

**Course Syllabus**  
**Marine Ecological Genomics MEFB 750**  
**Summer 2017**

**Professor:** Dr. David Plachetzki

Phone: 603-862-5144 email: david.plachetzki@unh.edu

**Course Description:** This course provides immersion training in emerging practices in marine ecological genomics research. The course combines a field component with extensive training in common genomics approaches including: next generation sequence analysis, phylogenomics, differential gene expression and population genomics.

**Approach:** There is no textbook for this course. Course materials are comprised of course lectures and required reading assignments.

**Grading scale:** 93-100=A; 90-92.99=A-; 87-89.99=B+; 83-86.99=B; 80-82.99=B-; 77-79.99=C+; 73-76.99=C; 70-72.99=C-; 67-69.99=D+; 63-66.99=D; 60-62.99=D-; Below 60=F

Maximum Points	
Mid-term quizzes (3 exams, 100 points each)	300 points
Writing Assignments (100 points each)	100 points
Project Proposal	100 points
Project Presentation	100 points
Total	<hr/> 600 points

**Quizzes:** Topical quizzes will consist of short answer responses questions from lecture and journal club.

**Exam Dates:**

TBA

**Writing Assignments:** This course includes one short literature review paper due at the end of week 1. The purpose of this assignments is to gain experience with the primary literature in marine ecological genomics, to gain proficiency in scientific writing and to learn to articulate key concepts in the field. The writing assignments will follow a template that I will provide and will be done on selected assigned papers.

**Project Proposal:** Students will have the opportunity to work with a variety of different types of marine genomics data and will be required to develop a unique project of their own that deals with any aspect of the course. Students are to describe their projects in a proposal due by the end of week one. Proposals will follow a template that the instructor will provide.

**Project Presentations:** Students will present their project findings in an ecological marine genomics poster session, to be held the last day of the course.

**Course Objectives:** Successful completion of this course will prepare students to comprehend and evaluate progress in the following topics:

Next Generation Sequencing  
RNA seq  
Whole genome sequencing approaches  
Phylogenomic Analysis of Genomes  
Detecting the Signature of Selection in Genomes

Speciation Genomics  
Current Issues in Population Genomics  
Marine Ecological Genomics  
Metagenomics

## Marine Ecological Genomics SUMMER 2017

Day	Topic	Required Reading
Monday	<b>Genome Biology and Evolution I</b> 1. DNA, Chromosomes, Mitosis, Meiosis 2. Evolutionary Genomics 3. Next Generation Sequencing 4. Linux and bash programming (Evening session)*	
Tuesday	<b>Phylogenomics I</b> 1. Fundamentals of Phylogenetics 2. Phylogenomic Analyses 3. Working with computer clusters 4. Scripting (Evening session)	
Wednesday	<b>Phylogenomics II</b> 1. Hypothesis testing in phylogenetics 2. Field excursion, intro to the marine environment 3. Experimental design 4. Viewing and interpreting phylogenetic trees (Evening session)*	
	<b>Quiz 1</b>	
Thursday	<b>Comparative Gene Expression</b> 1. Sequencing technologies: Illumina, Pac Bio, Sanger, Nanopore, etc. 2. RNAseq experimental design 3. RNAseq data processing I 4. RNAseq data processing II (Evening session)*	
Friday	<b>Comparative Gene Expression</b> 1. RNAseq data processing I 2. Field excursion 3. Boat trip 4. Differential gene expression in EdgeR (Evening session)*	
	<b>Literature Review Paper</b>	
Saturday	<b>Marine Ecological Genomics</b> 1. Major issues in marine ecological genomics 2. Population Genomics 3. <i>Literina obtusata</i> system 4. Data analysis in the snail I (Evening session)*	
Sunday	<b>Marine Ecological Genomics</b> 1. Data analysis in the snail II 2. Field groups sample field sites 3. Free time for data analysis	
	<b>Project Proposal due</b>	
Monday	<b>Next Generation Library's (UNH laboratory)</b> 1. Orientation 2. Principles of library construction 3. RNA/DNA extractions 4. Genome Center Tour	
	<b>Quiz 2</b>	
Tuesday	<b>Next Generation Library's (UNH laboratory)</b> 1. Break into groups and prep libraries 2. Guest Lecture 3. Data analysis in the snail III	
Wednesday	<b>Next Generation Library's (UNH laboratory)</b> 1. Finish libraries and run tapestation 2. Wrap up and depart for docks	
Thursday	<b>Meta Genomics</b> 1. Microbial communities and the sea 2. Qime and the metagenomics tool kit 3. Guest Lecture	
Friday	<b>Phylogenomics Revisited III</b> 1. Analyze phylogenomics runs 2. Summarize results in FigTree 3. Work on independent projects 4. Consultation with Dave in Commons (Evening Session)*	
	<b>Quiz 3</b>	
Saturday	<b>Wrap up and Free Time</b> 1. Field excursion 2. Work on independent projects 3. Consultation with Dave in Commons (Evening Session)*	
Sunday	<b>Marine Ecological Genomics Symposium</b> 1. Present work in commons 2. Clean up labs 3. Depart	

\* All evening sessions will conclude with night lighting from the docks.

## Expectations and Conduct:

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 anytime 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 (<http://www.shoalsmarinelaboratory.org/about-appledore>)

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: <http://cuinfo.cornell.edu/aic.cfm>
  - B. UNH: <http://www.unh.edu/vpsas/handbook/welcome-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, any SML staff is available for consultation 24/7. Find staff in the office in the Hamilton House between 8am – 7pm or knock on the door of Bartels Hall after hours