

# **BIOLOGY 400/600: MOLECULAR ECOLOGY**

Fall 2015

T, Th 12:30 – 1:50 PM

156 Life Sciences Complex

## **INSTRUCTOR:**

Dr. David Althoff  
440 LSC, 443-1096  
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Office hours: by appointment

## **COURSE OBJECTIVES AND LEARNING OUTCOMES:**

This course will introduce students to the study of Molecular Ecology. Students will read book chapters and peer-reviewed scientific journal articles to investigate the ways in which biological molecules are used to examine the ecology and evolution of organisms. Students will critique both historical and current concepts to gain a solid understanding about the promise and shortcomings of molecular ecology approaches. The goal will be to understand the conceptual framework of the field as well as become familiar with current and upcoming techniques. By completing this course students will gain the skills necessary to implement and evaluate current theory and practices in studies of Molecular Ecology and learn to convey these principles to other students and scientists. Prerequisite: Biology 345.

## **COURSE POLICIES:**

***Textbooks & Readings.*** There is no assigned textbook for this course. Readings will be mainly from the primary literature and will be posted in Blackboard. Students also will use the library and world wide web to find information for completing the course assignments.

***Course Evaluation*** - Students will be evaluated based on attendance, participation in class discussions, in class assignments, data analysis projects, and oral presentations. Evaluations will be based on a student's ability to collect, synthesize, and present information concerning Molecular Ecology. Assignments not received by the due date and time will have 10 percentage points deducted per day until completed.

### ***Types of assignments:***

- Questionnaire for each reading-- short survey to be completed for each reading.
- Species natural history presentations-- a one page handout and short presentation about an organism.
- Participation in discussions-- active role in exploring and evaluating the assigned readings.
- Problem sets-- analyze molecular datasets
- Proposal presentation-- 10 minute presentation on research project related to Molecular Ecology.
- Research presentation-- 10 minute presentation on results of research project.
- Research Report-- 3 page report detailing research project and results.

### **Grading Scheme:**

Attendance (including surveys)	15%
Participation	30%
Natural History/Software Reports	10%
Data set analyses	15%
Proposal/Project Presentations	20% (10% for each)
Research Report	10%

**Attendance** - Students are required to attend all course meeting times and participate in the discussions and evaluations of oral presentations.

**Religious observances**— SU’s religious observances policy recognizes the diversity of faiths represented among the campus community and protects the rights of students, faculty, and staff to observe religious holy days according to their tradition ([http://supolicies.syr.edu/emp\\_ben/religious\\_observance.htm](http://supolicies.syr.edu/emp_ben/religious_observance.htm)). Under the policy, students are provided an opportunity to make up any examination, study, or work requirements that may be missed due to a religious observance provided they notify their instructors before the end of the second week of classes. For fall and spring semesters, an online notification process is available through MySlice/Student Services/Enrollment/My Religious Observances from the first day of class until the end of the second week of class. Students should contact the instructor in advance to arrange for any missed coursework due to a religious observance.

**Academic Integrity**-- Syracuse University’s academic integrity policy reflects the high value that we, as a university community, place on honesty in academic work. The policy defines our expectations for academic honesty and holds students accountable for the integrity of all work they submit. Students should understand that it is their responsibility to learn about course-specific expectations, as well as about university-wide academic integrity expectations. The university policy governs appropriate citation and use of sources, the integrity of work submitted in exams and assignments, and the veracity of signatures on attendance sheets and other verification of participation in class activities. The policy also prohibits students from submitting the same written work in more than one class without receiving written authorization in advance from both instructors. The presumptive penalty for a first instance of academic dishonesty by an undergraduate student is course failure, accompanied by a transcript notation indicating that the failure resulted from a violation of academic integrity policy. The presumptive penalty for a first instance of academic dishonesty by a graduate student is suspension or expulsion. SU students are required to read an online summary of the university’s academic integrity expectations and provide an electronic signature agreeing to abide by them twice a year during pre-term check-in on MySlice. For more information and the complete policy, see <http://academicintegrity.syr.edu>.

**Disability Statement**-- If you believe that you need accommodations for a disability, please contact the Office of Disability Services (ODS), <http://disabilityservices.syr.edu>, located in Room 309 of 804 University Avenue, or call (315) 443-4498 or TDD: (315) 443-1371 for an appointment to discuss your needs and the process for requesting accommodations. ODS is responsible for coordinating disability-related accommodations and will issue students with documented Disabilities Accommodation Authorization Letters, as appropriate. Since accommodations may require early planning and generally are not provided retroactively, please contact ODS as soon as possible.

## Course schedule

DATE		TOPIC	ASSIGNMENT
<b>September</b>	1 T	Course Intro and goals	Should I really take this class?—in class assessment
	3 Th	The molecules of Molecular Ecology	Read and prepare to discuss Avise, Chapter 3 pdf
	8 T	The techniques of Molecular Ecology	
	10 Th	Hardy-Weinberg and beyond	
	15 T	Simple analyses of genetic variation	Install GenAlEx on laptop and bring to class
	17 Th	Frequency vs. distance approaches	Bring laptop to class
	22 T	Phylogenetics	Read and prepare to discuss Baldauf 2003
	24 Th	The coalescent process	Print out Elliot & Mooers lecture and bring to class
	29 T	Putting it all together	Read and prepare to discuss Rosenberg & Nordburg 2002
<b>October</b>	1 Th	Kinship & Paternity	Read and prepare to discuss Randall et al. 2007
	6 T	Genetic drift and populations	Read and prepare to discuss Berg et al. 2007
	8 Th	Gene flow and spatial structure	Read and prepare to discuss Whiteley et al. 2006
	13 T	Project & Proposal guidelines	
	15 Th	Identifying selection	Read and prepare to discuss Bergamo et al. 2015
	20 T	The importance of history	Read and prepare to discuss Olivieri et al. 2008
	22 Th	Phylogeography	Read and prepare to discuss Rich et al. 2008
	27 T	<b>Proposal Presentations</b>	
	29 Th	<b>Proposal Presentations</b>	
<b>November</b>	3 T	The NextGen revolution	Read and prepare to discuss McCormack et al. 2013
	5 Th	Analysis of NGS data	
	10 T	NextGen application	Read and prepare to discuss Cavender-Barres et al. 2015
	12 Th	Transcriptomics	Read and prepare to discuss Wang et al. 2009
	17 T	Transcriptomic application	Read and prepare to discuss Berdan et al. 2015
	19 Th	To be announced	
	24 T	Thanksgiving break	
	26 Th	Thanksgiving break	
<b>December</b>	1 T	To be announced	
	3 Th	To be announced	
	8 T	<b>Research Presentations</b>	
	10 Th	<b>Research Presentations</b>	
	11 F		<b>Research Report Due at 5:00 pm EST</b>
<b>****THERE IS NO FINAL EXAM****</b>			
Instructor reserves the right to make changes to the course schedule. Any changes will be announced in class.			