPORT DUE)
09:00-10:00  Guest lecture: Salmon Ecology (Marisa Litz)
10:00-10:30  Break
10:30-11:30  Reading discussion: Barcelo et al. (2015)
11:30-12:30  Lunch Break
13:30-15:00  Laboratory: Notebook time
15:00-       Study time

April 19 (T)
08:00-13:00  Study time
13:00-15:00  SECTION EXAM
<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
</tr>
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<tbody>
<tr>
<td>15:00-16:00</td>
<td>Laboratory cleanup and return of remaining fishes to field (required)</td>
</tr>
<tr>
<td>16:00-18:00</td>
<td>Notebook time</td>
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<tr>
<td>18:00</td>
<td>(FIELD NOTEBOOK DUE) (LABORATORY NOTEBOOK DUE)</td>
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**April 20 (W)**  
DAY OFF!

**PART 3: Marine Macroalgae and Natural History (Instructor: Dr. Annette Olson; TA: Miram Gleiber)**

**April 21 (Th)**  
**INTRODUCTION**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>08:30</td>
<td>Lecture: Section goals [0.25] Classroom</td>
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<tr>
<td>08:30</td>
<td>Lecture: Ecological significance of macroalgae [1.0]</td>
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<tr>
<td>09:45</td>
<td>Tea [0.25] Move to Lab</td>
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<tr>
<td>10:00</td>
<td>Lab demo I: Overview of macroalgal phyla &amp; morphology [0.75]</td>
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<tr>
<td>10:45</td>
<td>Lecture: Evolutionary origins of macroalgal phyla [0.5]</td>
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<tr>
<td>11:00</td>
<td>Lunch break [1.25]</td>
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<tr>
<td>13:00</td>
<td>Lab/Field: Introduction to lab and field [0.5]</td>
</tr>
<tr>
<td>13:30</td>
<td>Lab/Field: Lab skills I: Using keys and references [0.25]</td>
</tr>
<tr>
<td>11:45</td>
<td>Lunch break [1.25]</td>
</tr>
<tr>
<td>13:00</td>
<td>Lab/Field: Lab skills II: Microscope care and use + Specimen preparation [1.0] Move to lab</td>
</tr>
<tr>
<td>15:00</td>
<td>Field: Prep for first field trip [0.5] Note: Very early start tomorrow</td>
</tr>
<tr>
<td>15:30-16:50</td>
<td>Team appointments: (4 @ 20 min/team) [1.33] Lab/Classroom</td>
</tr>
<tr>
<td>16:30-18:00</td>
<td>Early supper break [1.5]</td>
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<tr>
<td>18:00-19:00</td>
<td>Workshop: Pressing seaweeds [required &amp; FUN!] [1.0] Lab</td>
</tr>
<tr>
<td>18:30-20:10</td>
<td>Team appointments: (5 @ 20 min/team) [1.67] Lab/Classroom</td>
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**April 22 (F)**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>06:00</td>
<td>Depart for field trip (Sunrise 0619h) [0.5]</td>
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<tr>
<td>06:30</td>
<td>Boiler Bay: Common taxa. Elevation vs. wave exposure [~2.5 hr in field]</td>
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<tr>
<td>09:00</td>
<td>Travel from field, store samples, clean up [0.75]</td>
</tr>
<tr>
<td>09:45</td>
<td>Brunch break [1.25 hr] Note: Bring snacks to class for afternoon break</td>
</tr>
<tr>
<td>11:00</td>
<td>Lecture: Over view of macroalgal life histories [0.5] Classroom</td>
</tr>
<tr>
<td>12:00</td>
<td>Lecture: Macroalgal morphology II: Anatomy (cellular arrangement) [0.5]</td>
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<tr>
<td>12:00</td>
<td>PHYLUM CHLOROPHYTA (greens)</td>
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<tr>
<td>12:30</td>
<td>Lab demo II: Overview of greens (diversity demo) [0.5] Lab</td>
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<tr>
<td>13:45</td>
<td>Labs a, b: Chlorophyta: Filaments, Sheets &amp; tubes [0.75] Lab</td>
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<tr>
<td>14:30</td>
<td>Short snack break [0.5]</td>
</tr>
<tr>
<td>15:00</td>
<td>PHYLUM OCHROPHYTA: CLASS PHAEOPHYCEAE (browns)</td>
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<tr>
<td>15:00</td>
<td>Lecture: Phaeophytes I [0.75]</td>
</tr>
<tr>
<td>15:45</td>
<td>Lab demo III: Overview of kelps &amp; fucoids (diversity demo) [0.75]</td>
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</tbody>
</table>
16:30 EARLY DISMISSAL. Have a good weekend!

WEEKEND (APRIL 23, 24) Sunday, optional field trip: Meet @ Boiler Bay. LT @ 08:33 (-0.2')

April 25 (M)
07:30 Depart for field trip [0.25]
07:45 Seal Rock: Common taxa. Sand-influenced communities. [~2.0 hr in field]
    LT @ 09:07 -0.07m (-0.2ft) [South Beach Tide Station]
09:45 Travel from field, store samples, clean up [0.5]
10:15 Short breakfast break [0.75] Note: Bring snacks to class for afternoon break

PHAEOPHYTES (continued)
11:00 Lab demo IV: Overview of small browns (diversity demo) [0.5]
11:30 Lecture: Phaeophytes II [0.75]
12:15 Labs c, d: Phaeophytes: Sacs & crusts, small blades & tubes [1.5]
13:45 Long snack break [0.5]

PHYLM RHODOPHYTA (reds)
14:15 Lab demo V: Overview of small reds (diversity demo) [0.5]
14:45 Lecture: Rhodophyta I [1.0]
15:45 Labs e, f: Rhodophyta I: Sheets, filaments, finely branched axes [1.0]
16:45-18:05 "Tank talks": Review demo specimens with instructors (4 slots @ 20 min/team) [1.33]
    Note: Last meeting overlaps with supper break
18:00 Short supper break [1.0] OK to eat during seminar
19:00 Invited speaker: Few costs to selfing? The mixed mating system of the sea palm kelp,
    Allie Barner, OSU Grad student [1.0] Seminar room
20:00-21:40 "Tank talks": Review demo specimens with instructors (5 slots @ 20 min/team) [1.67]

April 26 (Tu)
07:00 Depart for field trip [0.5]
07:30 Boiler Bay: Team field study. LT @ 08:38 am, -0.03m (-0.11ft) [~2.5 hr in field]
10:00 Travel from field, store samples, clean up [0.75]
10:45 Brunch break [1.25]

RHODOPHYTA (continued)
12:00 Lab demo VI: Overview of large reds (diversity demo) [0.5]
12:30 Lecture: Rhodophyta II [0.75]
13:15 Labs g, h: Rhodophyta: Coarsely branched axes; corallines [1.5]
    Tea [0.25]
15:00 Labs i-k: Rhodophyta: Blades [1.5] Note: Specimen ID sheets due tomorrow at 5 pm
16:30 Invited speaker: Dulse culture and tour of facilities,
    Dr. Chris Langdon, OSU Professor Seminar room

TBA Supper break
19:00 Independent lab review: Review algae, ask questions abt Specimen IDs or team
    projects [1.0]

April 27 (W) INDEPENDENT STUDY / TEAM PROJECTS
09:00 Independent study: Finish Specimen ID Sheets, begin Team demo prep
10:00 Coffee & Doughnuts in Staff Lounge!
12:00 Lunch break Specimen ID Sheets due
13:00 Team projects: Demo prep & setup
<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>17:00</td>
<td>Supper Break</td>
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<tr>
<td>19:00-21:00</td>
<td><strong>Team projects:</strong> <em>Team-led lab demos</em> [required]</td>
</tr>
</tbody>
</table>

**April 28 (Th)**  
**ECOLOGY**  
09:00 Lecture: *Limpet feeding preferences and distribution of reproductive phases* [1.0]  
Tea  

**REVIEW / INDEPENDENT STUDY**  
10:30 Review: *Team-led lab review* [required] [1.5]  
12:00 Lunch break [1.5]  
13:30 Review: *Instructor-led lecture review* [recommended] [1.5]  
15:00 Independent study Lab open  
17:30 Supper Break  
19:00 Independent study Lab open: Last opportunity for lab review

**April 29 (F)**  
**EXAMS**  
08:00 Independent study Lab closed for setup of practicum  
10:00 Lecture Final [1.5]  
11:30 Lunch break / Independent Study Team Demo files due by 2:00 pm  
14:00 Lab Practicum [2.0]  
16:00 Lab and Microscope Cleanup Check-in Keys and Microscopes

**WEEKEND (APRIL 30, MAY 1)**

**May 2 (M)** NO CLASS

**PART 4:** Marine Community Ecology (Instructor: Dr. Bruce Menge; TA: Chenchen Shen)

**May 3 (T)**  
0900-1030 Procedures (BAM, CS): Field Trip Preparation: How to Quantify Community Patterns (spatial structure, diversity, food webs). See “Quantification of Community Structure: Methods” in Course Notes.  
1100-1200 Field Trip 1 (BAM, CS). Practicing doing Community Surveys: Yaquina Bay  
1200-1300 Lunch Break  
1300-1500 Lecture 1 (BAM): *Community structure and dynamics* (Ch. 1 in Class Notes)  
1530-1600 Break  
1600-1700 Discussion: “Writing the data report”  
1900-2000 Special Lecture: Elizabeth Cerny-Chipman “Interactive effects of whelk and sea star predation”

**May 4 (W)**  
0900-1100 Lecture 2 (BAM): *Biotic Interactions and Community Structure* (Ch. 2 in Class Notes)  
1100-1200 Special Lecture (BAM): Sea star wasting disease-symptoms and ecology  
1200-1300 Lunch Break  
1300-1500 Lecture 3 (BAM): Modification of Biotic Effects on Community Structure (Ch. 3 in Class Notes)  
1500-1530 Break  
1530-1630 Special Lectures: Chenchen Shen “Turf algae as ecosystem engineers” and Jenna Sullivan “Competition between baby Pisaster and Leptasterias?”

**May 5 (Th)**  
0530 LEAVE FOR FIELD TRIP
<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
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<tbody>
<tr>
<td>0615-1030</td>
<td><strong>Field Trip 2 (BAM, CS). Disease Impacts – Sea Star and Prey Abundance and Size Surveys. Yachats Beach and Tokatee Klootchman.</strong> (Low tide: -0.8ft @ 0539)</td>
</tr>
<tr>
<td>1115-1300</td>
<td>Lunch Break</td>
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<tr>
<td>1300-1400</td>
<td>Computer Laboratory: Data Entry</td>
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<tr>
<td>1400-1600</td>
<td><strong>Lecture 4 (BAM): Complex Interactions and Community Structure (Ch. 4 in Class Notes)</strong></td>
</tr>
<tr>
<td>1600-1700</td>
<td>Independent Study</td>
</tr>
<tr>
<td>1900-2000</td>
<td><strong>Special Lecture: Alissa Rickborn “Phase shifts in the intertidal”</strong></td>
</tr>
<tr>
<td><strong>May 6 (F)</strong></td>
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<tr>
<td>0530</td>
<td><strong>LEAVE FOR FIELD TRIP</strong></td>
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</tbody>
</table>
| 0600-1030  | **Field Trip 3 (BAM, CS). Community Sampling Transects and Whelk Diets I. Boiler Bay.**  

(Low tide: -1.5 ft @ 0628). |
| 1100-1130  | Laboratory: Post-field trip activities, clean gear                      |
| 1130-1300  | Lunch Break                                                             |
| 1300-1400  | Computer Laboratory: Data Entry; begin analysis of transect data        |
| 1400-1600  | **Lecture 5 (BAM): Recruitment: Patterns and Effects on Community Structure (Ch. 5 in Class Notes)** |
| 1600-1700  | Computer Laboratory: Data Entry; begin analysis of transect data        |
| 1900-2000  | **Special Lecture: Barbara Spiecker “Coral reef meta-ecosystems”**       |
| **May 7 (Sa)** |                                                          |
| 0530       | **LEAVE FOR FIELD TRIP**                                                |
| 0615-1100  | **Field Trip 3 (BAM, CS). Community Sampling Transects and Whelk Diets II.**  

Strawberry Hill (Low tide: -2.0ft @ 0716). |
| 1100-1130  | Laboratory: Post-field activities, clean gear                           |
| 1130-1300  | Lunch Break                                                             |
| 1300-1500  | **Lecture 6 (BAM): Variation in Marine Communities: Chaos or Generality? (Ch. 6 in Class Notes)** |
| 1500-1700  | Computer Laboratory: Data Entry; analysis of transect data              |
|           | **WEEKEND (SUNDAY MAY 8 ONLY)**                                         |
| **May 9 (M)** |                                                          |
| 0900-1200  | Data Analysis, Figure preparation & Discussion                          |
| 1200-1300  | Lunch Break                                                             |
| 1300-1500  | **Lecture 7 (BAM): Species Diversity Gradients In Marine Communities (Ch. 7 in Class Notes)** |
| 1500-1700  | Data Analysis, Figure preparation & Discussion                          |
| 1900-2000  | **Special Lecture: Sarah Gravem “Population growth and habitat shifts by intertidal prey after mortalities of two predatory sea stars”** |
| **May 10 (T)** |                                                          |
| 0900-1200  | Preparation of Data Reports                                             |
| 1200-1300  | Lunch Break                                                             |
| 1300-1700  | Preparation of Oral Presentations                                       |
| **May 11 (W)** |                                                          |
| 0800-1200  | Independent Study                                                       |
| 1200-1300  | Lunch Break                                                             |
| 1300-1500  | **Data Reports: Oral Presentations**                                   |
1500-1600  **Review Session (BAM)**  
1600-1700 Independent Study

**May 12 (Th)**  
0800-1200 Independent Study  
1200-1300 Lunch Break  
1300-1400 Independent Study  
1400-1600 **EXAM**  
1600 **Written Data Reports due**

**PART 5: Marine Conservation and Policy (Instructor: Dr. Sarah Henkel)**

**May 13 (F)**  
09:00-09:15 Introductions, Overview of week  
09:15-10:15 **Lecture 1: State of the Oceans**  
10:15-10:30 Break  
10:30-11:30 **Lecture 2: Climate Change and Oceans**  
11:30-12:15 Prepare for discussion **(READ)**  
12:15-13:15 Lunch break  
13:15-14:00 **Lecture 3 & Discussion 1: Emerging Ocean Uses - Aquaculture**  
14:00-14:15 Break  
14:15-16:00 **Lecture 4 & Discussion 2: Emerging Ocean Uses – Renewable Energy**  
16:00-17:00 **Paper and oral presentation assignments; Begin research**

**WEEKEND (MAY 14, 15)**

**May 16 (M)**  
09:00-09:15 Questions about Policy Project  
09:15-10:15 **Lecture 5: Marine Protected Areas and Marine Reserves**  
10:15-10:30 Break  
10:30-12:00 **Lecture 6 and Discussion 3: Marine Reserves in Oregon**  
12:00-13:15 Lunch break  
13:15-14:15 **Lecture 7: The Science-Policy Interface**  
14:15-14:30 Break  
14:30-15:30 **Lecture 8: Seabirds: The Land-Sea Connection**  
15:30-> Independent research

**May 17 (T)**  
09:15-15:30 **FIELDTRIP** to Cape Perpetua & Ten-Mile Creek Restoration Project (pack lunch)  
15:30-20:00 Independent research: Mini writing assignment due (email to Sarah) at 8p

**May 18 (W)**  
09:15-10:15 **Lecture 9: Fisheries**  
10:15-12:30 **FIELDTRIP** to Bayfront for dock walk & lunch at Local Ocean Seafoods  
12:30-14:00 **Check-in with instructor:** Project progress / Independent research  
14:00-15:00 **Lecture 10 & Discussion 4: New Tools for Fisheries Management**  
15:00-16:30 **Discussion 5: Science, Policy, and Ethics**  
16:30-> Independent research

**May 19 (Th)**  
08:30-10:30 **Finalize papers and presentations**  
10:30-12:00 **Presentations: Round 1 - Annotated Bibliographies (individual & team) due at 10:30**
12:00-13:00  Lunch break
13:00-14:30  Presentations: Round 2, End of Section

PART 6: Student Research Projects (Instructors: Drs. Sarah Henkel, Sally Hacker, Su Sponaugle; TAs: Vanessa Constant, Chenchen Shen)

May 20 (F)
08:30-9:30  Class Meeting about Research Projects
9:30-13:00  Meetings with individual groups about Research Projects
13:00-17:00  Work on Research Project Proposal; Gather equipment; Make schedule
17:00  Research Project Proposal Due

WEEKEND (May 21, 22) (May 21 LT: -0.18 m @ 07:00; May 22 LT: -0.24 m @ 07:36)

May 23 (M)
All day  Research Projects (LT: -0.28 m @ 08:12)

May 24 (T)
All day  Research Projects (LT: -0.28 m @ 08:47)
13:00-17:00  Groups meet with Sarah/TA about Project Progress

May 25 (W)
All day  Research Projects (LT: -0.25 m @ 09:25)

May 26 (Th)
All day  Research Projects (LT: -0.25 m @ 10:07)

May 27 (F)
All day  Research Projects (LT: -0.11 m @ 10:53)
Research Project Data Analysis and Writing

WEEKEND (MAY 28, 29)

May 30 (M)  MEMORIAL DAY—NO CLASS

May 31 (T)
All day  Research Project Data Analysis and Writing
17:00  First Drafts of Research Projects due, if possible (email to Sarah and Sally)

June 1 (W)
09:00  All First Drafts of Research Projects DUE (email to Sarah and Sally)
All day  Make Revisions on First Draft; Prepare Seminar

June 2 (Th)
All day  Make Revisions on First Draft; Prepare Seminar

June 3 (F)
08:30  Research Papers Due (email to Sarah and Sally)
08:30-10:00  Lab Clean Up (REQUIRED)
10:00-11:00  Break
11:00-12:00  Research Symposium Session 1, Visitor Center Auditorium
12:00-13:00  Lunch
13:00-15:00  Research Symposium Session 2, Visitor Center Auditorium
15:00  End of Course!