

SML UWR EXAMPLE SYLLABUS & SCHEDULE (2025)

Shoals Marine Laboratory Underwater Research (BIOSM 3650/MEFB 730)

Course Syllabus and Schedule

Course Faculty: Dr. Jarrett Byrnes (jarrett.byrnes@umb.edu)
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Prerequisites: One semester of college level biology or equivalent and recognized Open Water SCUBA certification. Additionally, accepted students must apply for approval to SCUBA dive at Shoals Marine Laboratory.

Class enrollment limit: 8

Credit hours: 3- BIOSM 3650
4- MEFB 730

Course Objectives/Goals:

- To recognize and conduct good research by:
 - Developing skills in critical and constructive thinking via reading and orally critiquing several papers reporting current subtidal research
 - Designing an original research proposal requiring the development of hypotheses and their subsequent evaluation through
 - Design of sampling protocol and experiments
 - Appropriate statistical analysis of preliminary data
 - Formal written proposal (incorporating preliminary data)
 - To recognize and identify common species of subtidal invertebrates, vertebrates, and algae associated with the Isles of Shoals and in the Gulf of Maine
- To understand key marine ecological concepts, both general and specific to the Gulf of Maine
- To recognize and understand how anthropomorphic activities (pollution, climate change, etc.) are changing the marine environment, both globally and within the Gulf of Maine
- To understand the physiological limitations of working underwater and learn how to collect data underwater in an efficient and safe manner
- To complete necessary training (100 classroom hours and 12 dives) leading to AAUS (American Academy of Underwater Sciences) Scientific Diver Status

Course Materials:

NAUI e-Learning: [Diving First Aid for Professional Divers](#)
AAUS e-Learning: [Scientific Diver Certification Course](#)

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Assignments & Grading:

Grades:

- a. Research Proposal: 35%
- b. Graphical Abstract: 10%
- c. AAUS Exam: 30%
- d. Underwater Organism Exam: 15%
- e. Philosophical Paper Summary: 10%

Research Proposal:

During the second week of the course, students will design a Research Proposal and conduct original research on a subject of their choice. Students work closely with the instructors to formulate research questions (based on observations made during the first week and/or lectures) and the appropriate sampling and experimental design to answer the questions. Due to time constraints and the nature of collecting data underwater, the research proposal will utilize preliminary data that can be collected within the time frame of the course. The proposal offers students the opportunity to observe patterns, design their own project, test specific hypotheses, analyze preliminary data and interpret results, and design sampling regimes and experiments that would be done if sufficient time was available. Accordingly, it represents the culmination of everything learned in UWR. Proposals will be evaluated based on scientific soundness.

AAUS Exam:

The AAUS exam consists of an online component based on materials from readings and lecture on dive techniques, safety, and conduct. Exams will be reviewed in class as students progress to complete their AAUS certification.

Paper Discussions:

Pairs of students will read and critically evaluate current papers assigned from the primary literature. Results of their analysis will be presented to the class in the form of an organized discussion. Additionally, all students are expected to have read and comprehended the papers in preparation for the group discussions. Grades will be assigned to both the discussion leaders and student participation.

Underwater Organism Exam:

Groups of two or four students will be lead by one of the instructors on an underwater "tour". The instructor will point to various organisms *in situ* and students will be asked to identify the organism by scientific name on their underwater slate. Slates will be collected at the dives' conclusion and graded.

Paper Summary:

Students will prepare a verbal summary and evaluation of a philosophical paper of their choice. This paper is in addition to the papers presented and evaluated by students during evening discussion sessions.

Expectations and Conduct:

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Students are responsible for fully understanding all of the information presented in this syllabus. If there are any questions regarding this information, it is the student's responsibility to bring it to the instructor's attention. In addition, students are responsible for attending all activities associated with this course and completing all assignments. Students are responsible for asking questions any time they need clarification (remember, there is no such thing as a bad question).

Every student is responsible for their own behavior- specifically in being respectful and collegial to other students and with instructors. Students are responsible for fully understanding and adhering all of the information presented in the SML Appledore Handbook (https://www.shoalsmarinelaboratory.org/sites/default/files/media/2022-12/appledorehandbook2016_ada.pdf)

1. *Personal Technology*. Do not use cell phones, smart phones, iPads, mp3 players, headphones, or similar devices in the classroom or during course activities. If you take notes with your computer, disable wireless access during lecture
2. The lab has a modest computer facility in Loughton Library; please treat this shared facility with respect. Printers are available, but please limit printing to your FINAL document (if required).
3. *Transmission of Course Materials*. Students are not authorized to replicate, reproduce, copy or transmit lectures and course materials presented, or derivative materials including class notes, for sale or free distribution to others without written consent of the instructors who are the original source of the materials.
4. *Academic Integrity*. Any work submitted must be your own. Uncredited use of another person's words, data or images is considered plagiarism, a serious violation of the Code, whether the material comes from another student, a web site, or a published paper. Students must adhere to Cornell's and UNH's Policy for Academic Honesty/Plagiarism and Discrimination
 - a. Cornell: <https://cals.cornell.edu/environmental-engineering/student-experience-resources/environmental-engineering-major-handbook/academic-integrity-plagiarism>
 - b. UNH: <https://catalog.unh.edu/srrr/academic-policies/academic-honesty/>
5. *Disabilities & ADA Accommodation*: Students with a disability must contact Cornell's (420 CCC building; 607-254-4545) or UNH's Student Disability Services (<http://www.unh.edu/disabilityservices>) four weeks prior to start of class for confidential discussion of needs and for registration to verify eligibility for academic accommodations. No retroactive accommodations can be made.
6. *Mental Health*: Shoals Marine Laboratory cares about you and your well-being. If you experience unusual personal or academic stress during the course or need to talk with someone about a personal problem, seek support from your instructors as soon as possible. In addition, any SML staff is available for consultation 24/7. Find staff in the office in the Hamilton House during regular hours or knock on the door of Bartell House after hours.

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Monday	Afternoon	Arrival and Island Orientation - Shoals Marine Laboratory
14-Jul	Evening	Introduction to the course and instructors Organisms (flora and fauna) of the Gulf of Maine (Jarrett)
Tuesday	Morning	SML dive locker orientation (Mike)
15-Jul		Swim and snorkel skills evaluation - SML dock Searching for patterns (snorkeling)
	Afternoon	Coastal Environmental Gradients (Taylor) The Gulf of Maine Subtidal Environment (Jarrett) Dive operations and equipment (Dive locker- Mike)
	Evening	Rock Talk: Anthony "Tony" Lyons
Wednesday	Morning	SCUBA checkout dive from dock (1)
16-Jul	Afternoon	Decompression Sickness and use of dive tables/computers (Mike) Work on dive table problems FOOD RUN @ 16:00 Underwater Navigation (Lecture - Mike)
	Evening	Organisms Review Tools of the Trade (Jarrett) Stress, problem solving & mental health in diving (Taylor)
Thursday	Morning	Dive Rescue w/ O2 and CPR (Mike)
17-Jul		Lab 1 Intro (Jarrett)
	Afternoon	Underwater Navigation Exercises and Dive Rescue (2) Lab 1: Crustacean Counts on Belt Transects (3)
	Evening	Weather, tides, and currents (Mike) Diving protocols, planning, and logging (Mike)
Friday	Morning	Philosophy of research reading and discussion (Jarrett)
18-Jul	Afternoon	Statistical analysis and sampling design (Taylor) Introduction to Analysis/ Lab 1 Analysis (Taylor) Microscope & fauna review (Taylor)
	Evening	Artist-in-Residence Demo
Saturday	Morning	Intro to Lab 2: Algal Quadrat Lab (Taylor) Dive Physics, Sac rates, Lift bags (Mike)
19-Jul	Afternoon	Lab 2: Quadrat Lab (4) Lift Bags and Surface Marker Buoys (5)
	Evening	Tank filling (mike) Lab 2 (Quad Lab) Analysis (Taylor)

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Sunday 20-Jul	After Brunch Evening	DFA Pro Training and Evaluations (Mike) 11-1300 Boats for Biologists (Mike) 1300-1500 Reading Time: Kelly et al. 2024 How to break down a paper Species study time Introduce proposals + proposal handout Project Idea development
Monday 21-Jul	Morning Afternoon Evening	Kelp forests and global change (Jarrett) Proposal Paragraphs - Writing Underwater Organism Exam (6) Proposal Paragraphs - Writing Proposal Paragraphs - Discussion
Tuesday 22-Jul	Morning Afternoon Evening	Proposal Discussion and Dive Planning Proposal Dives (7) (8) KEEN Survey Training (Discussion) 8:00 PM - Rock Talk
Wednesday 23-Jul	Morning Afternoon Evening	KEEN Walkthrough KEEN Survey Dives (9) (10) (with Liz, bring lunch) FOOD RUN 4:00 Project planning & organizing Proposal Dive Data Analysis Meetings
Thursday 24-Jul	Morning Afternoon Evening	Proposal Dives (11) Proposal Dives (12) (13) Visualization & Artist in Residence
Friday 25-Jul	Morning Afternoon Evening	Float Proposal Dive (14) Lecture - Night Diving (Mike) Deep Dive Planning (Mike) Proposal Discussions Night Dive (15)
Saturday 26-Jul	Morning Afternoon Evening	Work on Proposals SURG Lightning Talks Work on Proposals Work on Proposals
Sunday 27-Jul	Morning Afternoon Evening	Proposals due at Brunch Deep Dives from R/V JBH (16) (17) (11:30-4 Heiser) Open Mic Night/Banquet/Enjoy!
Monday 28-Jul	Morning	Depart Island