



# BIOLOGY 818

## *MOLECULAR TECHNIQUES IN EVOLUTION AND ECOLOGY*

### FALL 2013

**Instructor:** Prof. José R. de la Torre, Ph.D.  
**Office:** Hensill Hall 668A  
**Phone:** 415-338-7043  
**E-mail:** [jdelator@sfsu.edu](mailto:jdelator@sfsu.edu)  
**Office Hours:** Mondays 14:00-16:00; Hensill Hall 668A

**Schedule** Mon & Wed, 9:10 – 10:00 in HH 501  
Mon & Wed, 10:10 – 13:00 in HH445

#### **Enrollment:**

This graduate-level course is primarily intended for graduate students with no prior Molecular Biology experience and interested in molecular techniques applied to the fields of evolution and ecology.

***The class will be extremely limited in size – enrollment is by permission of the instructor only.***

#### **Course Description:**

Over the past decades, the use of molecular techniques, including the amplification, cloning and sequencing of nucleic acid sequences, has become pervasive in almost all fields of biological research. The objective of this course is to teach beginning graduate students in the fields of Evolution and Ecology, who have little or no prior molecular experience, the basic approaches and skills required to carry out a molecular biology-based thesis project.

#### **Learning Objectives**

By the end of this course, students will be able to:

- Extract nucleic acids, particularly genomic DNA, from a variety of research samples.
- Design oligonucleotide primers, PCR amplify, clone and sequence specific genes of interest
- Troubleshoot molecular experiments
- Design simple molecular experiments to address research questions in their chosen fields.

#### **Attendance:**

Classes will include a one hour lecture (typically on Mondays, but also occasionally on Wednesdays) followed by three hours of laboratory work. All students will attend lectures and computer laboratories and take exams based on the lecture material, written exercises and laboratory exercises. Because the emphasis of the course is on laboratory methods, many of the scheduled “lecture” sessions will be demonstrations and full-participation exercises carried out in the laboratory.

#### **Grading:**

Two exams (mid-term and final) will give students an opportunity to show written proficiency with the basic methodologies covered in the course. Homework (graded and ungraded) will be assigned throughout the semester.

#### **Class Website & E-mail Policy**

Course materials will be made available online via iLearn (<http://iLearn.sfsu.edu/>). If you encounter any problems downloading or printing these files, please contact the instructor immediately.

Students are encouraged to e-mail questions to the instructor. Please include "BIOL 818" in the subject line and identify yourself by signing with your **full name** and **SFSU ID number**. ***Be advised that, in general, e-mails will receive responses within a day or two.***

### Changes to the Syllabus or Lecture Schedule

The syllabus and lab schedule are subject to change. Changes to the syllabus or lab schedule will be announced in class and/or posted on iLearn.

### Holidays

There will be no class on the following days:

<b>September 2, 2013</b>	<b>Labor Day</b>
<b>November 11, 2013</b>	<b>Veteran's Day</b>
<b>November 25-29, 2013</b>	<b>Fall Recess</b>

### Mandatory Lab Fee

Lab fees for this course can be paid in person at the Bursar's office or online at

<http://www.sfsu.edu/~bursar/>.

### Statement on plagiarism and cheating

Students are expected to maintain a high level of academic integrity in all work pursued at SFSU.

**Cheating or plagiarism will not be tolerated under any circumstances in this class.** Cheating on an examination will result in an automatic zero points for that exam. Plagiarism, defined as either direct copying or loose paraphrasing of text from any published work (including online) without appropriate referencing, or use of another person's work or ideas without appropriate attribution, will result in an automatic zero points for that entire assignment. There will be no second chances. Furthermore, any incidence of cheating or plagiarism will be reported to the Chair of the Biology Department, the Dean of the College of Science and Engineering, and the Office of Student Affairs for possible disciplinary action. Consequences can include penalties up to expulsion from the University.

### Cell phones & pagers

Please silence cell phones and pagers before arriving in class.

### American with Disabilities (ADA) Accommodation

The University is committed to providing reasonable academic accommodation to students with disabilities. Students with disabilities who need accommodations are encouraged to contact the instructor. The Disability Programs and Resource Center (DPRC) is available to facilitate the accommodations process. The DPRC is located in the Student Service Building and can be reached by telephone (voice/TTY 415-338-2472) or by e-mail ([dprc@sfsu.edu](mailto:dprc@sfsu.edu)).

### Important Deadlines for Add/Drop/Withdrawal:

#### **September 9, 2013**

Last day to drop courses using GATOR REG.

#### **September 23, 2013**

Deadline to add courses with instructor-issued permit number.

#### **September 10 – November 22, 2013**

Withdrawal period -- no documentation required.

Withdrawals will result in a "W" grade on transcript records.

#### **November 23 – December 16, 2013**

Withdrawal is permissible only for **serious and compelling reasons**. Students must file a petition to be reviewed by the Instructor and the Department Chair. Approved withdrawals will result in a "W" grade on transcript records. ***"Withdrawals are not normally permitted during the final three weeks except in verified cases of accident or serious illness where the cause of withdrawal is due to circumstances clearly beyond the student's control and where the assignment of an incomplete is not practical. Ordinarily, withdrawals in this category will involve total withdrawal from the University."*** (SFSU Bulletin)

**BIOL818: MOLECULAR TECHNIQUES IN EVOLUTION & ECOLOGY - TENTATIVE SCHEDULE (ver. 2)**

DATE	Lecture (9:00-10:00)	Lab (10:00-13:00)
26 Aug.	<b>Introduction, syllabus, course policies (HH501)</b>	Lab orientation, safety training
28 Aug.	<b>Lect 01: Molecular markers (HH501)</b>	Pipetting exercise
2 Sep.	<b>LABOR DAY</b>	<b>NO CLASSES</b>
4 Sep.	<b>Lect 02: Units and concentrations (HH501)</b>	Solution making exercise & calculations
9 Sep.	<b>Lect 03: DNA Extraction Methods &amp; Preservation (HH501)</b>	
11 Sep.	<b>Lect 04: PCR &amp; gel electrophoresis overview (HH501)</b>	PCR set-up exercise
16 Sep.	<b>Lect 05: Alu insertions &amp; genetic markers (HH501)</b>	Chelex extraction & Alu PCR
18 Sep.	gDNA quantification (dot vs Qubit)	gDNA & Alu PCR gels
23 Sep.	Animal tissue extractions (Chelex)	Animal tissue extractions (Chelex)
25 Sep.	Animal tissue extractions (Phenol:CHCl <sub>3</sub> )	Animal tissue extractions (Phenol:CHCl <sub>3</sub> )
30 Sep.	<b>Lect 06: PCR optimization (HH501)</b>	16S rRNA PCR
2 Oct.	<b>Lect 07: Restriction digests (HH501)</b>	16S rRNA PCR gels & restriction digests
7 Oct.	RFLP analysis gels	Searching sequences for restriction sites
9 Oct.	<b>Lect 08: DNA purification methods (HH501)</b>	Supplies ordering exercise
14 Oct.	<b>Midterm exam (HH501)</b>	Open lab for DNA extraction/PCR practice
16 Oct.	<b>Lect 09: PCR primer design (SCI249)</b>	Working with sequences: GenBank, BLAST (SCI249)
21 Oct.	Plant gDNA extractions (DNEasy)	Plant gDNA extractions (DNEasy)
23 Oct.	<b>Lect 10: Sanger sequencing (HH501)</b>	trnL PCR set-up
28 Oct.	trnL PCR gels & quantification	trnL amplicon ExoSAP
30 Oct.	trnL cycle sequencing set-up	trnL cycle sequencing set-up
4 Nov.	trnL cycle sequencing cleanup	Load ABI 3100
6 Nov.	<b>Lect 11: Sequence analysis (SCI249)</b>	Sequence analysis (SCI249)
11 Nov.	<b>VETERANS DAY</b>	<b>NO CLASSES</b>
13 Nov.	Sequence analysis (SCI249)	Sequence analysis (SCI249)
18 Nov.	<b>Lect 12: NextGen Sequencing (HH501)</b>	Soil gDNA extractions (PowerSoil kit) & 16S PCR
20 Nov.	<b>Lect 13: Microsatellites (SCI249)</b>	Genescan analysis (SCI249)
25 Nov.	<b>FALL RECESS</b>	<b>NO CLASSES</b>
27 Nov.		
2 Dec.	Control region ExoSAP	Control region sequencing
4 Dec.	Cycle sequencing clean-up	Load ABI 3100
9 Dec.	Sequence analysis (SCI249)	Sequence analysis (SCI249)
11 Dec.	Sequence comparison & phylogeny (SCI249)	Sequence comparison & phylogeny (SCI249)
16 Dec.	<b>Final Exam (take-home)</b>	<i>no laboratory</i>