**AP Biology Unit 6 – Molecular Genetics**

# **Tentative Test Date – February 24,25**

# Objectives:

Construct scientific explanations that use the structures and mechanisms of DNA and RNA to support the claim that DNA and, in some cases, that RNA are the primary sources of heritable information. [LO 3.1, SP 6.5]

Justify the selection of data from historical investigations that support the claim that DNA is the source of heritable information. [LO 3.2, SP 4.1]

Describe representations and models that that illustrate how genetic information is copied for transmission between generations. [LO 3.3, SP 1.2]

Describe representations and models illustrating how genetic information is translated into polypeptides. [LO 3.4, SP 1.2]

Create a visual representation to illustrate how changes in a DNA nucleotide sequence can result in a change in the polypeptide produced. [LO 3.25, SP 1.1]

Predict how a change in a specific DNA or RNA sequence can result in changes in gene expression. [LO 3.6, SP 6.4]

Describe the connection between the regulation of gene expression and observed differences between different kinds of organisms. [LO 3.18, SP 7.1]

Describe the connection between the regulation of gene expression and observed differences between individuals in a population. [LO 3.19, SP 7.1]

Explain how the regulation of gene expression is essential for the processes and structures that support efficient cell function. [LO 3.20, SP 6.2]

Use representations to describe how gene regulation influences cell products and function. [LO 3.21, SP 1.4]

Refine representations to illustrate how interactions between external stimuli and gene expression result in specialization of cells, tissues, and organs. [LO 4.7, SP 1.3]

Justify a claim made about the effect(s) on a biological system at the molecular, physiological, or organismal level when given a scenario in which one or more components within a negative regulatory system is altered. [LO 2.15, SP 6.1]

Explain how signal pathways mediate gene expression, including how this process can affect protein production. [LO 3.22, SP 6.2]

Use representations to describe mechanisms of the regulation of gene expression. [LO 3.23, SP 1.4]

Connect concepts in and across domains to show that timing and coordination of specific events are necessary for normal development in an organism and that these events are regulated by multiple mechanisms. [LO 2.31, SP 7.2]

Use a graph or diagram to analyze situations or solve problems (quantitatively or qualitatively) that involve timing and coordination of events necessary for normal development in an organism. [LO 2.32, SP 1.4]

Justify scientific claims with scientific evidence to show that timing and coordination of several events are necessary for normal development in an organism and that these events are regulated by multiple mechanisms. [LO 2.33, SP 6.1]

Describe the role of programmed cell death in development and differentiation, the reuse of molecules, and the maintenance of dynamic homeostasis. [LO 2.34, SP 7.1]

Justify the claim that humans can manipulate heritable information by identifying at least two commonly used technologies. [LO 3.5, SP 6.4]

Predict how a change in genotype, when expressed as a phenotype, provides a variation that can be subject to natural selection. [LO 3.24, SP 6.4, SP 7.2]

Explain the connection between genetic variations in organisms and phenotypic variations in populations. [LO 3.26, SP 7.2]

Predict the effects of a change in an environmental factor on the genotypic expression of the phenotype. [LO 4.24, SP 6.4]

Major Topics and Textbook Correlations:

Chapter 16 – The Molecular Basis of Inheritance (not 16.3)

* Search for Genetic Material
* DNA Replication and Repair

Chapter 17 – From Gene to Protein

* Connection between Genes and Proteins
* Protein Synthesis: Transcription and Translation
* Comparing Protein Synthesis in Prokaryotes and Eukaryotes
* Mutation Types and their Effect on the Protein

Chapter 18 – Regulation of Gene Expression (not 18.5)

* Regulation of Gene Expression in Bacteria
* Organization and Control of Eukaryotic Genomes
* Genome Organization at the DNA level
* The Control of Gene Expression

Chapter 19 – Viruses (not 19.3)

* History of Virus Discovery
* Viral Genomes
* Lytic vs. Lysogenic Cycles
* Evolution of Viruses

Chapter 20 – Biotechnology (not 20.3 or 20.4)

* DNA Technology and Cloning
* DNA Fingerprinting
* Practical Application of DNA Technology

Chapter 21 – Genomes and Their Evolution (only 21.2 and 21.5)