

**BIOL 312L: MOLECULAR BIOLOGY LAB**  
Fall 2009 Syllabus

**Course Description:** A comprehensive study of the techniques used in the isolation and analysis of DNA. Techniques covered will include cloning and analysis of recombinant molecules, Polymerase Chain Reaction, and DNA sequencing. The course will also cover some of the molecular biology programs available on the internet.

Instructor:	Dr. Stephanie Dellis
Office:	202-A Science Center
Office hours:	Mon 11-12, Tue 10:30-11:30, after lab, or by appointment. if I'm not in the office, check the lab room 222 or 222-A
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Web pages (case sensitive):	<b>Dr Dellis:</b> <a href="http://delliss.people.cofc.edu">http://delliss.people.cofc.edu</a> <b>Molecular Biology Lab</b> (gel photos, syllabus, review sheets): <a href="http://delliss.people.cofc.edu/Biol312Lpage/">http://delliss.people.cofc.edu/Biol312Lpage/</a> <b>Virtual Lab Book</b> (lab readings, example photos): <a href="http://delliss.people.cofc.edu/virtuallabbook/">http://delliss.people.cofc.edu/virtuallabbook/</a>

**Textbook:** There is not a required paper textbook for the lab. There will be Lab Readings from the Virtual Lab Book and Handouts.

**Supplies:** REQUIRED One very fine point permanent marker (e.g. ultra fine point Sharpie) and one three-ring binder for Web materials.

**Course Objectives:** Upon course completion the student should:

- \* Have a working knowledge of Restriction Endonucleases and plasmids and their use in molecular biology research.
- \* Understand and be able to explain the use of modern molecular biology techniques such as agarose gel electrophoresis, polymerase chain reaction, and DNA sequencing.
- \* Be able to effectively communicate laboratory results in journal and poster formats.

**Grades:** Based on a total of 300 points by the following system:

- \* Six quizzes or homework assignments, 10 points each, drop lowest score = 50 pts
- \* Midterm (emphasis on concepts and theory) = 90 pts
- \* Comprehensive final (emphasis on problem solving) = 110 pts
- \* Journal articles and poster presentation = 45 pts
  - #1 Article critique = 15 pts
  - #2 Powerpoint presentation of Journal Article = 10 pts
  - #3 Poster presentation = 20 pts
- \* Participation and safety = 5 pts

**Safety:** You will lose these points if you have an unexcused absence, handle bacteria or chemicals in an unsafe manner, set fire to the lab, or otherwise cause distress.

**Participation:** Students are expected to help with cleanup after their lab. Remember to empty the solid waste containers, bleach liquid waste and tubes containing bacteria, wipe down your work area with disinfectant, and *always wash your hands*.

**Final grades** will be determined using the following grading system, modified if necessary:

Grading Scale													
A	A-	B+	B	B-	C+	C	C-	D+	D	D-	F	WA	XF
100-93	93-90	90-87	87-83	83-80	80-77	77-73	73-70	70-67	67-63	63-60			
4.0	3.7	3.3	3.0	2.7	2.3	2.0	1.7	1.3	1.0	0.7	0	0	0

**Class Participation:** Since this is a lab class, attendance is critical. Come prepared for lab; this is an upper-level course with high expectations. Please notify me, and have an appropriate excuse, if you must miss a lab.

It will occasionally be necessary to come into lab early or to stay later. We will try to work around everyone's existing class or work schedule, and make sure the tasks are distributed equally among the class.

All students are expected to take exams on the scheduled date for their section. If an exam is missed, it is your responsibility to make arrangements within 48 hours for a make-up exam, or the resulting grade will be a "0". There are no make-up quizzes. Assignments are due during the scheduled lab period. Late assignments or lab reports will receive a 5-point penalty for each day they are late.

**The Flu:** At this point we do not know how severe the flu season will be. However we should all be prepared for the worst-case scenario. If you have the flu, please do NOT come to class until you are well. Please DO contact me by email or phone. We will try to make up missed labs if possible, even if other students have to pitch in to insure enough materials are available. I will be as flexible as possible with assignment due dates. I urge everyone to get a flu shot as soon as they are available.

**Cheating and Plagiarism:** The Honor Code of the College of Charleston specifically forbids cheating, attempted cheating, and plagiarism. A student found guilty of these offenses will receive a failing grade for the course. Additional penalties may include expulsion or suspension from the College at the discretion of the Honor Board. See the College of Charleston Student Handbook for definitions of these offenses.

## MOLECULAR BIOLOGY 312-L ~ FALL 2009 SCHEDULE

This semester we will perform two long, multiple-week experiments and several shorter experiments:

**Experiment One**, Introduction to molecular lab techniques and lab safety.

**Experiment Two**, the cloning of a DNA fragment into a plasmid.

**Experiment Three**, the identification of unknown bacteria using DNA sequencing.

**Experiment Four**, human DNA typing using Polymerase Chain Reaction.

DATE	LABORATORY EXERCISE	READINGS
Aug 31-Sept 2	Introduction. <b>EXPT 1</b> - Micropipetting, Bacterial culture techniques, Isolation of individual colonies, Laboratory safety. <b>EXPT 2</b> - Restriction digest for cloning experiment.	Safety in the Molecular Biology Lab (pdf) Basic Skills in Molecular Biology (pdf) Protocol_BasicSkills (pdf) <i>a/so</i> : plasmid antibiotic resistance, how to streak a plate, streak plate examples
Sept 7-9	<b>EXPT 1, cont.</b> - Examination of petri plates. <b>EXPT 2, cont.</b> - Gel electrophoresis of cut plasmid and DNA. Ligation of DNA fragment and plasmid.	Restriction Digestion and Agarose Gel Electrophoresis (pdf) Protocol_RE&Gels (pdf) <i>a/so</i> : Loading an Agarose Gel
Sept 14-16	<b>EXPT 2, cont.</b> - Making competent cells and transformation of <i>E. coli</i> with recombinant plasmids.	Competent Cells and Transformation (pdf) Protocol_CompCells&Transf (pdf) <i>a/so</i> : How to Spread a Plate, Spreading Examples.
Sept 21-23	<b>EXPT 2, cont.</b> - Minipreparation and restriction analysis of recombinant plasmids.	Minipreparation of Plasmid DNA (pdf) Protocol_Miniprep (pdf) <i>a/so</i> : Understanding Plasmid DNA, Controls in Molecular Biology.
Sept 28-30	<b>EXPT 2, cont.</b> – Analysis of plasmid restriction digests. <b>EXPT 3</b> - PCR amplification of DNA from unknown bacteria.	PCR and Thermalcycling (pdf) 16s rDNA Sequencing to Identify Unknown Microorganisms (pdf) Protocol_DNA Isolation (pdf) Protocol_PCR (pdf)
Oct 5-7	<b>MIDTERM EXAM</b>	
Oct 6	Last day to withdraw with “W”.	
Oct 12-14	<b>FALL BREAK</b>	
Oct 19-21	<b>EXPT 3, cont.</b> - Isolation of DNA from gel in preparation for sequencing. Check purification and concentration of rDNA fragment.	Cycle Sequencing (pdf) (Review PCR and DNA sequence identification.)

Oct 26-28	<b>EXPT 4</b> – Human genotyping of selected alleles by PCR <i>and</i> <u>Journal article power point presentations.</u>	Human DNA Typing (pdf) Protocol_DNA Isolation & PCR (pdf) <i>a/so:</i> Polyacrylamide Gel Electrophoresis
Nov 2-4	<b>EXPT 3, cont.</b> – Sequence analysis of rDNA fragments. <b>EXPT 4, cont.</b> – Load gels for human genotype analysis.	Interpreting DNA Sequence (pdf)
Nov 9-11	<b>EXPT 3, cont.</b> – Developing a phylogenetic tree. <b>EXPT 4, cont.</b> – Analysis of human genotyping results <i>and</i> <u>article critique.</u>	Constructing a Phylogenetic Tree (pdf)
Nov 16-18	<u>Poster presentations</u> (Sequencing and identification of unknown bacteria). In-class review.	
Nov 23, 24	<b>NO CLASS</b>	
Nov 25	<b>THANKSGIVING BREAK</b>	
Nov 30-Dec 2	<b>FINAL EXAM</b>	