

BIOL 4310/4320 Biotechnology
Mon 2:00- 4:50pm and Tuesday 2:30 – 5:20 pm SC 104
Fall 2005

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Office hours: Tuesday 10 am -12 noon, Wednesday 11-12 noon and 1-2 pm and Friday 2-3 pm.

Course Objective: Biotechnology is a growing industry and the products of this industry impact us all. This course gives you an in depth understanding of the ethical considerations of biotechnology and hands-on experience with the methods used in this rapidly evolving field. There will be lot of wet-lab in this class – you will conduct your own research to simulate what you might be doing would you ever work in this industry or in a research setting. In addition to your own project we will go thorough several techniques that are used in applied DNA-technology in a variety of fields. The public is very concerned with some of the possible outcomes of the biotechnology industry and in this class we will take a scientific view of some of these ethical issues.

Text required: Molecular Biotechnology by Bernard R. Glick and Jack J. Pasternak ISBN 1-55581-224-4 or paperback – 1-55581-269-4.

There are also several articles on WebCT that are required reading material – if you do not know how to use WebCT, please come see me.

Lectures and Laboratory Work: Even though the class is posted as a separate time for lecture and lab we will be mixing these two things up every class period. You are responsible for everything in both lecture and labs. For lecture you need to rely on the book, distributed articles, your own findings and good note taking. Very few actual lectures will be done in this class and most of the learning will take place in groups and by discussion. You are required to maintain a lab books were EVERY experiment with EVERYTHING included needs to be kept. In this class you will learn how to keep a proper lab book. The lab books will be collected every second Tuesday and graded and returned the following Monday. All the writing you do in these books should happen in the class period while actually doing the experiments.

Assignments and grading policy:

There is a total of 950 points in this class.

Participation in class: There are only 15 students in this class and we will be doing a lot of talking. You are expected to read everything before class and come prepared to discuss it. Participation is part of your grade. Total of 100 points.

Papers and Debates: There are three written assignments in the class that all lead up to an in class debate. You are going to be graded both on your papers and the following participation in class. Papers to start you on the review of the issues will be handed out in the beginning of the semester so that you will have plenty of time to work on the papers. Starting early generally lead to better papers. Total of 150 points.

Local biotech assignment and campus survey: These two assignments will make you aware of the local community's exposure to biotechnology and knowledge about some of the issues that we discuss in class. The class will be divided in to three groups for these assignments and will present their findings in class. Total of 50 points.

Exams: There will be one mini-exam, two midterm exams and a final. Total of 350 points.

Group Research Project: For this project you will actually be doing real research. I have a gene that I have cloned and I have also purified the enzyme encoded by this gene. The protein is capable of degrading many kinds of pesticides. There are two aspects to this research – we would like to have the enzyme mass produced so that it can be used to clean up spills in the environment. The other aspect is to understand exactly how this enzyme works by creating mutants of specific amino acids in the active site. There will be 4 students in each group and you need to write up a short proposal that I will discuss with you and then conduct the research that you have proposed. You will be presenting your project at the end of the class. Total of 200 points.

Laboratory Notebooks: As already mentioned the notebooks will be collected every other Tuesday and graded for the following Monday. Total of 100 points.

Grading Scale:

A = 93-100

A⁻ = 89-93

B⁺ = 86-89

B = 83-86

B⁻ = 79-83

C⁺ = 76-79

C = 73-76

C⁻ = 69-73

D⁺ = 66-69

D = 63-66

D⁻ = 60-63

F = < 60

There will be no curving of the grades. A straight percentage scale will be used.

Academic integrity:

Scholastic dishonesty **will not be tolerated** and will be prosecuted to the **fullest** extent. You are expected to have read and understood the current issue of the student handbook (published by Student Services) regarding student responsibilities and rights, and the intellectual property policy, for information about procedures and about what constitutes acceptable on-campus behavior.

Students with disabilities:

Students with medical, psychological, learning or other disabilities desiring academic adjustments, accommodations or auxiliary aids will need to contact the Southern Utah University Coordinator of Services for Students with Disabilities (SSD) in Room 205C of the Sharwan Smith Center or phone (435) 865-8022. SSD determines eligibility for and authorizes the provision of services.

Disclaimer:

Information contained in this syllabus other than the grading, late assignments, makeup work and attendance policies may be subject to change with advance notice as deemed appropriate by the instructor.

Schedule:

	Lecture/Discussion topics	Lab assignments	Readings/ Due
8/29	What is Biotechnology?		Ch. 1
9/6	Molecular Biotechnology	Documenting the Lab/What is a proposal? How to write a science paper	
9/12	Mini - quiz of the basics	Lab instruments and making solutions Prepare and Maintain Bacterial Cultures	Ch. 2, WCT Ch. 3, WCT Local biotech assignment due
9/13	Recombinant DNA Technology	Getting Proposals done	Ch. 4, Lab notebooks due
9/19	Recombinant DNA Technology	Designing primers/Isolation of DNA	Ch. 4
9/20	PCR and sequencing of DNA	Plasmid preps/Quantification of DNA	Ch. 5, WCT – Proposals due
9/26	Gene expression in Prokaryotes	Restriction Digest/PCR	Ch. 6, WCT
9/27	Gene expression in Prokaryotes	<i>Alu</i> -PCR – DNA fingerprinting	Ch. 6, Lab notebooks due
10/3	Production of proteins in Eukaryotes		Ch. 7
10/4	Directed Mutagenesis/Protein Engineering	MIDTERM I	Ch. 8, WCT
10/10	Directed Mutagenesis/Protein Engineering		Ch. 8
10/11	Molecular Diagnostics		Ch. 9, WCT, Lab Notebooks due
10/17	Therapeutic Agents		Ch. 10
10/18	Vaccines		Ch. 11, WCT
10/25	Synthesis of Commercial Proteins		Ch. 12, WCT Opinion paper I due

Schedule (continued):

Lecture/Discussion topics	Lab assignments	Readings
10/31 Bioremediation		Ch. 13
11/1 Plant Growth-Promoting Bacteria		Ch. 14, Lab Notebooks due
11/7 Microbial Insecticides		Ch. 15, WCT
11/8 Large Scale Production of proteins		Ch. 16
	MIDTERM II	Opinion paper II due
11/14 Genetic Engineering of Plants	Transformation of Plants	Ch. 17, WCT,
11/15 Applications of Engineered Plants		Ch. 18, Lab Notebooks due
11/21 Transgenic Animals		Ch. 19
11/22 Human Molecular Genetics		Ch. 20, WCT
11/28 Risks and Regulations		Ch. 21
11/29 Biotechnology as a Business		Ch. 22, Lab Notebooks due
		Opinion paper III due
		Present campus surveys
12/5 Presentations		
12/6 Presentations		
12/12 Study Day		
12/16 Final 1-2:50 pm – SC 104		