

Format:

Section I	45 minutes	30 multiple choice questions
Section II	90 minutes	2 essay questions and 4 short free response questions

Reading: Hillis chapter 10 (and all previous readings)

Concepts to Review:

- EVERYTHING FROM EXAMS 1–5
- Protein Synthesis
  - Understand how DNA controls all cell activities, as well as an organism's characteristics.
  - Know the RNA base pair rules.
  - Be able to explain the processes of *transcription* and *translation*, including the roles of the enzymes *RNA polymerase* and *tRNA synthetase*.
  - Be able to describe how mRNA is processed after transcription, including the roles of *introns*, *exons*, *spliceosomes (snRNPs)*, *GTP caps*, and *poly-A tails*.
  - Be able to use the *genetic code table* to translate a string of mRNA codons into a sequence of amino acids.
  - Be able to explain what a *virus* is and how it reproduces.
  - Be able to explain what a *retrovirus* is, how it takes over a cell, and the role of *reverse transcriptase*.
  - Be able to explain how changes in DNA affect the resulting protein.
  - Be able to describe the experimental evidence showing that mRNA is read in triplet codons.
  - Be able to describe how and why polypeptides may be processed after being synthesized.
- Labs
  - Be able to graph data, including labeling both axes with units.
  - Be able to write a null hypothesis and use a chi-square test to reject or fail to reject the null hypothesis.

Overarching Questions to Consider:

**\*\*Suggestion: Answer all of these questions in writing, then compare answers with a classmate. I promise that taking the time to do so will be well worth it and much more useful than memorizing facts and definitions.\*\***

1. What is the difference between a nucleotide, a codon, an allele, a gene, a chromosome, and a genome? What does a gene code for? What does a codon code for?
2. Why do loss-of-function mutations tend to be recessive alleles and gain-of-function alleles tend to be dominant alleles?
3. What is the relationship between nucleotides and polypeptides? What does a gene code for? What does a codon code for?
4. What does it mean for a gene to be expressed? What steps are necessary for gene expression to occur?
5. How are the steps required for a gene to be expressed different in prokaryotes and eukaryotes?
6. What does a gene look like? That is, what are the parts of a gene? How is coding DNA different from noncoding DNA? Why is noncoding DNA so important if it is not expressed?
7. Why is it that bacteria can synthesize human insulin when transformed with DNA that contains human insulin genes even though bacteria and humans are so different? How is it that all humans share over 99 percent of our DNA even though we are all so different?

### Practice Exam Questions:

Visit the course website and click on the “Multiple Choice Practice” link. Complete all practice questions for the relevant chapters and check your work against the answer key. Note: these items are password protected.

Practice multiple choice and partial versions of free response questions are also available through the College Board by logging into AP Central with the class code.

### Free Response Question Hints:

Of the two essay questions:

- Questions 1 and 2 will assess your ability to analyze data from an authentic scientific investigation and apply it to concepts from the course.
- Question 1 will emphasize your ability to identify experimental design procedures.
- Question 2 will emphasize your ability to construct a graph using confidence intervals.

Of the four short free response questions:

- Question 3 will assess your ability to analyze an experimental design and predict the results of the experiment.
- Question 4 will assess your ability to use biology concepts to predict the results of a disruption in a biological system.
- Question 5 will assess your ability to analyze and construct biological models.
- Question 6 will assess your ability to analyze data and construct a scientific argument.

Please note that the style and formatting of these questions will match those you will encounter on the AP exam.