

# Biology 105 - Molecular Biology - Spring 2012

## Grading

Determination of grades will be based on points earned in the following categories:

10 completed Lab exercises (10 points each)	100
5 Lab Quizzes (20 points each)	<u>100</u>
Total Possible points	200

## Grading Scale

A >90%	>180 pts
B 80-89%	160-179 pts
C 65-79%	130-159 pts
D 50-64%	100-129 pts
F <60%	< 100

Completed lab exercises are due the day of the quiz for that same lab.

## Lab Exercises

1. Tools of the Trade
2. Growth of *E. coli* Bacteria
3. Isolation and Titration of Bacteriophage Lambda
4. Gel Electrophoresis
5. Transformation of *E. coli* with pGlo Plasmid DNA
6. Purification and Restriction Analysis of pGlo Plasmid DNA
7. Isolation of Green Fluorescent Protein (GFP) by Chromatography and polyacrylamide gel electrophoresis (PAGE)
8. Mutagenesis of pGlo plasmid by Restriction digest
9. Polymerase Chain Reaction (PCR) of Alu DNA from Human Cells
10. Enzyme-Linked Immunosorbant Assay
11. *C. elegans* Genetics
12. Yeast Genetics

# Bio 105 - Timeline of Experiments, Spring 2012

**Week #1, T 1-24**

Lab #1 Tools of the Trade

Measuring weights and volumes, Gel Electrophoresis, Spectrophotometry

**Week #2, T 1-31**

Lab #2 Growth of *E. coli* bacteria

Determine the growth rate, Determine concentration of culture in cells/ml, Bacterial gram stain.

**Week #3, T 2-7**

Lab #2 Growth of *E. coli* bacteria

Count colonies and complete calculations of *E. coli* concentration

Lab #3 Isolation and Titration of Bacteriophage Lambda

Induce the lytic cycle in a Lambda lysogen. Determine phage titer by plaque assay.

Lab #4 Gel Electrophoresis – Part I (forensics)

**Week #4, T 2-14**

Lab #3 Isolation and Titration of Bacteriophage Lambda

Count plaques and determine titer.

Lab # 5 Transformation of *E. coli* with pGlo Plasmid DNA

Transform bacteria with plasmid DNA, plate out and incubate overnight

Lab #4 Gel Electrophoresis – Part II

Quiz #1 Covers Lab 1, lab 2 and lab 4 part I

**Week #5, T 2-21**

Lab # 5 Transformation of *E. coli* with pGlo Plasmid DNA

Score transformation results.

Lab #6 Purification and Restriction Analysis of pGlo Plasmid DNA

Purify plasmid DNA by affinity chromatography. Digest DNA with restriction enzymes.

Lab #4 Gel Electrophoresis – Part III (cut Vs uncut pGlo DNA)

**Week #6, T 2-28**

Lab #6 Purification and Restriction Analysis of pGlo Plasmid DNA

Electrophoresis, staining and analysis of DNA digests.

Lab #7 Isolation of Green Fluorescent Protein (GFP) by Chromatography and polyacrylamide gel electrophoresis (PAGE)

Production of cell lysates

Quiz #2 Covers Lab 3, lab 4 parts 2 &3, and lab 5

**Week #7, T 3-6**

Lab #7 Isolation of Green Fluorescent Protein (GFP) by Chromatography and polyacrylamide gel electrophoresis (PAGE): Purification of GFP by column chromatography and PAGE

**Week #8, T 3-13**

Lab #7 Isolation of Green Fluorescent Protein (GFP) by Chromatography and polyacrylamide gel electrophoresis (PAGE): Analysis of stained gels

Lab #8 Mutagenesis of pGlo plasmid by Restriction digest

Digest pGlo DNA. Electrophoresis of digest. Extract and purify DNA band from gel. Set up ligation to run overnight, store till next time.

Quiz # 3 Covers Labs 6 and 7

**Week #9, T 3-20**

Lab #8 Mutagenesis of pGlo plasmid by Restriction digest

Transform E. coli with wt and mutant pGlo plasmid.

Score results within the same week before leaving for break.

Lab #9 Polymerase Chain Reaction of Alu DNA from Human Cells

Extract cheek cell DNA. Run PCR reactions. Electrophoresis & analysis of amplified DNA

**Week #10, 3-26 to 3-31 Spring Break****Week #11, T 4-3**

Lab #8 Mutagenesis of pGlo plasmid by Restriction digest

Discuss results of transformation

Lab #10 Enzyme Linked Immunosorbant Assay

Identify Antigen-specific monoclonal antibodies

**Week #12, T 4-10**

Lab #11 C. elegans Anatomy and Behavior

Distinguishing males from hermaphrodites. Distinguishing larval stages. Measuring response to stimuli. Transferring worms between plates.

Quiz # 4 Covers Lab 8, lab 9 and lab 10

**Week #13, T 4-17**

Lab #12 Yeast Genetics

A Simple Cross: Mate and observe schmoos

Environmental effects on red phenotype, part 1

Lab #11 C. elegans

Set up the RNAi experiment

Identifying males and L4s and transferring worms

**Week #13 Th 4-19**

Lab #12 Yeast Genetics

A Simple Cross: Select for diploids on MV

**Week #14, T 4-24**

Lab #12 Yeast Genetics

A Simple Cross: Observe growth of diploids on MV and then transfer diploids to YED for presporulation

Environmental effects on red phenotype, part 2

Two genes/one trait: mate 4 strains of red mutants

Lab #11 C. elegans

Score RNAi experiment

Fluorescence microscopy of GFP-expressing worms

**Week #14 Th 4-26**

Lab #12 Yeast Genetics

A Simple Cross: Transfer diploids to YEKAC for sporulation

Two genes/one trait: observe color of diploids, transfer to MV

**Week #15, T 5-1**

Lab #12 Yeast Genetics

A Simple Cross: Observe asci and streak for single colonies

Two genes/one trait: Observe growth on MV, complementation analysis

Lab #11 C. elegans

A Genetic Cross: Mate wt males with mutant hermaphrodite L4s

**Week #15, W 5-2**

Lab #11 C. elegans

A Genetic Cross: transfer mated hermaphrodites to new plate

**Week 15, F 5-4**

Lab #11 C. elegans

A Genetic Cross: transfer phenotypically wt hermaphrodites to new plate

**Week #16, T 5-8**

Lab #12 Yeast Genetics

A Simple Cross: Observe restoration of red phenotype in haploid colonies

Lab #11 C. elegans

Score Genetic Cross

Quiz #5 covers Labs 11 and 12