

Spring 2006
CE239L/BME 240L: Environmental Molecular Biotechnology

Instructor:

Claudia Gunsch, 127 Hudson Hall, ckgunsch@duke.edu, Phone: 660-5208

Class Time:

Lectures: Wednesday and Friday, 10:05-11:20
Lab: TBD

Teaching Assistant:

Ellen Cooper, ellenc@duke.edu

Office Hours:

Tuesday 1-2 or by appointment

Textbooks:

1. Glick, B.R. and Pasternak, J.J. Molecular Biotechnology – Principles and Applications of Recombinant DNA, Third Edition
2. Assigned journal articles

Prerequisites:

CE120L, BIO25L, graduate standing or consent of the instructor

Grading:

Group Laboratory Reports: 20%
Group Paper: 10%
Individual Paper/Presentation: 10%
Quizzes: 10%
Midterm (1): 20%
Final: 30%

Academic Integrity:

<http://www.gradschool.duke.edu/Regulations/standards.htm>

Bulletin Description:

CE 239L/BME 240L. Environmental Molecular Biotechnology. Principles of genetics and recombinant DNA for environmental systems. Applications to include genetic engineering for bioremediation, DGGE, FISH, micro-arrays and biosensors. Laboratory exercises to include DNA isolation, amplification, manipulation and analysis. Prerequisites: CE120L, BIO25L or consent of the instructor. Instructor: Gunsch. One course.

Class Schedule:

<i>Class Period</i>	<i>Date</i>	<i>Reading Assignment</i>	<i>Topic</i>
1	13-Jan	Chapter 1 and 2	Introduction, Cell Biology: Prokaryotes, Eukaryotes, Viruses, Cell Organization, Molecular Biotechnology Biological Systems
2	18-Jan	Chapter 3	DNA, RNA, Protein Structure
3	20-Jan	Chapter 3	Regulation (mRNA transcription, promoters, protein)
4	25-Jan	Chapter 4	Plasmids (Cloning vectors), Restriction Digestion, Gene cloning
5	27-Jan (Early)	Lab Handout	LAB 1, Quiz 1 - Report due Class 10
6	1-Feb	Chapter 4	Southern/Northern Hybridization, Transformation, Micro-arrays
7	3-Feb	Chapter 5	DNA Chemical Synthesis, Sequencing and PCR, Real Time PCR
8	8-Feb	Chapter 5	Gene Cloning (Library, cDNA Subtraction, Gene Walking)
9	10-Feb	Chapter 6	Bacterial Expression Vectors, Chromosomal Integration, Protein Isolation, Western Blot
10	15-Feb	Lab Handout	LAB 2, Quiz 2
11	17-Feb		MIDTERM
12	21-Feb	Lab Handout	Lab 2 (2nd Part) - Report due Class 17
13	24-Feb	Chapter 7	Eukaryotic Protein Production/Heterologous Expression
14	1-Mar	Chapter 8	Protein Engineering, Mutagenesis, Protein Activity
15	3-Mar (Early)	Lab Handout	LAB 3, Quiz 3 - Report due Class 20
16	8-Mar	Handouts	Wastewater Treatment (DGGE, FISH and microarrays)
17	10-Mar	Handouts	Bioremediation (Part I)
SPRING BREAK			
18	22-Mar	Lab Handout	LAB 4 (Part I), Quiz 4 Bioremediation (Part II)
19	24-Mar	Lab Handout	LAB 4 (Part II) - Report due Class 23
20	29-Mar	Chapter 13 and Handouts	Air Pollution Treatment (Biofiltration – Gene isolation and real time PCR) Review Lab 4 Results (Individual Papers are due)
21	31-Mar	Lab Handout	LAB 5, Quiz 5 – Report due Class 25
22	7-Apr	Handouts	Biosensors and Phytoremediation
23	12-Apr	Handouts	Industrial Biotechnology and Bioethics
24	14-Apr	Presentation Abstracts	PRESENTATIONS (5 people)
25	18-Apr	Presentation Abstracts	PRESENTATIONS (5 people)
26	20-Apr	Presentation Abstracts	PRESENTATIONS (3 people) and Evaluations (Group Papers are due)

Quizzes:

- A quiz will be held prior to each lab to ensure students are familiar with the lab protocol. Each quiz will cover the lab handout information.

Assignments:

- Group Laboratory Reports: Each group should submit a report 2 weeks after the completion of a lab. These reports should include the following sections: title, author names, abstract, introduction, materials and methods, results, discussion and references.
- Group Paper: Reports from labs 2, 3, 4 and 5 will be combined into a paper which should follow scientific journal format and guidelines.
- Individual Paper/Presentation:
 - *Undergraduate Students*: Each student will write a 7-page paper (Times New Roman, 12 pt, 1.5 space) on a topic of their choice.
 - *Graduate Students*: Each student will write a 10-page paper (Times New Roman, 12 pt, single spaced) on a topic of their choice.

Each paper should include an abstract (~200-300 words) which will be distributed to the class prior to the end of semester presentations. Note that the abstract does not count towards the page limit. It is the responsibility of each student to gain approval from the instructor on their chosen topic. At the end of the semester, each student will give a 10 minute Powerpoint presentation.