BCHB-508 LABORATORY APPLICATIONS OF BIOTECHNOLOGY

Section #1: Thursdays 9:00 to 10:00 am LA-4, 10:00 to 3:00 pm, Rm LD4

Spring 2008 – 4 Credits

SESSION			TOPIC	
1			**Lab Assessment Test**	
2			**Lecture**: Principles of Agarose Gel Electrophoresis; Restriction Enzymes and mapping **Lab:** DNA fragments and Staining DNA Digestion/Size Mapping	
3			**Lecture:** Principles of Plasmid and Chromosomal Isolation **Lab:** Plasmid Isolation Chromosomal Extraction	
4			**Lecture:** Principles of Transformation: the Lac Operon **Lab:** Transformation: Blue/White Colonies	
5			**Lab**: Read Plates/Determine Transformation Efficiency	
6			**Lecture:** Large Scale Bio-Protein Assay **Lab:** Separation using membrane technology and recombinant DNA technology	
7			**Lecture:** Principles of DNA Cloning I **Lab:** Basics of DNA Cloning I & II	
8			**Lab:** Read Plates/Determine Transformation Efficiency, Set up Overnight Cultures	
9			**Lecture:** Basics of DNA Cloning II **Lab:** Basics of DNA Cloning III Basics of DNA Cloning IV & V	
10			**Lecture:** Protein Purification: Ion Exchange Chromatography **Lab**: Purification of *Eco* RI, I and II	
11			**Lecture:** Protein Purification: **Lab:** Purification of *Eco* RI	
12			**Mid-Term Test**	
13			**Lecture:** Principles of Southern Blot **Lab: Southern Blot**	
14			**Lab:** Finish Southern Blots	
15			**Lecture:** Antigen-Antibody Interaction The Ouchterlony Procedure **Lab:** Antigen-Antibody Interaction The Ouchterlony Procedure Simulation of HIV	

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15			**Lecture:** Antigen-Antibody Interaction The Ouchterlony Procedure	
16			**Finish Lab, Read Plates**	
17			**Lecture:** Polymerase Chain Rx. RT-PCR. HIV Replication **Lab:** VNTR DNA Fingerprint/PCR RT-PCR: A Model of HIV Replication-	
18			**Lab**: Complete Thursday's Lab	
19			**Lecture:** Polyacrylamide Gels and Protein Identification **Lab:** Polyacrylamide Gel Analysis-	
20			Lab: Complete Lab Analysis	
21			**Lab Review: Concept and Theory**	

Please read Lab Pamphlets before scheduled lab

May 27, 2008

To: Dr. Jack G. Chirikjian

From: Sharon Helling,
BCHB 508, Lab Instructor

Re: Lab BCHB 508 Student and instructor time commitment per lab section.

Scheduled student hours can be broken down as follows:

1. Pre-lab lecture hours: 1 hour (60 min):	hr x 14 labs = 14	lecture hours
2. Lab Assessment Test:	= 2	hours
3. Mid-Term Test:	= 2	hours
4. Review sessions	= 2	hours
5. Final Exam	= 2	hours
Total	= 20	hours

** (20 hours x 60 minutes = 1200 minutes/50 = 24 hours)

6. Scheduled lab hours

a. 8 labs require 5 hours	5 hr x 8	= 40 lab hours
b. 4 labs require 4 hours	4 hr x 4	= 16 lab hours
c. 2 labs require 3 hours	3 hr x 2	= 6 lab hours
		= 62 lab hours

7. Additional lab hours: Finishing up experiments (next day)
   a. 4 labs require addition 1 hour: 1 hr x 4 = 4 lab hours

Total = 66 lab hours

**(66 hours x 60 minutes = 3960 minutes/50 = 79.2 hours)

Grand Total of Student Contact Hours (each 60 minutes): 20 hours + 66 hours = 86 hours
Grand Total of Student Contact Hours (each 50 minutes): 24 hours + 79.2 hours = 103.2 hours

***We are considering adding 10 hours of bioinformatics computer instruction as a component in the lab course beginning in Fall '08.

BCHB-508--Lab Applications of Biotechnology Objectives

1. **To develop an understanding of the use of restriction endonucleases as tools to cut DNA at specific sequences by comparing restriction patterns on pDNA and chromosomal DNA after electrophoresis.**

2. **To determine size of DNA fragments generated by single and combinations of restriction enzymes.**

3. **To determine the relative positions of restriction enzyme cleavage sites in a DNA molecule by mapping after performing electrophoresis of DNA fragments.**

4. **To introduce the principles of extracting plasmid DNA from bacterial cells.**

5. **To develop an understanding of the structure and function of plasmid DNA.**

6. **To isolate high molecular weight DNA suitable for spooling.**

7. **To clone DNA fragments in the pUC-linker and select colonies that have DNA inserts based on color selection.**

8. **To understand the process of transformation and how to determine transformation efficiency.**

9. **To understand the Lac operon in relation to the β-galactosidase gene.**

10. **To use various recombinant DNA technology procedures to clone a DNA fragment and extract and map the resulting recombinant plasmid.**

11. **To purify a restriction endonuclease using ion-exchange chromatography, test its enzyme activity, and visualize the test results by agarose gel electrophoresis.**

12. **To learn the principle of affinity chromatography by isolating a carbohydrate-binding lectin protein from an extract of jack bean meal.**

13. **To learn how of set up a Southern Blot as a tool for "DNA Fingerprinting" in forensics and paternity determination.**

14. **To introduce the principles of antigen-antibody interactions using the Ouchterlony procedure.**

15. **To understand the molecular biology of the human immune deficiency virus and the pathogenesis of acquired immune deficiency syndrome.**

16. **To understand the methodology by experimentation involved with enzyme linked immunosorbent (ELISA) assays in the context of clinical screening of serum samples for antibodies to the HIV virus.**

17. **To gain an understanding and hands-on experience of the principles and practice of PCR, relate this to a VNTR amplified region on human DNA chromosome #1 and compare resulting individual DNA polymorphisms.**

18. **To gain an understanding of the principles and practice of RT-PCR and relate this to HIV replication.**

19. **To develop at understanding of protein structure and to determine the molecular weights of unknown proteins by using SDS-polyacrylamide gel electrophoresis.**

20. **To understand the principles of and set-up a Western blot.**