Unit 3: Modes of Inheritance & Non-Mendelian Genetics

Content Area: **Science**
Course(s): **Modern Genetics**
Time Period: **Semester 1**
Length: **5 Weeks**
Status: **Published**

Standards

	Patterns
	Cause and Effect
HS-LS1-1	Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.
LS1.A	Structure and Function
	Constructing Explanations and Designing Solutions
HS-LS3-1	Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.
	Asking Questions and Defining Problems
LS3.A	Inheritance of Traits
HS-LS3-2	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.
	Engaging in Argument from Evidence
LS3.B	Variation of Traits

Enduring Understandings

1. Certain traits are inherited according to patterns other than pure dominant and recessive patterns.

2. These traits are still inherited in the forms of alleles passed from parent to offspring.

3. The environment can not only select for the presence of certain traits in a population, it can also allow certain genes to be expressed in an organism. Organisms of the same species in a different environment may not express these same genes.

4. Patterns of inheritance can be mapped using pedigree charts, and genetic composition of a family can be portrayed through multiple generations.

5. Genetic disorders can result from a variety of genetic and chromosomal mutations. Some are heritable and their pattern of inheritance can be mapped through families, others are not.

6. Genetic mutations can occur randomly or as the result of some inherited condition, or environmental factor. Mutations can have a wide variety of affects on the amino acid sequence of a protein and thus, protein function.

Essential Questions

1. How are the variety of phenotypes seen in human eye color, skin color, blood type etc. possible given what we have learned about dominant and recessive patterns of inheritance?

2. Why do some traits seem to be more common in one sex versus another?

3. How does the environment control gene expression and why do we notice certain traits are more common in some environments than others?

4. How can the appearance of a trait in certain members of a family, across different generations reveal how a trait is inherited?

5. How can genetic disorders result from genetic and chromosomal mutations and how can they be passed on?

Knowledge and Skills

Knowledge:

1. Genes can be controlled by patterns of inheritance other than dominant/recessive inheritance, such as incomplete dominance, codominance, sex-linked inheritance and others which differ from the simple dominant/recessive inheritance pattern.

2. Environmental conditions can affect gene expression.

3. Pedigree charts can be used to map inheritance of a trait through families.

4. Genetic mutations can have variety of effects on an individual given how the change in the genetic sequence alters a protein.

Skills:

1. Develop and use models to display understanding and convey ideas.

2. Identify problems by asking questions and work on designing solutions to these problems

3. Conduct and investigation based on a given problem.

4. Construct an explanations based on evidence gathered from a scientific investigation.

Assessments

https://docs.google.com/document/d/1wR7bQF-8AQoRrt0g4C3hKja0yjwDjC9_BiAmONWbTcI/edit?usp=sharing

Modifications

https://docs.google.com/document/d/1ODqaPP69YkcFiyG72fIT8XsUIe3K1VSG7nxuc4CpCec/edit