Course Syllabus: **Marine Ecology**
University of Oregon | Oregon Institute of Marine Biology
Spring 2022 | BI 474/574, (5 Credits)

Instructor: Dr. Aaron Galloway (agallow3@uoregon.edu); 541-346-7288
GTF: Samantha Persad (spersad5@uoregon.edu)
Time: Mondays ~8:30-5:00 (subject to variation due to tides)
Place: Lectures: in the field, and in OIMB Boathouse (larger, safer gathering space given COVID concerns); group and project work: Marine Birds and Mammals and connected classroom; many field trips; some guest speakers and remote conference attendance via Zoom.

Summary:

Marine Ecology is an interdisciplinary field covering the interaction of organisms with each other and their environment. In this course, we approach the discipline by focusing on the strengths of our program's unfettered access to the flora and fauna of the local shore, emphasizing concepts and practice of rocky intertidal community ecology. Each week, we will be in the field, getting wet, making observations, and learning how to link these observations to developing and testing hypotheses that connect to fundamental ecological theory. Students will contribute to a full-term coordinated class project, based on characterizing a coastal rocky intertidal community at Cape Arago. The basic ethos of the course is: ***doing*** applied marine ecology research.

Learning Outcomes:

1) Students will develop their ability to make careful observations and generate good questions about patterns and processes in marine ecology through fieldwork and experiments. [knowledge]
2) Comprehension of the topics will be demonstrated through active participation in group activities, and graphical, video, and oral communication of research projects. [synthesis, application, evaluation]
3) Students will master many of the basic tools in the marine ecologist's toolbox for an applied research question. We'll be: making stuff (e.g., sampling quadrats), analyzing data, archiving class-generated tidy data, learning how to make good figures and presentations. [problem solving]

Research Products

Overview: Students will conduct a marine ecology research project, involving the collection and analysis of new data. We will do a coordinated in-depth photographic surveys and documentation of a local rocky intertidal area at Cape Arago (Fig. 1). Students will contribute survey photos and field data to a research network data portal (DIMES; diversifying and integrating marine education at stations). These carefully referenced images and data from our coast will be available to students in other institutions for years to come. Students will use the raw photography data to produce their own primary research products: **1) a poster** (48" wide x 36" high), **2) submission of the data collected** (in the form of a "flat" excel file with descriptive metadata), **3) submission of all formatted and referenced photographs used to derive the data**, and **4) a short documentary YouTube video** about their projects. An initial draft of the poster will be peer-reviewed by other students in the class, the instructor, and the GTF.

Logistics: Projects will involve individuals or groups of 4 students working together on field surveys, photo management logistics/metadata, and a documentary video, all of which are group projects. Each student will take on a specific individual question that they can investigate from the shared group photographs of their study area, and each student's results will need to be featured in a poster **which will be an individual project**.

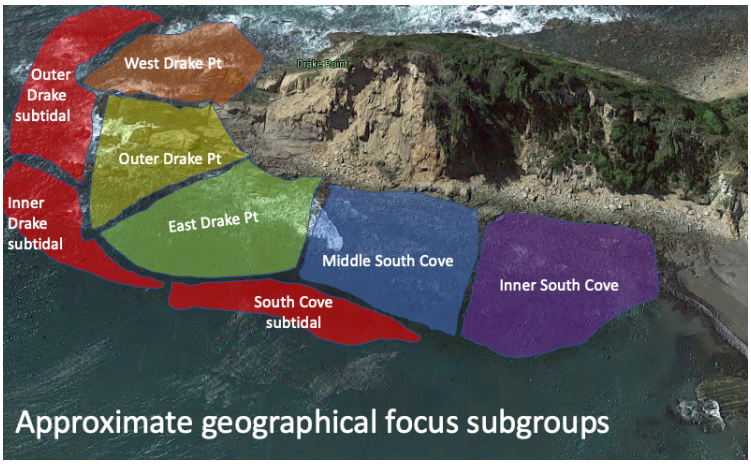

Fig. 1. Schematic of Cape Arago at South Cove. Students will work in groups of 4 to lead data collection in 6 groups (5 intertidal and 1 subtidal group covering 3 areas). Image from Google Earth.

Field Trips

There will be a trip to the field most weeks. The destination for most trips will be the low intertidal areas at South Cove at Cape Arago. This will require coordination of ride sharing by students in housing pods, as we have more students in the class than can fit in the two vans. The reason for repeated visits to the same beach is so that people can conduct in-depth research projects at a particular place, through time.

Course Modality: Lectures, Lessons, and Labs

Each week we will have one or two lectures and lesson activities (e.g., 30-60 min) on a core topic in the field of marine ecology (physical context, disturbance, competition, herbivory, climate change, key marine habitats, etc.) that overlaps issues relevant for the student projects. Because of ongoing COVID concerns, I am going to give all lectures either in the field (bring your waterproof notebooks!), in the boat house lecture hall, or sometimes as either live zoom or recorded lectures which you can download from Canvas asynchronously. However, Zoom lectures will be rare and thus this class is not suitable for asynchronous instruction. Please note that this is an in-person course: that means that, unlike asynchronous online/WEB courses, we will meet during scheduled class meeting times. I will accommodate illness and absences as described below. If you need additional flexibility UO encourages you to consider WEB courses. If you need accommodation related to a medical or other disability, you can set those up through AEC (https://aec.uoregon.edu). Ultimately, please plan on attending lectures in real time, unless there are pandemic-related developments that require this to change [see additional notes on this below in the 'special circumstances' section].

How instructor(s) will communicate with you

Instructors will send regular updates about the weekly detailed class schedule through Canvas Announcements function. Make sure you receive notifications when we post new announcements. All of the course expectations, assignments, zoom links for class and office hours, readings, lecture notes, activities, and grading rubrics are posted within Canvas.

How you can communicate with the instructor(s)

The best way to communicate with both the instructor and the TA is directly via email. The email function within Canvas is not convenient. We are available during class hours and weekly during drop-in office hours in zoom. In addition, we are both happy to meet with you individually. Please communicate your needs and we will work something out. **Please cc both the instructor, Dr. Galloway, and the TA, Samantha Persad on questions**. We are both instructors and we will cc each other on our replies even if you don't, unless you are clear that you specifically want to only talk to one of us.

Participation

We will be visiting the intertidal on many weeks so that students can conduct ongoing field studies within their groups. There will be participation points each week for the smaller hands-on activities and labs we are working on.

Readings and Reading Assessments

Most weeks there will be a reading from the text 'Monitoring Rocky Shores' (ed. by Murray et al.), on the topic of field sampling methods and core issues in coastal rocky intertidal ecology. This book is available, free of charge, through the UO library system. There will also be a couple of readings from 'Between Pacific Tides' (ed. by Rickets et al.), which will be provided as PDFs in Canvas. To ensure accountability on the readings, there will be short Reading Assessment quizzes on the readings on the day of class. The lowest quiz score for each student for the whole term will automatically be dropped.

Course materials:

All required readings will be provided as PDFs in Canvas or in the library resources. Required supplies: rain boots, rain pants, rain jacket, and write-in-rain notebook. Optional but very helpful: smartphone/camera, or hand-held waterproof field camera.

Grading and Deadlines Description: [1000 pts total]

Grading will be based on following assignments. Grading rubrics used to assess the assignments will be available in Canvas. Also, see the Schedule table below for exact times (if not already indicated in this summary) and due dates. There are no exams in this course. If you honestly work hard in this class you will almost certainly get a great grade. *What you will get out of my class is directly proportional to what you put in.*

1) 10% - **Reading Assessments** [100 pts] – [10-15 pts per wk for 9 readings] via short quizzes in class. Readings posted for a given week need to be read PRIOR to class that week. The quizzes are open book, and due the day before class (Sundays at 11:59 pm).
2) 5% - **Weekly Participation** [50 pts] – [5 pts/wk] assessed by assignments/labs/field participation.
3) 2.5% - **Natural History Note** [25 pts] – A short, one page note about an early term natural history study you made while in the field, updated with some additional context.
4) 42.5% - **Individual Research Project** [425 pts total]
    a. **Research project plan** explaining your proposed research question. The proposal is due by 11:59 pm on 18-April [25 pts]. (wk 3)
    b. **Draft 1 of rproject poster** due by the start of class on 23-May [50 pts]. (wk 9).
        i. This version will be peer reviewed (see below)
    c. **Research project data** [150 pts total] – a "flat" excel file [100 pts] with an associated metadata worksheet [50 pts] that provides ample description of the data in the file, due at 11:59 pm on 30-May. (wk 10)
    d. **Revised [final] poster** due by the start of class on 6-June [200 pts]. (Finals wk).
5) 20% - **Research project photos and metadata** [200 pts] – All finalized, labeled, appropriately sized, and properly named photographs (at least n=100) used to derive the raw project research data will be submitted to a class cloud drive. This assignment also includes all of the associated photograph metadata. Due at 11:59 pm on 8-May, the day before class on week 7. *This deadline is important so that all students can access all photos for their individual poster projects. This is a GROUP project; all members of group will get the same grade.* (wk 6)
6) 5% - **Peer Review** [50 pts] – Each student will conduct a peer review of two of the other posters after they are shown on 23-May (wk 9). The peer review is due at 11:59 pm on 30-May (wk 10). *Each INDIVIDUAL will write their own document.*

7) 15% - **<u>Research group documentary video</u>** [150 pts] – a 3-min documentary video, uploaded to YouTube, showing: 1) your team and study area, 2) an overview of your methods, 3) and the five most interesting things you discovered during your work. Due by the start of class on 6-June. *This is a GROUP project; all members of group will get the same grade.* (Finals wk)

Schedule:

A schedule for the day of each week's class with timing and objectives will be sent to students between Friday-Sunday prior to each week's class. Start and end times for class will vary throughout the term but will generally be based upon taking advantage of low tides, so there are some early days already planned (see this schedule below).

Class schedule:

Wk#	**Date**	**Low Tides (m)**	**<u>Basic topics</u> – *themes for day*, specific goals, assignments due (further details on scheduling will be provided each week)**
1	28-March	16:34, -0.07	<u>Intro to Marine Ecology</u> – *Natural History, Discovery, Patterns* • Overview of the syllabus and detailed intro to the class and expectations • Go to the field, class overview, get to know each other, explore and observe, start thinking about what you see; do the natural history observations • Reflect on ideas from field • Lectures: **Intro to class, natural history observations**, and **physical context** • Survey to identify project teams and geographic pairings What is due? *Quiz on reading, natural history observations.* What is the reading? *Between Pacific Tides* ***(BPT) Introduction Chapter***
2	4-April	09:04, -0.01	<u>Intro to Rocky & Sandy Shore Ecology</u> – *Seaweeds, Research Project Development* **early start/early finish** • Go to field, time in groups to strategize about your survey approach • Group discussions: what are you curious about in your study area? What do you personally want to figure out? • Lecture on **intro to the algae** (in-person whiteboard version in the field) • Building photo framers, testing cameras and connections • ***Guest Zoom lecture:*** **DIMES** PI Dr. Robin Elahi, Stanford Hopkins Station • Meeting in groups with instructors for feedback on survey design ideas, gathering supplies • Review quality of framer images from the field What is due? *Quiz on reading due by 11:59 pm 3-Apr. Natural history note assignment due by 11:59 pm 4-Apr.* What is the reading? *Monitoring Rocky Shores* ***(MRS) Ch. 1*** *(Designing Rocky Intertidal Monitoring...)*
3	11-April	15:30, +0.26	<u>Setting up a long term rocky intertidal monitoring project</u> – *Research Project Development, Field Techniques* • Lectures on **kelp forests** and **rocky intertidal ecology (pt. 1)** • Literature searching activity • Intro to poster design and science communication part 1 • Setting up system for image storage and formatting • Lectures on **field sampling design/tools** • Go to field, time in groups for strategizing, testing framers and field sampling protocol before the week 4 data collection blitz • Meeting in groups with instructors for feedback on survey design ideas What is due? *Quiz on reading due by 11:59 pm 10-Apr.* What is the reading? ***MRS Ch. 3*** *(Biological Units)*

4	18-April	08:06, -0.36	Executing a monitoring project pt. 1 – *Raw data collection* **early start/early finish** • Go to field (early) to set up and *do* photo collection surveys – this will take most of the day • **Special Guest joins us in person: Dr. Rodrigo Beas-Luna (UABC, DIMES)** • Intro to **ImageJ** lab • Meeting in groups with instructors for feedback on survey design ideas What is due? *Quiz on reading due by 17-Apr at 11:59 pm. Individual research project proposal due by 11:59 pm 18-Apr. ImageJ lab due by 11:59 pm 18-Apr* What is the reading? ***MRS Ch. 4*** *(Sampling Design)*
5	25-April	15:08, +0.06	Executing a monitoring project pt. 2 – more *data collection and image analysis* • Lecture on **rocky intertidal ecology (pt. 2)** • Lecture on **tidy data** and data management • Working time for data entry and photograph management • Go to field in afternoon to set up and finish the field photo collection surveys and video documentaries What is due? *Quiz on reading due 24-Apr at 11:59 pm. Enter initial metadata on completed surveys; Show significant progress on photo naming, management and uploading to shared drive.* What is the reading? ***MRS Ch. 5*** *(Transects, Quadrats, etc.)*
6	2-May	08:02, -0.23	Executing a monitoring project pt. 3 – Bonus *data collection (biodiversity blitz)* **early start/early finish** • Go to field and *complete* bonus photo collection surveys and do the biodiversity blitz protocol • Lecture on **herbivory and seaweed defenses** • In field and back at lab: work on producing documentary videos What is due? *Quiz on reading due 1-May at 11:59 pm. All project photos uploaded (Dropbox), final project data submitted (Canvas) (GROUP Assignment) due by 11:59 on Sunday 8-May.* What is the reading? ***MRS Ch. 6*** *(Quantifying Abundance 1 – density and cover)*
7	9-May	13:34, +0.26	Project data analysis – *Data wrangling, organization, and tools* [no field trip] • Learning basics for data visualization • **Intro to R lab**/activity • Working time for applying ImageJ to your own photographs: measure dominant organism sizes, density, and %cover • Working time for data entry, data management, figure building What is due? *Quiz on reading due 8-May at 11:59 pm. Demonstrate progress on ImageJ analyses for project research in class during meetings with the instructor.* What is the reading? ***BPT Outer Coast Rocky Shores Chapter***
8	16-May	07:06, -0.57	Project data visualization and presentation – *Making figures, data analysis* **VERY early start/early finish (depart around 4 am)** • Trip to Port Orford to help ODFW and Kendall with annual surveys • Lecture on **poster best practices** design and presentation part 2 • Work on individual projects • Meeting in groups with instructors What is due? *Instead of quiz, submit your own comments to the announcement thread about what poster design you are using and why, due on 15-May by 11:59 pm; comment on the new poster design article by 11:59 pm on 16-May.* What is the reading? Read the Inside Higher Ed article (and watch video) about poster designs (see citations for link at end of syllabus).
9	23-May	13:28, +0.04	Project visualization and feedback – *Pulling everything together into a poster and applied class question* [no field trip]

			• Initial poster viewing and peer review session • Meeting in groups with instructors • Meeting in Zoom groups with other DIMES classes in Mexico and Alaska? What is due? *Instead of quiz, again it's a writeup on your reading of your choice, due on 22-May; draft 1 of the project poster (INDIVIDUAL project) due by start of class on 23-May* What is the reading? ***Reading is your choice**: a scientific paper about your research topic or interest*
10	30-May	07:40, -0.32	NO CLASS – Memorial Day Holiday What is due? *Instead of quiz, again it's a writeup on your reading of your choice, due on 29-May; Poster peer reviews and research project data files are due by 11:59 pm 30-May (both are INDIVIDUAL assignments).* What is the reading? ***Reading is your choice**: a scientific paper about your research topic or interest*
Finals Week	6-June	NA	Presenting final poster projects • Gather for remote poster sessions via Zoom, open to DIMES collaborators • Follow-up meeting in groups with instructors to discuss final data, photo, and video products and fix any issues What is due? *Final poster (digital format), final individual data, and the project documentary video uploaded (YouTube) due by the start of class 6-Jun.* What is the reading? ***No reading this week***

References:

This is an active learning class... it will feel harder sometimes, but there is a reason – it is better for your actual education. If you are interested in understanding why I teach this way:

Check out this overview:

https://news.harvard.edu/gazette/story/2019/09/study-shows-that-students-learn-more-when-taking-part-in-classrooms-that-employ-active-learning-strategies/

And the underlying study the overview is based on:

Deslauriers, L., L. S. McCarty, K. Miller, K. Callaghan, and G. Kestin. 2019. Measuring actual learning versus feeling of learning in response to being actively engaged in the classroom. Proceedings of the National Academy of Sciences 116:19251–19257. (https://www.pnas.org/content/116/39/19251)

In addition, here is another paper showing how active learning also narrows achievement gaps:

Theobald, E. J., et al. 2020. Active learning narrows achievement gaps for underrepresented students in undergraduate science, technology, engineering, and math. Proceedings of the National Academy of Sciences 117:6476–6483. (https://www.pnas.org/content/117/12/6476)

Here is a link to DIMES website: https://sites.google.com/stanford.edu/dimes-rcn-ube/home

Here is the link to the Inside Higher Ed article about new poster design: https://www.insidehighered.com/news/2019/06/24/theres-movement-better-scientific-posters-are-they-really-better

Student Conduct Code:

All University of Oregon students are expected to follow the rules of the Student Conduct Code. These can be found at (http://policies.uoregon.edu/vol-3-administration-student-affairs/ch-1-conduct/student-conduct-code). Cheating or plagiarism by students is subject to the disciplinary process outlined in the code. Students are expected to be honest and ethical in their academic work. For example, you are all surely aware by now that there are many resources available to professors for passing writing through plagiarism filters. We will take issues of academic misconduct seriously, and minding details and guidelines is important.

Classroom Community Expectations:

All members of the class (both students and instructor(s) can expect to:

- Follow General COVID Guidelines: As per UO policy, all students are required to wear a mask while indoors. We are not required to maintain 6' physical distancing inside, but we are doing our best at OIMB to still set things up this way whenever possible. Stay home if you are sick, wash hands frequently, and watch for signs and symptoms of COVID with daily self-checks.
- Participate and Contribute: Students are expected to participate by sharing ideas and contributing to the collective learning environment. This entails preparing, following instructions, and engaging respectfully and thoughtfully with others. Together, we will establish more specific participation guidelines and criteria for contributions in our first weeks of the term.
- Expect and Respect Diversity: All classes at the UO welcome and respect diverse experiences, perspectives, and approaches. What is not welcome are behaviors or contributions that undermine, demean, or marginalize others based on race, ethnicity, gender, sex, age, sexual orientation, religion, ability, or socioeconomic status. We will value differences and communicate disagreements with respect. We may establish more specific guidelines and protocols to ensure inclusion and equity for all members of our learning community.
- Help Everyone Learn: Our goal is to learn together by learning from one another. As we move forward learning during this challenging time, it is important that we work together and build on our strengths. We are returning with a range of feelings about and comfort with being in person, and this means we need to be patient with each other, identify ways we can assist others, and be open-minded to receiving help and feedback from others. No one should hesitate to contact me to ask for assistance or offer suggestions that might help us learn better.

Accessibility:

If there are aspects of the instruction or design of this course that result in disability-related barriers to your participation, please contact the instructors—your success and the success of your peers matters. You are also encouraged to contact the Accessible Education Center in 164 Oregon Hall at 541-346-1155 or uoaec@uoregon.edu. The AEC offers a wide range of support services including note-taking, testing services, sign language interpretation and adaptive technology.

Absences:

The policy for attendance is that all students are expected to attend all classes. Missing more than one day of class is significant and may be problematic for your learning in this class. Because OIMB only meets 10 times a quarter (9 times this term due to a holiday on May 31), missing one or two days of class is much more significant than missing a couple hour lecture / labs. I cannot make up the field trips, class/group activities, or guest lectures but I will provide recordings of my lectures in case you miss a class. I will do my best to accommodate absences associated with reasonable explanations (COVID, travel, sickness, other extenuating circumstances).

Academic Disruption:

In the event of a campus emergency that disrupts academic activities, course requirements, deadlines, and grading percentages are subject to change. Information about changes in this course will be communicated as soon as possible by email, and on Canvas. If we are not able to meet face-to-face, students should immediately log onto Canvas and read any announcements and/or access alternative assignments. Students are also expected to continue coursework as outlined in this syllabus or other instructions on Canvas. In the event that the instructor of this course has to quarantine, this course may be taught online during that time.

Flexibility under difficult circumstances:

In summary, I recognize that these are very difficult and upsetting times, in regards to climate change, systemic racism, and a deadly global pandemic. In light of this, I commit to working to make this course as accommodating as possible given the challenging circumstances we are currently experiencing. This can mean many things, but a few examples are:

- If we are meeting online, I enjoy seeing you on Zoom (it does help me connect and engage as a teacher) but will not require that you always have video on.
- I will do my best to accommodate your schedule if you can't make it to class.
- You are expected to attend lectures and guest talks in person, but if something comes up for you and you can't make it every now and then, you can email me for the link to the lecture recording. If you just miss one or two lectures, I don't need to have any excuses or reasons. But I hope no one takes this flexibility too far. I will keep notes on attendance, and I'd like to know if you are going to miss >80% of the lectures/classes. If you do need to miss more than a couple of classes, I will still be happy to accommodate you within reason.
- I have adjusted my class to be as flexible as possible on deadlines, except for the few deadlines that require everyone to be on the same page (e.g., peer reviews, final products).
- Please let me know if anything is going on in your life that requires assistance. I don't need to know details if you don't feel comfortable sharing. The following resources are available to you as a student.
    - University Health Services or call (541) 346-2770
    - University Counseling Center or call (541) 346-3277 or (541) 346-3227 (after hrs.)
    - MAP Covid-19 Testing

Mandatory Reporter Status:

Your instructors are designated reporter/student-directed employe]. For information about our reporting obligations as employees, please see Employee Reporting Obligations on the Office of Investigations and Civil Rights Compliance (OICRC) website. Students experiencing any form of prohibited discrimination or harassment, including sex or gender-based violence, may seek information and resources at safe.uoregon.edu, respect.uoregon.edu, or investigations.uoregon.edu or contact the non-confidential Title IX office/Office of Civil Rights Compliance (541-346-3123), or Dean of Students offices (541-346-3216), or call the 24-7 hotline 541-346-SAFE for help. Your instructors are also mandatory reporters of child abuse. Please find more information at Mandatory Reporting of Child Abuse and Neglect.