



Image: Finley, 1917

INSTRUCTOR: Dr. Allison Barner, [email](#)

TEACHING ASSISTANT: Miram Gleiber, PhD candidate, [email](#)

SECTION GOALS:

1. Learn basic physiology, life-history, morphology, ecology, and evolution of seaweeds
2. Learn how to identify the intertidal seaweeds of Oregon, with a focus on field identification
3. Investigate the role of seaweeds in global natural and human-dominated systems

SECTION OVERVIEW:

This section is designed both to introduce you to fundamental principles and species in the study of seaweeds and to help you learn how to learn more about this incredible group of species. The seaweeds are the most evolutionarily diverse groups of species you will study in this course, which presents new challenges. Primarily, unlike fish and invertebrates, visible seaweed morphology is unrelated to their phylogeny, so species identification cannot be made using observable traits. We will concentrate our attention on “focal” taxa to hone in on the differences in physiology, life-history, morphology, and ecology among seaweed phyla, and teams will dig into the diversity of different seaweed groups. You’ll have the opportunity to design, carry out, and analyze your own projects in teams. Finally, you’ll learn about the place of algae in global ecosystems, in food systems, and in our changing climate.

Required texts (choose one of the following)

- a. Druehl, L. & B. Clarkston. 2016. *Pacific Seaweeds: Updated and Expanded Edition*. Harbour Publishing. [older version OK, too: Druehl, L. D. 2000. *Pacific Seaweeds: A Guide to Common Seaweeds of the West Coast*. Harbour Publishing, Madeira Park, BC Canada.]
- b. Mondragon, J. & Mondragon, J. 2003. *Seaweeds of the Pacific Coast: Common Marine Algae from Alaska to Baja California*. Sea Challengers, Monterey, CA.
- c. Clarkston, B. 2015. *A Field Guide to Seaweeds of the Pacific Northwest*. Harbour Publishing, Madeira Park, BC.

GRADING

	Points	Percentage	Due
Lecture exam	40	27%	Friday, May 5
Lab practicum	40	27%	Friday, May 5
Team project	30	20%	Wednesday, May 3, 7pm
Lab assignments	30	20%	Tuesday, May 2, 3:30 pm
Field notebook	10	6%	Friday, May 5, 1:00 pm

Lecture exam. The lecture exam will cover material from lectures, focusing on the 1st and 3rd section goals. Learning objectives will be posed at the start of each lecture and exam questions will draw from these objectives, in the form of multiple choice, short answer, and short essays.

Lab exam. The lab exam will be a “practical”, focusing on field species identification. A list of species to know (and in what detail) is posted on Canvas. Both lecture and lab exams will have study guides posted a few days before the exams and an instructor-led review session the day before exams.

Team project. Students will be divided into six teams, with each team focusing on a different group of seaweeds. With your team, over the course of this section, you will become intimately acquainted with this group of seaweeds through a variety of graded activities, until you can serve as a veritable expert on your group of seaweeds for your classmates throughout the rest of the term. *See next page for breakdown of teams and seaweed groups.* Teams will email their typed (or scanned if handwritten) species identification cards and the results of their field study to Allie *before* team demonstration presentations. Templates for both species identification cards and field study results are available on Canvas. Species identification cards will be posted as study guides on Canvas on review day.

- ***Treasure hunt.*** Search for species from your seaweed group in the field. Before the first field trip, you will look up the treasure taxon for your group and prepare to search for it in the field. On the first two field trips, make observations about its habitat and associated species. Be sure to collect a diversity of species in your group to present in the team demo (below) (ungraded)
- ***Field study.*** On the third field trip, you will conduct a short ecological observation study of your treasure taxon (or another taxon in your group). We will brainstorm potential studies in class and each team will have an individual meeting with Allie & Miram to finalize study design. The results of your field study should be presented at the team demo (below) as a single powerpoint slide with your study question, a one sentence explanation of your study design, with plot(s) summarizing your results. (10 pts)
- ***Species identification cards.*** For five taxa in your group, you will develop a flash card (using the template posted on Canvas) describing in a concise written manner the important characteristics needed for identification of each alga in the field and/or lab. (10 pts)
- ***Team demonstration.*** In a "review-session" format, members of your team will take turns introducing other students your group of taxa by showing off the results of your field study, your species ID cards and the diversity of species you collected in the field. (10 pts)

Lab assignments (5 pts each). There are six labs to complete. These labs are designed to highlight a new species from each of the six seaweed groups and guide you through an exploration of its key morphological, reproductive, and ecological features. You may work alone, in pairs, or in teams on lab assignments, but your work (your words, your drawings) must be your own and you must write all names on your assignment.

Field notebook (5 pts for each of 2 days). Using your observation skills from the previous sections, you will orient yourself to the different algae species in your seaweed group. These field exercises are an opportunity to develop the observational skills you need to design and carry out your team field study

- For each trip, note the site name, date, time, weather, tide and draw an overall site map (with arrow for North), and complete the following tasks/questions
- Trip 1 (BB):
 - Find your treasure taxon
 - Draw it. What approximate size is it?
 - What is it attached to?
 - What habitat is it found in?
 - Where along the wave exposure and elevation gradient did you find this specimen?
 - What other general types of algae are nearby? What animals are nearby?
 - Walk along the wave exposure and elevation gradient, searching for your treasure taxon
 - Does it change in size or what it is attached to?
 - Draw any differences in the appearance of your taxon along the gradient.
- Trip 2 (TK): Repeat the exercise from BB, but with two other species from your team's seaweed group (see next page).

Rubrics. A grading rubric for the team project is posted on Canvas. Lab assignments are graded for completion.

SECTION POLICIES

Lecture Notes. Condensed versions of lectures will be posted to Canvas the night before lecture.

Absence and Late Work Policy. All aspects of this course are required unless otherwise noted as "optional" on the schedule below. Please contact Allie or Miriam immediately if you anticipate being unable to attend any aspect of this section. Late work will be reduced by 20% for every day late.

Academic Honesty, Accommodations and Student Conduct Policies. Please see main BI 450 syllabus for details.

Team	Seaweed group	Treasure taxon	Number of sp. ID cards *	Common PNW genera †
1	Green algae	<i>Cladophora columbiana</i>	4	Filaments, unbranched: <i>Chaetomorpha</i> , <i>Ulothrix</i> , <i>Urospora</i> Filaments, branched: <i>Acrosiphonia</i> , <i>Cladophora</i> Sheets: <i>Blidingia</i> , <i>Kornmannia</i> , <i>Monostroma</i> , <i>Prasiola</i> , <i>Ulva</i> , <i>Ulvaria</i> Coenocytes: <i>Bryopsis</i> , <i>Derbesia</i> ; "Spongy": <i>Codium</i>
2	Brown algae	<i>Phaeostrophion irregulare</i>	5	Crusts: <i>Analipus</i> , <i>Ralfsia</i> Cylinders: <i>Analipus</i> , <i>Cystoseira</i> , <i>Haplogloia</i> , <i>Melanosiphon</i> , <i>Sargassum</i> , <i>Scytosiphon</i> Sacs: <i>Colpomenia</i> , <i>Coilodesme</i> , <i>Leathesia</i> , <i>Soranothera</i> Blades: <i>Petalonia</i> , <i>Phaeostrophion</i> , <i>Punctaria</i> [Note: <i>Kelps</i> , <i>fucoids</i> , <i>Desmarestia</i> not counted towards sp ID cards]
3	Red: finely branched	<i>Cryptosiphonia woodii</i>	5	Corticated: <i>Callithamnion</i> , <i>Ceramium</i> , <i>Microcladia</i> , <i>Neoptilota/Ptilota complex</i> Polysiphonous: <i>Polysiphonia</i> , <i>Pterosiphonia</i> Finely branched: <i>Cryptosiphonia</i> , <i>Endocladia</i> , <i>Gloiopeltis</i> , <i>Odonthalia floccosa</i> (<i>floccosa</i> form), <i>Plocamium</i>
4	Red: coarsely branched	<i>Neorhodomela larix</i>	4	Flattened/cylindrical: <i>Ahnfeltia</i> , <i>Ahnfeltiopsis</i> , <i>Cumagloia</i> , <i>Gelidium</i> , <i>Gracilaria</i> , <i>Gracilariopsis</i> , <i>Neorhodomela</i> , <i>Osmundea</i> (= <i>Laurencia</i>), <i>Odonthalia floccosa</i> (<i>comosa</i> form), <i>Sarcodiotheca</i>
5	Red: branched blades	<i>Prionitis</i> spp.	5	Thick, branched blades: <i>Erythrophyllum</i> , some <i>Grateloupia</i> , <i>Mastocarpus</i> , <i>Opuntiella</i> , <i>Polyneura</i> , <i>Prionitis</i> , <i>Stenogramma</i> Thin, branched blades: <i>Callophyllis</i> , <i>Cryptopleura/Hymenena complex</i> , <i>Delesseria</i> , <i>Farlowia</i> , <i>Membranoptera</i> , <i>Palmaria</i> , <i>Phycodryis</i> , <i>Rhodymenia/Sparlingia</i>
6	Red: unbranched blades	<i>Mazzaella</i> spp.	5	Unbranched blades (may be split or lobed): <i>Chondracanthus</i> , <i>Constantinea</i> , <i>Dilsea/Neodilsea complex</i> , <i>Schizymenia</i> , <i>Mazzaella</i> , "<i>Porphyra</i>" complex , <i>Smithora</i>

* can include "focal" taxa from lecture, species that we keyed out in lab and/or your treasure taxon, † in bold are species to ID for exams, see full list of species to know on Canvas, list of common taxa modified from materials by Dr. Annette Olson

DETAILED SECTION SCHEDULE **subject to change*

April 26 (W)	morning	No morning class
	1300-1400	Lecture: <i>Introduction</i>
	1400-1445	Lecture: <i>Algal diversity & evolution</i>
	1445-1500	Lab: <i>Algal diversity & evolution</i>
	1500-1515	Break
	1515-1600	Lecture: <i>Introduction to algal ecology</i>
	1600-1630	Fieldwork prep
	1630-1730	Lab: <i>Team meetings</i>
April 27 (Th)	0600	Depart for Boiler Bay [sunrise ~0610]
	0630-0930	Field Trip 1: Boiler Bay (LT -1.6 @ 0745)
	1000-1130	Lunch/elevensies break
	1130-1230	Lecture: <i>Algal morphology</i>
	1230-1300	Break
	1300-1400	Lecture: <i>Algal life-history and reproduction</i>
	1400-1430	Break
	1430-1530	Lecture: <i>Chlorophyta (+ lab demo)</i>
	1530-1630	Lab: <i>Introduction to lab; chlorophyte identification (lab a)</i>
	1630-1800	Dinner break
	1800-1900	Lab: <i>Pressing seaweeds workshop</i>
April 28 (F)	0615	Depart for TK
	0700-0930	Field Trip 2: TK (LT -1.9 @ 0832)
	1030-1200	Lunch break
	1200-1230	Lecture: <i>Ochrophyta</i>
	1230-1330	Lab: <i>Team appointments to review field study plan with instructors</i> 1230: Teams 6 & 3, 1250: Teams 5 & 2, 1310: Team 4 & 1
	rest of day	Early dismissal
April 29, 30	Sunday	<u>Optional field trip</u> : Meet @Boiler Bay, 0930 [LT -1.5 @ 1014] RSVP to Allie via email by Saturday night
May 1 (M)	0830-0900	Fieldwork/team field study prep
	0900-1130	Field Trip 3: Boiler Bay, team field study (LT -0.9 @ 1111)
	1200-1330	Lunch break
	1330-1430	Lab: <i>Overview of the browns; ochrophyte identification (lab b)</i>
	1430-1500	Lecture: <i>Algal physiology & global change</i>
	1500-1530	Break
	1530-1600	Mini-review: <i>Chlorophyta species (meet in lab)</i>
	1600-1800	Lab: <i>Team appointments to review collected species with instructors</i> 1600: Team 1, 1620: Team 2, 1640: Team 3, 1700: Team 4 1720: Team 5, 1740: Team 6
May 2 (Tu)	0900-0930	Lab: <i>Overview of the reds</i>
	0930-1030	Lecture: <i>Rhodophyta (+ lab demo)</i>
	1030-1130	Lab: <i>Rhodophyte identification (labs c, d, e, f)</i>
	1130-1300	Lunch break; <u>optional</u> career chat with Miram
	1300-1400	Lab: <i>Rhodophyte identification continued (labs c, d, e, f)</i>
	1400-1530	Independent study: <i>finalize labs a-f, work on team projects</i>

May 2 (Tu)	1530	Labs a-f due
	1530-1600	Lecture: <i>Algal communities</i>
	1600-1630	Mini-review: <i>Ochrophyta species</i>
May 3 (W)	0900-0930	Lab + lecture: <i>Marine angiosperms</i>
	0930-1000	Lecture: <i>Algae & the food system</i>
	1000	Coffee & donuts in the staff lounge
	1030-1100	Mini-review: <i>Rhodophyta species (meet in lab)</i>
	rest of day	Team projects: <i>demo prep</i>
	1900	Team project due (species ID cards & team study results)
	1900-2100	Team demonstrations
May 4 (Th)	0900-0930	Lecture: <i>Wrap-up: future of phycology</i>
	0930-1100	Lab: <i>Instructor-led lab review</i>
	1100-1230	Independent study
	1230-1300	Lecture: <i>Instructor-led lecture review [optional]</i>
	rest of day	Independent study
May 5 (F)	morning	Independent study, <i>lab closed for practicum setup</i>
	1300-1430	Lecture final
	1430-1500	Break
	1500-1630	Lab practicum
	1630-1700	Required clean up