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| **Students will understand**   * The DNA Structure. * The steps of DNA replication. * The steps of transcription. * Translation of a protein. * Gene expression patterns changes over time and in different types of cells. * Genetic behavior associated with gene expression through time and tissue * Most of the genome encodes many types of RNA as well as introns, promoters, and other control sequences and repeats. * Mutation add, delete, or rearrange genetic material in a germline cell or the somatic cell. * Mutation in collagen genes can disrupt the protein’s precise organization. * Mutation in a gene can cause distinct illness or a version of the same disease. * The chromosomes differ by size, centromere location, satellites, and staining. * Karyotypes display the chromosome in size order. * Chromosomal shorthand summarizes the number of chromosomes, sex chromosomes constitution, and type of aberration. * Ideograms display features of individual chromosomes. | **Essential Questions:**   1. What is the structure of DNA? 2. What is DNA Replication and how does it maintain Genetic Information? 3. What are the steps of DNA replication? 4. Where in the cell do DNA replication, transcription, and translation occur? 5. How does transcription control cell specialization? 6. How can the same mRNA codon be at A site on the ribosome at one time, but at the P site another time? 7. What are the components of a ribosome? 8. Why an overlapping genetic code be restrictive? 9. How do protein’s primary, secondary, and tertiary structure affect conformation? 10. What genetic behavior associated with gene expression through time and tissue? 11. Why is control of gene expression necessary? 12. How does the development of the pancreas illustrate differential gene expression? 13. How does alternate splicing generate more than one type of protein from the information in the gene? 14. What are the four roles of DNA other than encoding protein? 15. How does mutation alter proteins? 16. Why is the collagen gene prone to mutation? 17. What are the three ways in which the genetic code protects against the effects of mutation? 18. What are the criteria used to determine whether mutation in the gene are likely to cause different disorders or different degrees of the disorder? 19. What is the structure of the Chromosome? 20. What are the types of chromosomal aberration that can cause duplications and or/deletion? |

**Sub-Unit Components/Sub-Headings/Objectives**

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| DNA Structure and Replication   * Experiments Identify and describe the genetic materials. * DNA Structure * DNA Replication-Maintaining Genetic Information | Gene Action   * Transcription * Translation of a protein * Protein Folding | Control of Gene Expression   * Gene Expression Through Time and Tissue * Mechanisms of Gene Expression * Noncoding RNAs Repeats | Gene Mutation   * Mutations can alter proteins * Causes of Mutation * Types of Mutations * The Importance of Position * Factors that lesson the effects of mutation * DNA Repair | Chromosomes   * Portrait of a Chromosome * Visualizing Chromosomes * Abnormal Chromosome Number * Uniparental Disomy |  |

**Knowledge—Students will know…**

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| 1. Define, interpret, and use unit vocabulary 2. Identify the experiments and describe the Genetic Material. 3. Describe the difference between purine and pyrimidine? 4. Describe DNA Structure. 5. Outline DNA Replication and explain how it is maintaining Genetic Information. 6. List the steps of DNA replication. 7. List and Place the enzymes in the order in which they begin to function during DNA replication. 8. Why must DNA be replicated continuously as well as discontinuously? 9. Describe two experiments that supported one hypothesis and at the same time disproving another. 10. Explain the genetic behavior associated with transcription. 11. Discuss the genetic behavior associated with translation of protein. 12. List the steps of DNA replication. 13. List and Place the enzymes in the order in which they begin to function during DNA replication. 14. Explain the genetic behavior associated with protein folding 15. Explain the genetic behavior associated with gene expression through time and tissue 16. Explain the genetic behavior associated with mechanism of gene Expression 17. Explain the genetic behavior associated with proteins outnumber genes 18. Explain the genetic behavior associated with most of the human genome does not encode protein 19. Explain how does mutation alter proteins 20. Describe the causes of mutation 21. Describe the factors that lessen the effects of mutation 22. Explain the importance of DNA Repair 23. Describe the portrait of a Chromosome 24. Explain the importance of visualizing chromosomes 25. Explain the significance causes of abnormal chromosome numbers 26. Describe abnormal Chromosome Structure 27. Explain how semiconservative DNA replication makes it possible for stem cells to receive the DNA least likely to bear mutation |

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| **Standards** | **Assessments/Evidence** |
| *List the standards set used and the individual standards to be taught and assessed. Highlight or* ***Bold*** *the standards of significance.* Example:   * HS-LS1-1: Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring. * HS-LS1-2: Make and defend a claim based on evidence that inheritable genetic variations may result from (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors. * HS-LS1-3: Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population. | **Which assessments will provide the best evidence of meeting the learning objectives? Consider the DOK required.**   * Bell-Ringer * Journal Activities * Exit-Slips * Exams * Quizzes * Small Group (Team Activities) * Experiments * Projects * Presentations * Case Studies * Vocabulary |

**Reading and Writing Standards (except for English/Language Arts courses)**

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| Include at least one CCSS Literacy and one Writing standard that will be taught and assessed. Access them with these links and then list below:   * [CCSS.ELA-Literacy.RST.9-10.8](http://www.corestandards.org/ELA-Literacy/RST/9-10/8/) Assess the extent to which the reasoning and evidence in a text support the author's claim or a recommendation for solving a scientific or technical problem.  * [CCSS.ELA-Literacy.RST.9-10.9](http://www.corestandards.org/ELA-Literacy/RST/9-10/9/) Compare and contrast findings presented in a text to those from other sources (including their own experiments), noting when the findings support or contradict previous explanations or accounts. |

**Instructional Resources/Materials**

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| * Lewis, R. (2008). *Human genetics: Concepts and applications*. Boston: McGraw-Hill Higher Education. * Lewis, R. (2007). *Case workbook to accompany Human genetics: Concepts and applications*. Boston: McGraw-Hill Higher Education. * Brooker, R. J. (2018). *Genetics: Analysis and Principles*. New York: McGraw Hill Education. * Robinson, T. R. (2010). *Genetics for dummies:* Hoboken, NJ: Wiley. * <Http://Wardisiani.com> * WWW.mhhe.com/lewisgenetics7 |