SIO 127: Marine Molecular Ecology
Spring Quarter 2019

Course Instructor:
Dr. Ron Burton, Scripps Institution of Oceanography
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Office Hours: by appointment (set up by email)

Course structure: Two lectures/week on T/Th, 9:30 am - 10:50 am in Spiess Hall 330
+ Discussion (occasional and optional): Th 11:00-11:50 Spiess 330

Course Description: Molecular methods are now commonly used to address a broad range of questions in ecology and evolution. These tools have had an enormous impact on our understanding of marine organisms, revealing information about patterns of biodiversity, connectivity, and mating systems in natural populations. The role of genetic drift and natural selection in adaptation to the environment can be inferred from population analyses of whole genomes using methods that have become available only in the past few years. This course will survey the application of molecular methods to address diverse questions concerning the ecology and evolutionary biology in marine organisms. Students will learn how different molecular approaches can be applied to understanding how marine organisms adapt to their physical and biotic environments.

Prerequisites: BILD 3 and BICD 100, or consent of instructor.

Lectures are important and it is important to take notes. I will post lecture slides on TritonEd. However, the slides are not a good substitute for attendance, as lectures include material that may not be on the lecture slides.

Textbook (required): Text: Molecular Ecology (2nd edition, 2011) Freeland, Kirk and Petersen.
Available electronically from the UCSD Library (FREE TEXTBOOK!)

The text provides a wealth of background information for many lecture topics, and expands on some topics we only touch on in class. The text is not focused on marine organisms but applies the same concepts to many terrestrial systems that are equally relevant to your understanding of molecular ecology

Additional course readings, consisting of primary literature, may be assigned in class or the TritonEd website. Basic information from the readings may not be covered in lecture, but can be on exams.

TritonEd web site: I will post lecture slides and other course materials.

Assignments - there will be a couple of homework assignments designed to get you engaged in the material and allow me to make sure we are all on the same page. In addition to readings, there will be two one-page papers.

– **Homework assignments**	**20 pts**
--- **Two short papers (1 page and 3 page)**	**40 pts**
– **Midterm**	**100pts**
– **Final**	**100pts**
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Test regrading policy: Requests for regrades must be submitted to me within one week of the exam return. Please attach a sheet noting which questions you would like regraded, along with a brief justification. Note that regrades are primarily an opportunity to fix grading errors. Only exams written in non-erasable ink will be considered.

Academic integrity:

Integrity of scholarship is essential for an academic community. For students, this means that all academic work will be done by the individual to whom it is assigned, without unauthorized aid of any kind. All suspicions of integrity violation will be reported to the Academic Integrity Office according to university policy. Integrity violation is not just blatant cheating (e.g., copying off another student during an exam), but include copying other students' papers or homework, copying or using old papers/report, working with others on individual assignments. Those students found to have committed academic misconduct will face administrative sanctions imposed by their college Dean of Student Affairs and will also face consequences for this course which may range in severity from an F on the exam or assignment to an F in the course. Students who assist in or are complicit with cheating could also be in violation of the Policy. Thus, students who become aware of their peers either facilitating academic misconduct or committing it should report their suspicions to us for investigation. For more information on academic integrity please refer to The Policy on Integrity of Scholarship (academicintegrity.ucsd.edu).

Lecture schedule

Date		Lecture Topic
April 2	Lecture 1	Introduction to Molecular Ecology
April 4	Lecture 2	DNA Barcoding
April 9	Lecture 3	Metabarcoding, Metagenomics, eDNA
April 11	Lecture 4	Genetic markers: Allozymes to SNPs
April 16	Lecture 5	Population genetics 1: drift and effective population size
April 18	Lecture 6	Population genetics 2: migration and natural selection
April 23	Lecture 7	Functional ecology: molecular adaptations at single loci
April 25	Lecture 8	Functional ecology: transcriptomics and regulatory variation
April 30	Lecture 9	Natural Selection
May 2	Lecture 10	Mating systems
May 7	**Midterm**	
May 9	Lecture 11	Microbial ecology and metagenomics
May 14	Lecture 12	Population structure
May 16	Lecture 13	Phylogeography
May 21	Lecture 14	Hybrid breakdown
May 23	Lecture 15	Guest Lecture
May 28	Lecture 16	Speciation
May 30	Lecture 17	Fisheries genetics 1
June 4	Lecture 18	Fisheries genetics 2
June 6	Lecture 19	Conservation genetics
June 11	**Final (Tuesday, 8-11am)**	