



Genetics 7-9 Syllabus

Course Goals

1 Mendelian Inheritance

Students understand the definition of a trait and discover how it is passed from generation to generation.

2 DNA Replication

Students learn how DNA replicates in preparation for cell division and how the structure of DNA leads to various proteins.

3 Real-World Applications

Students apply the principles of genetics they learn to issues including cancer, genetic engineering, and genome mapping.

Course Topics

1 Mendelism

Students learn about Punnett Squares and how they can be used to determine the traits of offspring.

2 Cell Structure and Life Cycle

Students learn about cell organelles and about how cells divide.

3 DNA

Students analyze the structure of DNA and understand how it is replicated.

4 Transcription and Translation

Students discover how the information coded in DNA becomes proteins.

5 Natural Selection

Students learn about how natural selection works and about the mutations that lead to it.

6 Cancer

Students learn about how cells can become cancerous.

7 Bacteria and Viruses

Students complete exercises to understand how bacteria and viruses replicate.

8 DNA Sequencing

Students learn about the process of DNA sequencing and genome mapping.

9 Genetic Engineering

Students discuss the ethics of genetic engineering and gene therapy after studying these concepts.

10 Pedigrees

Students create pedigree charts and understand how to analyze them.

Course Schedule

Day 1

Introduction to Course

Students are introduced to the instructor and the material they cover in the course.

Gregor Mendel

Students learn who Gregor Mendel is and the contributions he made to the study of genetics including the use of Punnett squares.

Punnett Squares

Students complete an activity to strengthen their understanding of how Punnett squares are used.

It's a Toss Up

Students participate in a coin-flipping activity to determine possible genetic combinations.

Mendel's Conclusions

Students discuss the conclusions that Mendel came to regarding traits along with some exceptions.

Incomplete Dominance and Co-Dominance

Students learn more about the exceptions to Mendel's conclusions.

Day 2

Cell Organelles

Students learn about the organelles that can be found in cells.

Analogies

Students create analogies for each part of the cell to further understand them.

Mitosis and the Cell Cycle

Students learn about the phases of mitosis as the cell cycle happens.

Mitosis Activity

Students complete an activity to more fully understand mitosis.

Meiosis

Students learn about the steps of meiosis and its differences from mitosis.

Meiosis Activity

Students complete an activity to solidify their understanding of meiosis

Day 3

Discovery of DNA

Students learn about how DNA was discovered and visualized.

Assembling DNA

Students use a magnetic kit to discover the shape of DNA and other properties.

DNA Modeling

Students create their own model of DNA using paper.

DNA Replication

Students learn how DNA replication works.

DNA: The Double Helix

Students review what they have learned so far about DNA.

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Extracting DNA

Student extract DNA from peas.

Day 4

Transcription

Students learn how the information in DNA is transcribed to create proteins.

Protein Synthesis

Students complete an activity to solidify their understanding of protein synthesis.

Translation

Students learn about how RNA is translated into a protein.

Protein Synthesis Continued

Students continue the progress they've made on their protein synthesis activity using their new knowledge.

Protein Flow Chart

Students fill out a flow chart to demonstrate their understanding of the process of creating a protein.

Coding for Words

Students re-enact protein transcription and translation through an activity that turns the classroom into a cell.

Day 5

Natural Selection

Students learn about the natural selection and discover examples of it.

Evolution

Students learn about evolution and the methods that drive it.

Mutated Coding for Words

Students participate in an activity to see how DNA can undergo mutations.

Mutations

Students receive more in-depth information about the types, effects, and causes of genetic mutations.

Mutations Activity

Students interact with a real-world example of mutations.

Day 6

Cancer

Students learn about what cancer is and how it affects DNA.

Media Claims and Cancer

Students examine advertisements for products that claim to prevent cancer and determine their accuracy.

Extranuclear Genetics

Students learn about other locations within a cell where DNA can be found.

Faces of Cancer

Students complete an activity to better understand the prognosis of cancer.

Day 7

Bacteria

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Students discover what bacteria are and how they reproduce.

Genetic Recombination

Students complete an activity to strengthen their understanding of genetic recombination.

Intro to Bacteria and Viruses

Students work to solidify their understanding of bacteria and are introduced to viruses.

Lysis

Students view a demonstration of the lytic cycle.

Viruses

Students receive more in-depth information about viruses.

Virus Cycles

Students strengthen their understanding of the different viral life cycles.

Intro to Bacteria and Viruses Continued

Students complete their initial introductory activity with their new knowledge of viruses.

Day 8

Genetic Diseases

Students learn about what genetic diseases are.

Sequencing DNA

Students learn how researchers can determine the sequence of DNA.

Human Genome Project

Students discover what the Human Genome Project is.

Cut-Off Genes

Students complete an activity to further understand how DNA is sequenced.

Genome Mapping

Students learn what genome mapping is and how it is important.

Day 9

Genetic Engineering

Students learn about the process of genetic engineering.

Genetic Engineering Activity

Students complete an activity to better understand how genetic engineering works.

Ethics

Students discuss the ethical considerations of genetic engineering.

Cloning

Students learn about how cloning works and what some real-life examples are.

Should We Clone?

Students discuss whether cloning is justified.

Differing Genetics Perspectives

Students explore the different opinions that individuals may hold regarding genetic engineering and cloning.

Final Project Preparation

Students receive an assignment to complete at home in preparation for the final day.

Day 10

Pedigrees

Students learn what pedigrees are and how they can be used.

Pedigree Activity

Students analyze several pedigree charts to learn how traits can be better understood.

Final Project

Students create pedigrees of their own traits to learn which alleles are dominant.

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