

AP Biology
Student Learning Plan
DNA Unit 8 - 14 Days

| Day/Date | Topic/Objectives | Support |
|----------|---|-----------|
| Day 1 | <p>Introduction</p> <ul style="list-style-type: none"> <input type="checkbox"/> Define the primary source of heritable information <input type="checkbox"/> Describe how common DNA is across domains. <input type="checkbox"/> Explain, using illustrations the structure of DNA including sugar, phosphate and bases and their arrangement and bonding within the molecule <input type="checkbox"/> Describe how base pairing and hydrogen bonding holds the DNA double helix together. <input type="checkbox"/> Compare and contrast the structure of purines and pyrimidines <input type="checkbox"/> Explain how the structure of DNA differs across domains | 14.1 – 2 |
| Day 2 | <ul style="list-style-type: none"> <input type="checkbox"/> Use data from historical investigations to support the claim that DNA is the source of heritable information <input type="checkbox"/> Explain the experiments of Watson and Crick, Wilkins, Franklin, Avery, MacLeod, McCarty, Hershey and Chase and how they contribute to our knowledge and understanding of DNA structure and function | 15.1-15.2 |
| Day 3 | <ul style="list-style-type: none"> <input type="checkbox"/> Explain, using models, how DNA is copied and transmitted from one generation to the next <input type="checkbox"/> Describe how the structure of DNA lends itself to the copying of information before it is passed from one cell to the next (mitosis) or one generation to the next (meiosis) <input type="checkbox"/> Describe the enzymes which facilitates the replication of DNA <input type="checkbox"/> Describe the purpose of proteins produced during translation <input type="checkbox"/> Review the structure and function of proteins in living organisms | 14.3 |
| Day 4 | <ul style="list-style-type: none"> <input type="checkbox"/> Compare and contrast the structure of DNA and RNA <input type="checkbox"/> Describe the structure and function of mRNA <input type="checkbox"/> Describe the structure and function of tRNA <input type="checkbox"/> Describe the structure and function of rRNA <input type="checkbox"/> Describe the structure and function of RNAi | 15.6 |
| Day 5 | <ul style="list-style-type: none"> <input type="checkbox"/> Explain, using models, how mRNA is transcribed <input type="checkbox"/> Describe the role of RNA polymerase <input type="checkbox"/> Describe three post transcriptional modifications that mRNA undergoes before leaving the nucleus <input type="checkbox"/> Describe proofreading mechanisms that reduce the rate of mistakes in DNA replication and transcription | 15.5 |

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| | <ul style="list-style-type: none"> <input type="checkbox"/> Describe the role of regulatory sequences such as promoters, terminators and enhancers in transcription <input type="checkbox"/> Describe the role of inhibitors a negative control mechanism in transcription <input type="checkbox"/> Describe the role of positive control in stimulating gene expression | |
| Day 6 | <ul style="list-style-type: none"> <input type="checkbox"/> Describe the site of protein synthesis <input type="checkbox"/> Explain, using models, how proteins are transcribed from the mRNA code <input type="checkbox"/> Explain why some genes, such as ribosomal genes are always turned on. | 15.7-15.8 |
| Day 7 | <ul style="list-style-type: none"> <input type="checkbox"/> Identify and explain at least two commonly used techniques that scientists use to manipulate DNA <input type="checkbox"/> Describe one example of how genetic engineering has impacted you personally <input type="checkbox"/> Describe how changes in DNA or RNA sequence can result in changes in gene expression <input type="checkbox"/> Use a visual representation to illustrate how changes in DNA nucleotide sequence can result in changes in the polypeptide produced <input type="checkbox"/> Describe possible results at the individual and population level when mutations occur. <input type="checkbox"/> Differentiate between heritable and nonheritable mutations. <input type="checkbox"/> Explain which mutations may be acted upon by natural selection <input type="checkbox"/> Describe what determines whether a given mutation is positive, neutral or negative. | 17.1-17.6 14.6 15.3 15.8 |
| Day 8 | <ul style="list-style-type: none"> <input type="checkbox"/> Explain why regulation of gene expression is necessary (Why aren't all genes turned on all the time?) <input type="checkbox"/> Using models, explain how regulation of gene expression is controlled in prokaryotic cells <input type="checkbox"/> Explain why coupling of transcription and translation is possible in prokaryotes but not eukaryotes <input type="checkbox"/> Describe inducers and repressors <input type="checkbox"/> Describe the three main phases of gene expression in prokaryotes <input type="checkbox"/> Describe the expression of genes by the mechanism of induction <input type="checkbox"/> Describe the expression of genes by the mechanism of repression <input type="checkbox"/> Explain the role of the start codon <input type="checkbox"/> Describe the significance of the codon <input type="checkbox"/> Use a genetic code chart to translate a nucleotide sequence into an amino acid sequence | 14.4 15.4 16.1-16.3 |

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| | <input type="checkbox"/> Describe the role of tRNA in elongation <input type="checkbox"/> Explain the role of the stop codon | |
| Day 9 | <input type="checkbox"/> Using models, explain how regulation of gene expression occurs in eukaryotic cells <input type="checkbox"/> Explain how regulation of gene expression influences cell products and functions <input type="checkbox"/> Describe the role of small regulatory RNAs in gene expression <input type="checkbox"/> Explain why gene regulation is more complex in eukaryotes than in prokaryotes <input type="checkbox"/> Describe the relationship of gene sequence and phenotype <input type="checkbox"/> Explain how two organisms with similar genomes can have different phenotypes based on gene expression <input type="checkbox"/> Describe how signal pathways mediate gene expression | 14.5 16.4-16.7 |
| Day 10 | <input type="checkbox"/> Compare and contrast the genome of prokaryotic and eukaryotic organisms <input type="checkbox"/> List sources of genetic variation in prokaryotes <input type="checkbox"/> List sources of genetic variation in eukaryotes | 28.4 |
| Day 11 | <input type="checkbox"/> Illustrate and describe the structure of a virus <input type="checkbox"/> Describe how viruses carry and transmit genetic information using a host organism | 27.1-27.2 |
| Day 12 | <input type="checkbox"/> Explain how retroviruses use reverse transcriptase and integrates into the host genome <input type="checkbox"/> Following integration describe how the retrovirus genome is transcribed and translated <input type="checkbox"/> Describe the positive and negative control mechanisms that regulate the expression of genes in viruses | 27.3-27.5 |
| Day 13 | <input type="checkbox"/> Review | |
| Day 14 | <input type="checkbox"/> Test | |