

BIO 106 LAB EXAM STUDY GUIDE

The BIO 106 lab exam accounts for 10% of your final BIO 106 grade, and will be taken during the last lab session of the semester.

I. Protein structure and function: Gel electrophoresis and Sickle Cell Anemia

A. TERMS

1. hemoglobin
2. amino acid
3. primary, secondary and quaternary protein structure
4. glutamate
5. valine
6. anemia
7. sickle cell anemia
8. carrier
9. codominance
10. agarose
11. electric gradient
12. protein bands
13. DNA structure and function

B. CONCEPTS

1. Describe how gel electrophoresis works to separate proteins based on their charge.
2. Describe how one base change in the DNA code can alter protein structure and/or function
3. Understand the differences between normal hemoglobin and hemoglobin of sickle cell anemia.
4. Describe how sickle cell anemia is inherited, and the symptoms of the disease

II. Diffusion and Osmosis

A. TERMS

1. diffusion
2. Brownian motion
3. directed motion
4. osmosis
5. semi permeable
6. hypertonic
7. hypotonic
8. isotonic
9. osmoregulator
10. osmoconformer
11. plasmolysis
12. flaccid
13. turgid

B. CONCEPTS

1. Explain Brownian motion. How does the movement of molecules, demonstrated by

2. Brownian motion, bring about diffusion?
2. Compare and contrast diffusion and osmosis.
3. Be able to explain the difference between isotonic osmoregulators and osmoconformers.
4. Describe what happens to cells placed in isotonic, hypotonic hypertonic and hypotonic solutions and why.

III. Enzyme kinetics

A. TERMS

1. enzyme
2. product
3. spectrophotometer
4. visible light
5. cellobiase
6. p-nitrophenol glucopyranoside
7. absorbance
8. transmittance

B. CONCEPTS

1. Explain, in general terms, how a spectrophotometer substrate works.
2. How can a spectrophotometer be used to measure catalyst the concentration of a protein?
3. Understand how environmental factors such as, pH and concentration of enzymes can affect enzyme function

IV. Analyzing and presenting data

A. TERMS

1. spreadsheet
2. descriptive statistics
3. mean
4. median
5. mode
6. range
7. standard deviation
8. null hypothesis
9. scientific method
10. hypothesis

B. CONCEPTS

1. Be able to describe the steps of the scientific method
2. Understand how to find peer-reviewed scientific journal
3. Be able to distinguish between a scholarly, authoritative reference and one that is not
What is the difference between bar graph and a histogram? What do each show?
4. Know when it is appropriate to use a student's t-test and what the results of the analysis mean

V. Effects of Temperature on Metabolic Rates in Animals (Respiration)

A. TERMS

1. Endotherm
2. Ectotherm
3. Metabolic rate
4. Basal metabolic rate
5. Total metabolic rate
6. Cellular respiration

B. CONCEPTS

1. Understand the relationship between oxygen consumption and heat production
2. Be able to calculate the metabolic rate of an animal
3. Be familiar with the process of cellular respiration in organism

VI. Fermentation

A. TERMS

1. Fermentation
2. Alcoholic fermentation
3. Glucose
4. Glycolysis
5. Pyruvate

B. CONCEPTS

1. Know the general equation for alcoholic fermentation
2. Describe the process of fermentation and be able to talk about each step in the process
3. Be able to write a testable hypothesis regarding yeast fermentation
4. Know what the products of fermentation are
5. Know how to measure the amount of CO₂ produced during fermentation

VII. Photosynthesis

A. TERMS

1. photosynthesis
2. cellular respiration
3. photo synthetically active radiation (PAR)
4. chlorophyll
5. chloroplasts

B. CONCEPTS

1. Know the overall reaction for photosynthesis and it is different from cellular respiration.
2. Describe how the photosynthetic rate is related to light intensity

VIII. Mendelian genetics

A. TERMS

1. Punnett square
2. phenotype.
3. genotype
4. trait
5. gamete.
6. chromosome
7. dominant
8. recessive
9. heterozygous
10. homozygous
11. allele
12. monohybrid
13. dihybrid
14. haploid
15. diploid
16. polygenic
17. meiosis
18. test cross
19. null hypothesis

B. CONCEPTS

1. Understand the relationship between the genotype and the phenotype
2. Understand how to do a test cross and punnett square.
3. Explain how to determine the probability of offspring showing a particular trait and what this means
4. Understand why it is important to test your hypothesis, then test the alternative hypothesis before accepting or rejecting your null hypothesis

IX. DNA Structure and Function

A. TERMS

1. DNA
2. RNA
3. mRNA
4. DNA polymerase
5. RNA polymerase
6. Purines
7. Pyrimadines
8. nucleotide
9. base
10. complementary base pairing
11. ribosome
12. tRNA
13. amino acid
14. codon
15. anticodon
16. genetic code

17. restriction enzymes
18. intron
19. exon
20. point mutation
21. reading frame
22. hydrogen bonds

B. CONCEPTS

1. Understand complementary base pairing
2. Be able to list and explain the steps in transcription and translation, and the function of the main enzymes involved.
3. Be able to use the genetic code to determine the amino acid sequence coded by a DNA sequence
4. Explain how one point mutation can result in an altered protein and, in some cases, disease.

X. **Biotechnology: Plasmids and Recombinant DNA**

A. TERMS

1. restriction enzyme
2. cloning
3. plasmid
4. extra chromosomal
5. R plasmids
6. antibiotic resistance
7. antibiotic
8. conjugation
9. transduction
10. transformation
11. competence

B. CONCEPTS

1. What is the basic process of the recombinant DNA technique?
2. Describe how to construct a recombinant DNA plasmid.
3. Understand the role of restriction enzymes.
4. Explain the difference between an R plasmid and a recombinant plasmid.
5. Understand why R plasmids are often used in recombinant DNA techniques.
6. Explain why each of the following were used in this experiment:
 - a. LB agar plates streaked with plasmid+ *E. coli*
 - b. LB agar with ampicillin streaked with plasmid+ *E. coli*
 - c. LB/Amp streaked with plasmid- *E. coli*
 - d. LB agar with ampicillin and arabinose streaked with plasmid+ *E. coli*

XI. The Beta-globulin gene

A. TERMS

1. hemoglobin
2. beta-globulin gene
3. antiparallel
4. DNA template
5. DNA coding strand
6. stop codon
7. reading frame
8. point mutation
9. exon
10. intron
11. poly-adenylation
12. restriction enzymes
13. RFLP analysis

B. CONCEPTS

1. Demonstrate how to read a gene map
2. Describe the effect a point mutation can have on a protein's structure and/or function
3. Describe RFLP analysis and how it is used to test for abnormal hemoglobin