University of Tennessee at Chattanooga
Biology 420: Molecular Genetics
Spring 2005
T/TH 10:50-12:05
Holt 208

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Textbook: Bernard R. Glick and Jack J. Pasternak (2003) ***Molecular Biotechnology: Principles and Applications of Recombinant DNA, 3rd Edition***

Introduction:
The purpose of this course is to introduce students to the molecular methods and applications of recombinant DNA technology. The course emphasizes how recombinant DNA technology can be used in the field of biotechnology to create various useful products as well as in the arena of academic research. Many scientific disciplines contribute to molecular genetics and biotechnology including molecular biology, microbiology, cell biology and biochemistry. The field is therefore an integrative science, incorporating a diverse range of scientific and mathematical disciplines.

Course Objectives:

The overall objective of this course is to give students an appreciation of the methods and techniques used by a molecular biologist to study, analyze molecular processes and to illustrate how these techniques can be applied in the fields of biotechnology and biological research. More specifically, the goals of this course are to:

- Review the basic molecular processes of DNA replication, transcription and translation
- Introduce the different biological systems used in molecular biology and biotechnology.

- Discuss what recombinant DNA technology is, how it is performed and how it is used in the fields of biotechnology and molecular research.
- Discuss the methodology and applications of chemical DNA synthesis, DNA sequencing technology and polymerase chain reaction
- Discuss the manipulation of gene expression in prokaryotes and eukaryotes
- Introduce the methodology of site-directed mutagenesis and protein engineering
- Discuss methodology and applications of molecular diagnosis of genetic disease
- Discuss microarray technology and implications in genomics and proteomics
- Discuss the methodology and application of vaccine development
- Introduce the molecular methods of genetic mapping
- Discuss molecular approaches and outcomes of human gene therapy

Tentative grading scheme:

There will be two mid-term exams worth 100 pts each, and one Final exam worth 100 pts. The content of the final exam will not be comprehensive but rather cover all new material given since the previous exam. In addition, homework assignments will be given throughout the course, and will be worth a combined total of 100 points. The last 2-3 class periods will be dedicated to student oral presentations on emergent technologies and issues in molecular biology (50 point value).

Grading

Mid-term Exam I, 100 pts	90%-100%	= A	(405-450 pts)
Mid-term Exam II, 100 pts	80%-89%	= B	(360-404 pts)
Homework assignments, 100 pts	70%-79%	= C	(315-359 pts)
Oral Presentation, 50 pts	60%-69%	= D	(270-314 pts)
Final Exam, 100 pts	<60%	= F	(<270 pts)
450 total pts			

Important Dates

- February 8, Exam I
- March 17, Exam II
- Final Exam (Exam III), Thursday, April 21, 11 am-1 pm

Late Homework Policy:

Each individual is entitled one late homework without penalty. However, the homework **must** be turned in no later than the **beginning** of the very next class period that follows the homework due date. For example, if homework was assigned on Thursday and due on the followingTuesday, late homework assignments will be accepted no later than the very next Thursday (1 week from original assignment). Any homework turned in after this date **will receive a ZERO**.

If you have a second or third or…..late homework, a point will be deducted from your homework for each day (not class period) it is late. Again, no homework will be accepted, for grading, 1 class period after the original due date.

Exam make-up policy:

There will be NO make-up exams. A missed exam will receive a grade of ZERO. However, if a student has a valid excuse for missing an examination, then the score for the missed exam will be equal to the percentage score of the student's final exam. **This option of allowing a student to substitute the percentage grade of the final exam for a missed mid-term exam (because of illness, a family death or because of other activity) is solely at the discretion of the instructor**. If you have a legitimate emergency, please contact the instructor **before** the exam in order to discuss the situation.

University Policies and Procedures.

Please refer to the Student Handbook for policies on topics such as the honor system. If you are a student with a disability (e.g. physical, learning, psychiatric, vision, hearing, etc.) and think that you might need special assistance or a special accommodation in this class or any other class, call the Office for Students with Disabilities/College Access Program at 425-4006 or stop by their office – 110 Frist Hall.

The syllabus is tentative, and subject to change.

TENATIVE SCHEDULE		
WEEK 1		January 6
		• Intro to Molecular Biotecnhology (Chpt. 1, 2)
WEEK 2	January 11	January 13
	• Review DNA replication and transcription (Chpt. 3)	• Review of translation and Gene regulation (Chpt. 3)
WEEK 3	January 18	January 20
	• Recombinant DNA Introduction: Restriction, cloning and modifying enzymes (Chpt. 4)	• Cloning Vectors • Mechanisms of gene transfer (Chpt. 4)
WEEK 4	January 25	January 27
	• Genomic and cDNA libraries (Chpt. 4)	• Molecular characterization of clones (lecture notes)
WEEK 5	February 1	February 3
	DNA synthesis techniques (Chpt. 5) • Oligonucleotide synthesis • Dideoxy sequencing • PCR	• Bioinformatics and Gene databases and (lecture notes) • Questions????
WEEK 6	February 8	February 10
	• **Exam I over weeks 1-4**	• Prokaryotic Gene Expression Systems (Chpt. 6)
WEEK 7	February 15	February 17
	• Eukaryotic Gene Expression Systems (Chpt. 7)	• Eukaryotic Gene Expression Systems (Chpt. 7)
WEEK 8	February 22	February 24
	• Directed Mutagenesis and Protein Engineering (Chpt. 8)	• Directed Mutagenesis and Protein Engineering (Chpt. 8)

WEEK 9	March 1	March 3
	• Microarray Technology (lecture notes)	• Microarray Technology (lecture notes)
WEEK 10	**SPRING BREAK** **March 7-13**	**NO CLASSES**
WEEK 11	March 15	March 17
	• Molecular Diagnostics (Chpt. 9) • Questions?????	• **Exam II over weeks 5-9**
WEEK 12	March 22	March 24
	• Molecular Diagnostics (Chpt. 9)	• Molecular Diagnosis of Disease (Chpt. 9 and lecture notes)
WEEK 13	March 29	• March 31
	• Vaccine Development (Chpt. 11)	• Vaccine Development (Chpt. 11)
WEEK 14	April 5	April 7
	• Gene Therapy (Chpt. 10 and lecture notes)	• Gene Therapy (Chpt. 10 and lecture notes)
WEEK 15	April 12	April 14
	• Student Presentations	• Student Presentations
WEEK 16	April 19	
	• Student Presentations	
FINAL EXAM	**Thursday, April 21 11-1pm**	