

Genetics

Unit 1: Introduction to Genetics

2 ½ weeks

Gen2, Gen8

Objectives	Methods	Resources	Assessment
<p>The student will:</p> <ul style="list-style-type: none">• Explain Mendel's principles of transmission genetics• Identify where biotechnology is used in today's society• Discuss the pros and cons of biotechnology in today's society• Distinguish between the stages of mitosis and meiosis	<ul style="list-style-type: none">• Lecture• Discussion• Group lab activity	<ul style="list-style-type: none">• Concepts of Genetics 8th edition, chapters 1 & 2• Chromosome beads• Genetics, Laboratory Investigations 13th edition, #4 – Cell Reproduction: Mitosis	<ul style="list-style-type: none">• Participation in class discussion• Responses to questions from workbook• Responses to lab investigation questions• Teacher made test

Genetics

Unit 2: Mendelian Genetics

3 weeks

Gen2, Gen6, Gen7

Objectives	Methods	Resources	Assessment
<p>The student will:</p> <ul style="list-style-type: none">• Review Mendel's principles of transmission genetics• Use Mendel's principles of transmission genetics to explain how an organisms' phenotype originate from its genotype• Use the probability laws to hypothesize the chance of various situations occurring• Use Chi-square analysis to determine if a set of data is possible by random chance• Explain the exceptions to Mendel's principles of transmission genetics and how the exceptions relate to an organisms phenotype• Support Mendel's principles of transmission genetics by conducting a monohybrid cross on <i>Drosophila</i>	<ul style="list-style-type: none">• Lecture• Discussion• Group lab activity	<ul style="list-style-type: none">• Concepts of Genetics 8th edition, chapter 3 & 4• Genetics, Laboratory Investigations 13th edition, #2 – Principles of Probability• Genetics, Laboratory Investigations 13th edition, #3 – The Chi-Square Test• Genetics, Laboratory Investigations 13th edition, #1 – <i>Drosophila</i> monohybrid crosses	<ul style="list-style-type: none">• Participation in class discussion• Responses to textbook questions• Responses to lab investigation questions• Lab report on monohybrid cross investigation• Teacher made test

Genetics

Unit 3: Chromosome Mapping

3 weeks

Gen2, Gen3, Gen6, Gen7

Objectives	Methods	Resources	Assessment
<p>The student will:</p> <ul style="list-style-type: none">• Differentiate between eukaryotic and prokaryotic genomes• Map genes on both eukaryotic and prokaryotic chromosomes• Explain how crossing over leads to recombinant gametes and genetic variation in eukaryotic organisms• Explain the various ways in which genes can recombine in prokaryotic organisms	<ul style="list-style-type: none">• Lecture• Discussion• Group lab activity	<ul style="list-style-type: none">• Concepts of Genetics 8th edition, chapters 5 & 6• Genetics, Laboratory Investigation 13th edition, #11 – Linkage and Crossing Over	<ul style="list-style-type: none">• Participation in class discussion• Responses to textbook questions• Lab report on crossing over investigation• Teacher made test

Genetics

Unit 4: Sex Determination & Chromosome Mutations

3 weeks

Gen2, Gen5, Gen6

Objectives	Methods	Resources	Assessment
<p>The student will:</p> <ul style="list-style-type: none">• Explain how an organism's chromosomes determine its gender• Explain the phenotypic results of humans having an extra sex chromosome in their karyotype• Explain why males are favored during conception over females• Explain the random inactivation of one of the X chromosomes in females• Explain how temperature can have an effect on the sex determination in reptiles• Recognize changes that occur in an organism's chromosome during meiosis• Explain how an offspring's phenotype is effected by chromosomes failing to separate during meiosis• Construct a karyotype• Diagnose a patient's genetic disorder based on their karyotype	<ul style="list-style-type: none">• Lecture• Discussion• Group lab activity	<ul style="list-style-type: none">• Concepts of Genetics 8th edition, chapters 7 & 8• Genetics, Laboratory Investigations 13th Edition, #10 – Human Chromosomes	<ul style="list-style-type: none">• Participation in class discussion• Responses to textbook questions• Responses to lab investigations questions• Diagnosis of an unknown individual's karyotype• Teacher made questions

Genetics

Unit 5: Extranuclear Inheritance & DNA Structure

3 weeks

Gen2

Objectives	Methods	Resources	Assessment
<p>The student will:</p> <ul style="list-style-type: none">• Explain that not all genetic material is located in the DNA of the organism's chromosomes• Explain that mitochondrial DNA is usually transmitted through the maternal gamete• Identify that DNA is the genetic material in all living things, except some viruses• Describe the Watson-Crick model of DNA• Describe a RNA model• Explain how the structure of DNA provides the basis for storing and expressing genetic information	<ul style="list-style-type: none">• Lecture• Discussion• Group lab activity	<ul style="list-style-type: none">• Concepts of Genetics 8th edition, chapters 9 & 10• DNA Profiling with Gel Electrophoresis, AP Biology workshop• Genetics, Laboratory Investigations 13th edition, #15 – Restriction Endonuclease Digestion and Gel Electrophoresis of DNA	<ul style="list-style-type: none">• Participation in class discussion• Responses to textbook questions• Responses to lab investigations questions• Determination of court case outcome based on gel electrophoresis• Teacher made questions

Genetics

Unit 6: DNA Replication & Organization

3 weeks

Gen3, Gen4

Objectives	Methods	Resources	Assessment
<p>The student will:</p> <ul style="list-style-type: none">• Defend the theory of semiconservative replication of DNA with scientific evidence• Describe semiconservative replication of DNA• Explain the roles of the various enzymes in the synthesis of DNA• Distinguish between prokaryotic and eukaryotic DNA replication• Distinguish between the organization of prokaryotic and eukaryotic DNA• Explain the presence of both repetitive DNA sequences and noncoding DNA sequences in genes	<ul style="list-style-type: none">• Lecture• Discussion	<ul style="list-style-type: none">• Concepts of Genetics 8th edition, chapters 11 & 12	<ul style="list-style-type: none">• Participation in class discussion• Responses to textbook questions• Teacher made questions

Genetics

Unit 7: The Genetic Code

3 ½ weeks

Gen2, Gen4

Objectives	Methods	Resources	Assessment
<p>The student will:</p> <ul style="list-style-type: none">• Explain why the genetic code is described as universal and triplet• Describe the process of transcription in DNA• Distinguish between the three types of RNA molecules• Describe the process of translation with RNA molecules• Distinguish between prokaryotic and eukaryotic translation• Distinguish between the four molecular shapes of proteins• Describe the various types of mutations that can occur in the genetic code	<ul style="list-style-type: none">• Lecture• Discussion• Group lab activity	<ul style="list-style-type: none">• Concepts of Genetics 8th edition, chapters 13, 14, & 15• Protein Synthesis Lab, AP Biology workshop	<ul style="list-style-type: none">• Participation in class discussion• Responses to textbook questions• Responses to lab investigation questions• Teacher made questions

Genetics

Unit 8: Regulating Gene Expression

3 weeks

Gen2, Gen4

Objectives	Methods	Resources	Assessment
<p>The student will:</p> <ul style="list-style-type: none">• Describe the regulatory mechanisms that exert control over transcription in prokaryotic and eukaryotic organisms• Distinguish between positive and negative control of gene expression• Distinguish between transcription being inducible or repressible• Describe how DNA methylation is important to regulating gene expression in eukaryotes• Describe various techniques in eukaryotes for posttranscriptional regulation of gene expression	<ul style="list-style-type: none">• Lecture• Discussion• Group lab activity	<ul style="list-style-type: none">• Concepts of Genetics 8th edition, chapters 16 & 17• Modeling Prokaryotic Operons, Carolina Biological Activities	<ul style="list-style-type: none">• Participation in class discussion• Responses to textbook questions• Responses to lab investigation questions• Teacher made questions

Genetics

Unit 9: Recombinant DNA

3 weeks

Gen

Objectives	Methods	Resources	Assessment
<p>The student will:</p> <ul style="list-style-type: none">• Explain how recombinant DNA technology can create artificial combinations of DNA molecules• Illustrate the technique of PCR (Polymerase Chain Reaction) and explain its uses• Explain how the use of recombinant DNA technology has revolutionized our ability to investigate the genomes of diverse species	<ul style="list-style-type: none">• Lecture• Discussion• Group lab activity	<ul style="list-style-type: none">• Concepts of Genetics 8th edition, chapter 19	<ul style="list-style-type: none">• Participation in class discussion• Responses to questions from workbook• Responses to lab investigation questions• Teacher made test

Genetics

Unit 10: Ethics

3 weeks

Gen8

Objectives	Methods	Resources	Assessment
<p>The student will:</p> <ul style="list-style-type: none">Identify various areas in which biotechnology has revolutionized the way humans work in agriculture, medicine, and forensicsResearch a current bioethical issue and present their opinion on the topic based on scripture	<ul style="list-style-type: none">LectureDiscussionResearch	<ul style="list-style-type: none">Concepts of Genetics 8th edition, chapter 22	<ul style="list-style-type: none">Participation in class discussionPresentation of research paper