BIOTECHNOLOGY & GENETIC ENGINEERING
(Course web page: see http://www.plantbio.ohiou.edu/epb/instruct/courses.htm)
PBIO 450 (#05172)/**550** (#05179); 4 credits

Time & Place: Tuesday & Thursday 10:10-12:00; Porter 104

Instructor: Allan Showalter Fall 2005

Text: Molecular Biotechnology ©2003 by Bernard R. Glick and Jack J. Pesternak

Requirements: PBIO110 or PBIO114 or BIOS 170

Course Description:
The purpose of this course is to introduce students to basic molecular biological concepts and techniques used in the fields of biotechnology and genetic engineering. Current experimentation and progress in these fields as well as ethical considerations of this research will be discussed.

Grades will be based on the following:

1. A midterm exam on the first third of the course (100 points).
2. A midterm exam on the second third of the course (100 points).
3. A comprehensive final exam (100 points).
4. A graded, in-class presentation on a biotechnology or genetic engineering topic, preferably a controversial one, to be approved by the instructor (50 points for PBIO 450 students and 25 points for PBIO 550 students). Each student will have to prepare a one-paragraph abstract of his or her presentation and a list of relevant references (including the article titles) for distribution to the class. Graduate students enrolled in the course will additionally have to submit an 8-10 page double spaced paper (25 points) on their chosen topic following the format of a review paper found in a journal called *Cell*, but with complete article titles for all references.
5. Homework (50 points). Email answers to review questions for each assigned chapter. Chapter answer sets are given equal grade weighting and are due each Monday by noon for the past week's assignments.

Thus, there are 400 points possible. Typically, 93.3% and above will earn an A, 90-93.3% an A-, 86.7-90% a B+, 83.3-86.7% a B, 80-83.3% a B-, 76.7-80% a C+, 73.3-76.7% a C, 70-73.3% a C-, 66.7-70% a D+, 63.3-66.7% a D, 60-63.3% a D-, and below 60% an F.

Exams will be based upon material covered in class lectures as well as in the assigned readings.

Office Hours:
By appointment, Porter Hall-Room 504 (phone number 593-1135 or email showalte@ohio.edu)

Academic Conduct:
The penalty for course-related academic dishonesty (i.e., cheating on exams, plagiarism, etc.) will be failure of the entire course along with a report of the incident being sent to Judiciaries.

Attendance Policy:
Attendance is highly recommended. Any absences must be well justified and explained to the instructor in advance in order to make up any of the graded material.

PBIO 450/550: BIOTECHNOLOGY AND GENETIC ENGINEERING
Fall 2005-Syllabus

Instructor: Dr. Allan Showalter

WEEK	DATE	CHAPTERS*	TOPICS
1	Sept.6	1-3 Review; 4	Biotechnology; recombinant DNA
	Sept. 8	4	Restriction enzymes & basic cloning
2	Sept. 13	5	DNA sequencing & PCR
	Sept. 15	6, 7	Prokaryotic & eukaryotic gene expression
3	Sept. 20	9	Molecular diagnostics
	Sept. 22	10	Therapeutic agents
4	Sept. 27	-	**Exam I**
	Sept. 29	11	Vaccines
5	Oct. 4	12	Microbial synthesis of commercial products
	Oct. 6	15	Microbial insecticides
6	Oct. 11	17	Plant genetic engineering
	Oct. 13	18	Plant genetic engineering
7	Oct. 18	19	Animal genetic engineering
	Oct. 20	-	**Exam II**
8	Oct. 25	19	Animal genetic engineering
	Oct. 27	20	Human genome project
9	Nov. 1	21, 22	Regulation, ethics & patenting of biotechnology
	Nov. 3	-	Class presentations
10	Nov. 8	-	Class presentations
	Nov. 10	-	Class presentations
	Nov. 15	-	Class presentations
	Nov. 18 (Friday)	-	**Final Exam (8:00 AM)**

* Assigned readings are from chapters in your text, Molecular Biotechnology ©2003 by Bernard R. Glick and Jack J. Pesternak.

SOME SUGGESTED TOPICS FOR YOUR CLASS PRESENTATIONS

(This list is merely a guide for potential topics; please consider other biotechnology/genetic engineering topics that interest you at present or as the course progresses. Note that controversial biotechnology/genetic engineering topics are perhaps the most interesting as you can present the scientific information, the arguments "for" and "against" the technology, and your own opinions.)

- Finding effective drugs to treat tuberculosis using a genetically engineered luciferase gene
- Using the polymerase chain reaction to detect disease-causing agents (e.g., HIV)
- Using restriction fragment length polymorphisms to detect genetic diseases
- Using genetically modified organisms to clean up the environment
- Production of human pharmaceuticals in the milk of genetically engineered farm animals
- Treating human brain tumors by gene therapy with the thymidine kinase gene
- The production of biodegradable plastics in plants
- The production of antibodies (i.e., plantibodies) in plants for medical use
- The production of a particular human pharmaceutical in bacteria
- Cause, detection, and treatment of a particular genetic disease (e.g., cystic fibrosis)
- Genetic engineering of transgenic fish with growth hormone genes
- Production of recombinant tissue plasminogen activator for treating heart attacks
- Engineering organisms with the jellyfish green fluorescent protein to follow development
- The human genome project and the ethical considerations associated with it
- Mammalian cloning (i.e., the cloning of sheep or humans or pets)
- The use of gene knockouts to determine gene function
- Enhancer trap experiments to locate tissue-specific promoters
- Genetic engineering of herbicide-resistant plants
- Genetic engineering of insect-resistant plants
- Genetic engineering of "golden rice"
- Genetically engineering disease-resistant farm animals
- Human gene therapy for SCID (Severe Combined Immunodeficiency Disease) or another genetic disease
- Genomics and DNA microarrays
- Proteomics
- Embryonic stem cell research and its applications for treating certain human diseases
- Biology and molecular biology of *Bacillus anthracis*, causative agent of Anthrax
- Marathon mice

BIOTECHNOLOGY AND GENETIC ENGINEERING
INSTRUCTOR EVALUATION FORM FOR STUDENT PRESENTATIONS

STUDENT:

GRADE:

PRESENTATION FEEDBACK (i.e., comments on the organization and clarity of the talk, the quality of the visual aids, the oral delivery/general "flow" of the talk, the scientific accuracy of the information presented, and whether sufficient background information was presented):

ASSIGNED HOMEWORK QUESTIONS:

Chapter	**Questions**
1	2,5,6,10
2	1,2,3,5
3	1,2,3,8,10
4	2,4,5,6,8,9
5	3,4,7,9
6	3,6,13,20
7	1,3,8,10
9	3,5,9,12
10	1,4,10,19,21
11	3,5,9,11
12	1,4,9,10,11
15	1,3,7,9,13
17	1,3,4,5,10
18	2,5,6,13,19,20,24
19	1,2,3,4,6,7,10
20	4,5,8,9
21	2,4,6,8,9
22	1,3,5,7,8

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