

**Shoals Marine Laboratory**  
**Marine Parasitology & Disease (BIOSM 3330; MEFB 506)**  
**July 31, 2023 to August 14, 2023**

**Faculty:** Dr. April Blakeslee ([blakesleeap14@ecu.edu](mailto:blakesleeap14@ecu.edu)) & Dr. Amy Fowler ([afowler6@gmu.edu](mailto:afowler6@gmu.edu))

**Prerequisites:** General / Introductory Biology

**Course Description:** This course will focus on one of the most diverse and fascinating groups of marine organisms—parasites and pathogens. The course will explore marine parasites and pathogens at multiple levels, including: (1) the evolutionary perspective with an emphasis on co-evolutionary relationships; (2) parasitic diseases and life cycles (from simple to complex); (3) taxonomic and phylogenetic understanding of parasite and host groups (with a focus on metazoan parasites and hosts); (4) ecological implications of parasitism in marine systems at population, community, and ecosystem levels; and (5) the effects of human-induced global change on parasitism in marine communities.

**Course Credits:** BIOSM 3330 (3 Credits); MEFB 506 (4 Credits)

**Learning Goals and Objectives:**

1. Understand science as a way of knowing (i.e., test ideas using evidence gathered from the natural world).
2. Learn fundamental facts, concepts, and theories in marine parasitology and disease.
3. Understand evolutionary and ecological importance of parasites/pathogens in marine systems.
4. Learn to identify taxa of marine parasites using scientific keys and descriptions.
5. Learn preparation and microscopy skills for parasite observations and identifications.
6. Explore and investigate host and parasite diversity in the local marine environment through both guided and open inquiries.
7. Effectively organize, communicate, and use your knowledge of marine parasitology and disease.  
By the end of this class you will be able to:
  - Identify relationships among concepts (organize)
  - Clearly write and speak about science with your peers (communicate)
  - Interpret and evaluate your own scientific claims/knowledge, interpret and evaluate claims in the media and scientific press, and inform your decisions as citizens (use)

**Course Overview:** The course will explore marine parasitology using a multitude of learning approaches, including class lectures, field observations, lab observations, and both guided and open field and lab inquiries. Major assignments/assessments will include a guided lab inquiry (report), class notebook / participation, an open inquiry and presentation, and two exams (a lab practical and a written exam).

**Expectations and Code of Conduct:** Students are responsible for understanding the information presented in this syllabus and should discuss any questions they may have with their instructors as soon as possible. Students are responsible for attending all activities associated with this course and completing all assignments—your experience in the course will be most valuable and effective if you are present, enthusiastic, and prepared! Each student is responsible for their own behavior: always be respectful and collegial to other students, with instructors, SML staff, interns, visiting researchers, and other visitors. SML is a community, so please strive to be a positive member of that community. Students are responsible for fully understanding and adhering to all of the information presented in the SML Appledore Handbook:

[https://www.shoalsmarinelaboratory.org/sites/shoalsmarinelaboratory.org/files/media/pdf/Manuals/appledorehandbook2016\\_ada.pdf](https://www.shoalsmarinelaboratory.org/sites/shoalsmarinelaboratory.org/files/media/pdf/Manuals/appledorehandbook2016_ada.pdf).

1. *Personal Technology / Electronic Devices*. Do not use cell phones, smart phones, iPads, headphones, or similar devices in the classroom or during course activities. If you take notes with your computer, disable wifi access during lecture. Device use during lectures and activities is distracting, disrespectful, and detrimental to your learning.
2. Shoals Marine Lab has a modest *computer facility* in Lighton Library; please treat this shared facility with respect and be conservative in all activities and with all materials.
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 Policies for Academic Integrity:  
 Cornell: <https://theuniversityfaculty.cornell.edu/dean/academic-integrity/code-of-academic-integrity/>  
 UNH: <https://www.unh.edu/dean-of-students/processes-policies-protocols/student-rights-rules-responsibilities>
5. *Disabilities & ADA Accommodation*: Students should contact Cornell's (<https://sds.cornell.edu/>) or UNH's Student Accessibility Services (<https://www.unh.edu/studentaccessibility/>) 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, you can consult any SML staff 24/7. Staff can be located in the Hamilton House office 8am – 7pm or knock on the door of Bartell House after hours.

### **Assessments / Grading Breakdown and Assessment Descriptions:**

*Class Notebook and Participation*: 15%. Throughout the duration of the class, students will be required to keep a class notebook, which should include the following information: (1) notes during lectures, (2) notes / ideas / questions during class activities, (3) discussion questions from assigned readings, and (4) brainstorming and notes during guided and open inquiry assignments. Students will be required to turn in their notebooks on the last full day of the course, and instructors will grade and return them to the student before they leave. Participation will also be assessed during lectures and inquiries.

*Paper Discussion*: 10%. With your team, you will select a paper focused on Marine Parasitology and lead a discussion with the class.

*Taxa-of-the Day Labs*: 15%. Students will participate in taxa-of-the day lab activities where they will find out information and draw certain parasites within major taxonomic groups (protists, helminths, crustaceans). These will be important to study from for the lab practical.

*Guided Inquiry*: 10%. We will have one guided inquiry in the field and lab. This inquiry will require the completion of a written assignment to be turned in according to the schedule.

*Exam*: 20%. There will be one exam that will assess knowledge of lecture and lab material learned throughout the class. The exam will include two parts: (1) lab practical and (2) content-based questions (multiple choice, fill in the blank, short answer).

*Presentation / Open Inquiry*: 30%. In the second half of the class, students can choose to either work in a small group, or independently, to design and carry out their own research project and then will present their project to the class at the end of the second week.

## DAILY CLASS SCHEDULE

DAY	TOPIC / THEME	CLASS ACTIVITIES / ASSIGNMENTS
(M) 7/31	-Syllabus and Course Expectations; Introductions; <i>The Nature of Parasitism</i>	<p><b>Mid Afternoon (4:00 pm):</b> Settling in; safety information</p> <p><b>Late Afternoon (5:00 pm):</b> Syllabus, Assignments, Assessments</p> <p><b>Dinner (6:00 pm)</b></p> <p><b>Evening (7:00 pm):</b> <i>Lecture - Nature of Parasitism (April)</i></p> <p><b>Homework:</b> Watch the Isles of Shoals history video (<a href="https://www.youtube.com/watch?v=X2URFnj3CIQ">https://www.youtube.com/watch?v=X2URFnj3CIQ</a>)</p>
(T) 8/1	-Diversity of Marine Parasites and Hosts ( <i>Protist Parasites</i> )  <i>Low tide (AM): 5:04 AM, -0.8 ft</i> <i>Low tide (PM): 5:10 PM, 0.1 ft</i>	<p><b>Breakfast (7:30 am)</b></p> <p><b>Morning (8:30 am):</b> Walk to Larus Ledge, Broad Cove, Great Tidepool – explore the intertidal</p> <p><b>Morning (10:30 am):</b> <i>Lecture - Protist parasites (Amy)</i></p> <p>Talk about Paper Discussion Assignment and form groups.</p> <p><b>Lunch (12:30 pm)</b></p> <p><b>Early Afternoon (1:30 pm):</b> <i>Lecture continued - Protist parasites (Amy)</i></p> <p><b>Mid Afternoon (3:00 pm):</b> Taxa-of-the-Day: Diversity Observations in Lab (Protists)</p> <p><b>Dinner (6:00 pm)</b></p> <p><b>Evening (8:00 pm):</b> “Rock talk” - Nichola Hill</p> <p><b>Homework:</b></p> <ul style="list-style-type: none"> <li>• Read Paper #1 (instructor-led) and be ready to discuss!</li> <li>• Work on Taxa-of-the-Day Assignment.</li> </ul>
(W) 8/2	-Diversity of Marine Parasites and Hosts ( <i>Helminth Parasites</i> ) <b>-Instructor-led Paper Discussion</b>  <i>Low tide (AM): 5:56 AM, -1.1 ft</i> <i>Low tide (PM): 6:05 PM, -0.3 ft</i>	<p><b>Breakfast (7:30 am)</b></p> <p><b>Morning (8:30 am):</b> <i>Lecture - Helminth parasites (April)</i></p> <p><b>Lunch (12:30 pm)</b></p> <p><b>Early Afternoon (1:30 pm):</b> Taxa-of-the-Day: Diversity Observations in Lab (Helminths)</p> <p><b>Food Run (~4:00 pm):</b> Students help bring food up to the kitchen!</p> <p><b>Late Afternoon (5:00 pm):</b> Paper Discussion #1 – instructor led</p> <p><b>Dinner (6:00 pm)</b></p> <p><b>Evening (6:45 – 8:00 pm):</b> Trip to Smuttynose Island</p> <p><b>Homework:</b></p> <ul style="list-style-type: none"> <li>• Read Paper #2 (student-led) and be ready to discuss!</li> <li>• Work on Taxa-of-the-Day Assignment.</li> </ul>
(R) 8/3	-Diversity of Marine Parasites and Hosts ( <i>Crustacean Parasites</i> ) <b>-Student-led Paper Discussion</b>  <i>Low tide (AM): 6:48 AM, -1.3 ft</i> <i>Low tide (PM): 7:00 PM, -0.5 ft</i>	<p><b>Breakfast (7:30 am)</b></p> <p><b>Morning (8:30 am):</b> <i>Lecture - Crustacean Parasites (Amy)</i></p> <p><b>Lunch (12:30 pm)</b></p> <p><b>Early Afternoon (1:30 pm):</b> Taxa-of-the-Day: Diversity Observations in Lab (Crustaceans). Finish up all Taxa-of-the-Day worksheets to turn in tomorrow morning. All slides and specimens will be available in the lab.</p> <p><b>Late Afternoon (5:00 pm):</b> Paper Discussion #2 – student led</p> <p><b>Dinner (6:00 pm)</b></p> <p><b>Evening (~7:15 pm):</b> Duck Island Tour (seals and birds!)</p> <p><b>Homework:</b> Complete Taxa-of-the-Day Assignment.</p>

DAY	TOPIC / THEME	CLASS ACTIVITIES / ASSIGNMENTS
(F) 8/4	<p><b>-Taxa-of-the-Day Assignment Due</b></p> <p>-Marine Mammals &amp; Parasites</p> <p>-Whale Watch</p> <p>-Host-Parasite Evolution</p> <p>Low tide (AM): 7:39 AM, -1.3 ft</p>	<p><b>Breakfast (7:30 am)</b></p> <p><b>*Turn in Taxa-of-the-Day Assignment*</b></p> <p><b>Morning (8:30 am): Lecture - Marine Mammals &amp; Parasites (Amy)</b></p> <p><b>Late Morning-Early Afternoon (10:00 am – 2:00 pm): Whale watch!!</b></p> <p><b>Late Afternoon (4:00 pm): Lecture - Host-Parasite Evolution (April)</b></p> <p><b>Dinner (6:00 pm)</b></p> <p><b>Evening (7:00 pm): Go over Guided Inquiry Assignment.</b></p> <p><b>Homework: Read Paper #3 (student-led) and be ready to discuss!</b></p>
(Sa) 8/5	<p>-Guided Inquiry: Field work and Lab data collection</p> <p>-Parasite Ecology</p> <p><b>-Student-led Paper Discussion</b></p> <p>Low tide (AM): 8:30 AM, -1.1ft</p>	<p><b>Breakfast (7:30 am)</b></p> <p><b>Morning (8:15 am): Guided Inquiry: Field and lab.</b> Trematode parasite diversity by tidal height (high, low) and snail species. Discuss how to collect data in field and perform sampling. Eat breakfast quickly – come to breakfast prepared, wearing field clothes and shoes.</p> <p><b>Lunch (12:30 pm)</b></p> <p><b>Early Afternoon (1:30 pm): Lecture - Parasite Ecology (Amy)</b></p> <p><b>Late Afternoon (4:00 pm): Guided Inquiry lab work</b></p> <p><b>Dinner (6:00 pm)</b></p> <p><b>Evening (7:00 pm): Paper Discussion #3 – student led</b></p> <p><b>Homework: Read Paper #4 (student-led) and be ready to discuss!</b></p>
(Su) 8/6	<p>-Parasites &amp; Behavior</p> <p>-Guided Inquiry: Lab data collection</p> <p><b>-Student-led Paper Discussion</b></p> <p>Low tide (AM): 9:21 AM, -0.7 ft</p>	<p><b>Brunch (10:00 am)</b></p> <p><b>Morning (11:00 am): Lecture - Parasites &amp; Behavior (April)</b></p> <p><b>Early Afternoon (1:00 pm): Guided Inquiry lab work</b></p> <p><b>Late Afternoon (4:00 pm): Paper Discussion #4 – student led</b></p> <p><b>Dinner (5:00 pm)</b></p> <p><b>Evening (6:00 pm): Guest Lecture #1 (Lauren Dykman)</b></p> <p><b>Evening (7:00 pm): A-I-R Activity</b></p> <p><b>Homework: Study for Exam on 8/8: Part 1 will be a lab practical Based on the Taxa-of-the-Day Worksheets and Part 2 will be based on lectures, paper discussions, and the Guided Inquiry</b></p>
(M) 8/7	<p>- Parasites and Conservation / Global Change</p> <p>-Guided Inquiry: Finalize lab work and compile class-level data.</p> <p>Low tide (AM): 10:14 AM, -0.2 ft</p>	<p><b>Breakfast (7:30 am)</b></p> <p><b>Morning (8:30 am): Lecture - Parasites and Conservation/Global Change (Amy)</b></p> <p><b>Late Morning (11:00 am): Guided Inquiry lab work.</b></p> <p><b>Lunch (12:30 pm)</b></p> <p><b>Early Afternoon (1:30 pm): Finish Guided Inquiry lab work &amp; compile class-level data.</b></p> <p><b>Dinner (6:00 pm)</b></p> <p><b>Homework: Study for Exam</b></p>
(T) 8/8	<p><b>-Exam: Parts 1 and 2</b></p> <p>-Open Inquiry: Formulate hypotheses and research plan.</p> <p>Low tide (AM): 11:10 AM, 0.4 ft</p>	<p><b>Breakfast (7:30 am)</b></p> <p><b>Morning (9:30 am): *Exam-Part 1*</b></p> <p><b>Lunch (12:30 pm)</b></p> <p><b>Early Afternoon (1:30 pm): *Exam-Part 2*</b></p> <p><b>Late Afternoon (4:00 pm): Discuss Open Inquiry Assignment.</b> Walk down to Broad Cove for brainstorming session. Discuss as a class. Form groups and start discussing study questions and hypotheses.</p>

DAY	TOPIC / THEME	CLASS ACTIVITIES / ASSIGNMENTS
		<p>Dinner (6:00 pm)</p> <p>Evening (8:00 pm): "Rock talk" - Brain Skerry</p> <p><b>Homework: Work on Guided Inquiry Lab Report to turn in tomorrow.</b></p>
(W) 8/9	<p><b>-Guided Inquiry Report Due</b></p> <p>-Open Inquiry: Data Collection</p> <p><i>Low tide (PM): 12:08 PM, 0.8 ft</i></p>	<p>Breakfast (7:30 am)</p> <p>Morning (8:30 am): <b>*Turn in Guided Inquiry Report*</b></p> <p>Collect data for open inquiry.</p> <p>April &amp; Amy are available for questions and help throughout day.</p> <p>Lunch (12:30 pm)</p> <p>Afternoon (1:30 pm): Collect data for open inquiry.</p> <p>April &amp; Amy are available for questions and help throughout day.</p> <p>Food Run (~4:00 pm): Students help bring food up to the kitchen!</p> <p>Dinner (6:00 pm)</p> <p>Evening (7:00 pm): Guest lecture (Carrie Keogh)</p>
(R) 8/10	<p>-Open Inquiry: Data Collection</p> <p><i>Low tide (PM): 1:09 PM, 1.2 ft</i></p>	<p>Breakfast (7:30 am)</p> <p>Morning (8:30 am): Collect data for open inquiry.</p> <p>April &amp; Amy are available for questions and help throughout day.</p> <p>Lunch (12:30 pm)</p> <p>Afternoon (1:30 pm): Collect data for open inquiry.</p> <p>April &amp; Amy are available for questions and help throughout day.</p> <p>Dinner (6:00 pm)</p> <p>Evening: Open inquiry work.</p>
(F) 8/11	<p>-Open Inquiry: Data Collection and Data Analysis</p> <p><i>Low tide (PM): 2:10 PM, 1.4 ft</i></p>	<p>Breakfast (7:30 am)</p> <p>Morning (8:30 am): Collect data for open inquiry. April &amp; Amy are available for questions and help throughout day.</p> <p>Lunch (12:30 pm)</p> <p>Afternoon (1:30 pm): Finalize data collection for open inquiry and work on analyses. Work on presentation.</p> <p>Dinner (6:00 pm)</p> <p>Evening (~7:30 pm): Career Panel and Discussion</p> <p><b>Homework: Make presentations and practice. Tomorrow you will do practice presentations for Amy &amp; April, so make sure you're ready!</b></p>
(Sa) 8/12	<p>-Open Inquiry: Data Analysis and Presentation Prep</p> <p><b>-Practice Presentations</b></p> <p><i>Low tide (PM): Low 3:07 PM, 1.5 ft</i></p>	<p>Breakfast (7:30 am)</p> <p>Morning (8:30 am): Practice presentation with your group.</p> <p>Morning (10:00 am): Attend SURG Symposium</p> <p>Lunch (12:30 pm)</p> <p>Afternoon (1:30 pm): Attend RiB Symposium</p> <p>Afternoon (3:30 pm): Practice Presentations for Amy &amp; April</p> <p>Dinner (6:00 pm)</p> <p>Evening (~7:30 pm): Sunset Island Tour</p>
(Su) 8/13	<p><b>-Class Notebooks Due</b></p> <p><b>-Student Research Presentations</b></p>	<p>Brunch (10 am)</p> <p>Morning (11:00 am): <b>*Turn in Class Notebook to be graded*</b></p> <p>Finalize revisions to presentations. Make sure all presentations are uploaded to Google Drive.</p> <p>Afternoon (2:00 pm): <b>**PRESENTATIONS**</b></p> <p>Dinner (5:00 pm)</p> <p>Evening (7:00 pm): Celebrations!</p>

DAY	TOPIC / THEME	CLASS ACTIVITES / ASSIGNMENTS
(M) 8/14	-Departure Day	<p>Bags on porch before breakfast (7:30 am).</p> <p>Breakfast (7:30 am)</p> <p>Morning (8:30 am): Class Reflections</p> <p>Boat leaves at 10:00 am. Have a great trip home and we hope to see you at Shoals next year!</p>

***\*\*The schedule above and procedures in the course are subject to change\*\****

***During the schedule, depending on timing and availability, there may be opportunities that arise during the week, and these will be slotted in as we go along. We will keep everyone up-to-date if the schedule changes!***