Shoals Marine Laboratory
Marine Parasitology & Disease (BIOSM 3330; MEFB 506)
June 10-24, 2019

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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, paper discussions, field observations, lab observations, and both guided and open field and lab inquiries. Major assignments/assessments will include student-led paper discussions, a guided lab inquiry (report), class notebook / participation, an open inquiry and research presentation, and two quizzes.

Course Materials: Selected readings (.pdf format) emailed in advance of class. These readings will include peer-reviewed original research and review papers that complement lectures. In addition, the class will be divided into discussion groups tasked with leading a lecture on a paper of their choice related to marine parasitology and disease (see below).

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 (http://www.sml.cornell.edu/sml_forms.html).

1. *Personal Technology / Electronic Devices.* 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 wifi access during lecture. Device use during lectures and activities is distracting, disrespectful, and detrimental to your learning.
2. The lab has a modest computer facility in Laighton 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 Policy for Academic Honesty/Plagiarism and Discrimination (Cornell: http://cuinfo.cornell.edu/aic/cfm; UNH: http://www.unh.edu/vpsas/handbook/welcom-university-new-hampshire).
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, 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:

Paper Discussion: 10%. Class members will present on a paper of their choice related to the evolution, ecology, or diversity of marine parasites. All students in the class must read the paper in advance of the class discussion and be prepared to participate.

Guided Inquiry: 15%. 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.

Quizzes: 20%. There will be two quizzes that will assess a student's knowledge of lecture and lab material learned throughout the class. The first quiz will be a practical and the second quiz will be short answer questions.

Class Notebook and Participation: 25%. Throughout the class, students will be required to take notes during lectures and guest lectures, to draw and take notes on organisms/taxa observed in lab, and to brainstorm and take notes during their open inquiry assignment. Students will be 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 lecture, discussions, and inquiries.

Research Presentation / Open Inquiry: 30%. In the second half of the class, students will work in a small group 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 ACTIVITES / ASSIGNMENTS
1 (M)	Syllabus and Course Expectations; Introductions; The Nature of Parasitism	**Afternoon**: Island tour. **Evening**: Syllabus; Assignments and Assessments Lecture (*Nature of Parasitism*)
2 (T)	Host-Parasite Co-Evolution; Diversity of Marine Parasites and Hosts (Protozoan Parasites)	**Morning**: Lecture (*Host-Parasite Evolution*; *Protozoan Parasites, pt 1)* **Afternoon**: Guided Inquiry: Field and lab. Trematode parasite diversity by tidal height (high, low) and snail species (*Littorina littorea, L. saxatilis*). Discuss how to collect data in field and perform sampling. Low tide: 12:38 PM; -0.1 **Evening**: "Rock" talk (tba).
3 (W)	Diversity of Marine Parasites and Hosts (Protozoans)	**Morning:** Lecture (*Protozoans, pt2*) **Late Morning**: Taxa of the Day: Diversity Observations in Lab (Protozoans) **Afternoon**: Lab work for Guided Inquiry (snails, trematodes). **Evening:** *Paper Discussion #1 (instructors)*
4 (R)	Diversity of Marine Parasites and Hosts (Helminth Parasites)	**Morning:** Lecture (*Helminth Parasites*) **Late Morning/Early Afternoon**: Taxa of the Day: Diversity Observations in Lab (Helminths) **Afternoon**: Lab work for Guided Inquiry (snails, trematodes). **Evening:** *Paper Discussion #2 (student-led)*
5 (F)	Diversity of Marine Parasites and Hosts (Parasites of Marine Mammals)	**Morning:** Lecture (*Parasites of Marine Mammals*) **Late Morning/Afternoon**: WHALE WATCH (tbd) **Late Afternoon**: Lab work for Guided Inquiry (snails, trematodes). **Evening:** *Paper Discussion #3 (student-led)*
6 (Sa)	Diversity of Marine Parasites and Hosts (Crustacean Parasites)	**Morning:** Lecture (*Crustacean Parasites*) **Late Morning**: Taxa of the Day: Diversity Observations in Lab (Crustaceans) **Afternoon**: Finish Guided Inquiry work and analyze data together as a group (*Guided Inquiry Report due Sunday evening*). **Evening: ***Study for Quiz Practical*
7 (Su)	Parasite Ecology	**Morning: ***Quiz Practical** (Diversity of Marine Parasites and Hosts: Protozoans, Helminths, Crustaceans) **Afternoon**: Work on Guided Inquiry Report to turn in by the evening. **Evening:** Lecture (*Parasite Ecology*) **Turn in Guided Inquiry Report**
8 (M)	Parasites & Behavior Open Inquiry: Formulate hypotheses and research plan; start collecting data	**Morning:** Lecture (*Parasites & Behavior*) **Late Morning**: Discuss *Open Inquiry Assignment* and experimental design. Meet with group to discuss ideas and formulate plan. Meet with Dr. Blakeslee and Dr. Fowler. **Afternoon**: Gather up equipment and supplies, map out plans for collecting data. Start collecting data, if possible. **Evening:** *Paper Discussion #4 (student-led)*

DAY	TOPIC / THEME	CLASS ACTIVITES / ASSIGNMENTS
9 (T)	Parasites and Conservation / Global Change Open Inquiry: Data Collection	**Morning:** Lecture (*Parasites and Conservation/Global Change*) **Late Morning/Early Afternoon**: Meet with group to plan out data collection. Collect data. **Late Afternoon**: Collect data. **Evening:** "Rock talk" (tba)
10 (W)	Open Inquiry: Data Collection	**Morning:** Lecture (*Statistical Analyses*) **Late Morning/Early Afternoon**: Meet with group to plan out data collection. Collect data. **Late Afternoon**: Collect data. **Evening:** *Paper Discussion #5 (student-led)*
11 (R)	Open Inquiry: Data Collection	**Morning:** Lecture (*Figures, Graphs, and Tables*; *Presentation tips*) **Late Morning/Early Afternoon**: Meet with group to plan out data collection. Collect data. **Late Afternoon**: Collect data. **Evening:** *Paper Discussion #6 (student-led)* **Study for Short Answer Quiz (Nature of Parasitism through Parasites and Conservation)**
12 (F)	Open Inquiry: Data Collection	**Morning:** **Short Answer Quiz** Discussion with groups about finalizing open inquiry—final things that need to be completed. **Late Morning/Early Afternoon**: Meet with group to plan out data collection. Collect data. **Late Afternoon**: Finalize data collection. **Evening:** *Paper Discussion #7 (student-led)* Meet with group to start analyzing data and think about presentation logistics.
13 (Sa)	Open Inquiry: Data Analysis and Presentation Prep	**Morning:** Discussion of data analysis. Ask questions and get help. **Late Morning/Early Afternoon**: Complete data analysis and make figures. **Late Afternoon**: Work on presentation. **Evening:** Work on presentation. *Finalize Class Notebook* to be turned in the following morning.
14 (Su)	Research Presentations	**Morning: ***Finalize work on presentations* *Turn in Class Notebook to be graded* **Late Morning**: Practice presentations. **Afternoon**: ***PRESENTATIONS*** **Evening:** Off (packing for home…. 😊☹)
15 (M)	Departure Day	**Morning:** Final departure related items. Have a great trip home and we hope to see you at Shoals next year!

*****The schedule above and procedures in the course are subject to change*****
During the schedule, depending on timing and availability, we also intend to join in with other ongoing classes and research to observe and participate in learning activities like a fish trawl, a marine mammal necropsy, a bird necropsy, and activities with the Artist-in-Residence. These (and any other opportunities that arise) will be slotted in once we have a better idea of the schedule for the other classes and for the Island.