



# Wyoming Department of Education Required Virtual Education Course Syllabus

## Sweetwater County School District #1

### Course Information

<b>Program Name</b>	Sweetwater County School District #1 Online Learning
<b>Course ID</b>	SC438SV
<b>Course Name</b>	Genetics
<b>SCED Code</b>	03059G0
<b>Content Area</b>	Science
<b>Grade Level</b>	10-12
<b># of Credits</b>	.5
<b>Curriculum Type</b>	Blended
<b>Please give a concise description of this course including the purpose and what students will demonstrate and/or gain from this course.</b>	
This course is about the inheritance patterns of living things. Students will be expected to utilize genetic concepts and apply them to living things.	

### Wyoming Content and Performance Standards

<b>Standard</b>	<b><u><a href="#">BENCHMARK (Standard/Indicator) Use the Standards and Benchmarks as Spreadsheets</a></u></b>
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.
HS-LS1-4	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
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.

### Wyoming Content and Performance Standards

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
HS-LS3-3	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.
HS-LS4-1	Apply concepts of statistics and probability to explain the variation and distribution of expressed traits in a population.
HS-LS4-2	Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment
HS-LS4-3	Apply concepts of statistics and probability to support explanations that organisms with an advantageous heritable trait tend to increase in proportion to organisms lacking this trait
HS-LS4-4	Construct an explanation based on evidence for how natural selection leads to adaptation of populations.
LS-LS4-5	Evaluate the evidence supporting claims that changes in environmental conditions may result in: (1) increases in the number of individuals of some species, (2) the emergence of new species over time, and (3) the extinction of other species

### Scope and Sequence

Unit Outline	Standard #	Outcomes Objectives/Student Centered Goals
<p>Introduction</p> <p>This unit will cover the basic vocabulary, pioneers of genetics and a basic review of concepts from Biology.</p>	HS-LS1-1	Students will construct a presentation that will address the contributions of genetics pioneers such as Francis Crick, Gregor Mendel, Charles Darwin and Barbara McClintock. Students will review through a series of activities genetics concepts learned in Biology.
<p>Cell Division and Chromosomes</p> <p>This unit will cover the basics of DNA structure and function. It will cover the basics of Mitosis and Meiosis. It will cover the process of protein synthesis. It will introduce the concept of karyotyping.</p>	HS-LS1-1 HS-LS1-4 HS-LS3-1	<p>Students will construct a working model of DNA</p> <p>Students will construct a model of a plant and animal cell using computer programming.</p> <p>Students will construct a model of a human karyotype</p> <p>Students will perform a lab that demonstrates protein synthesis.</p>

### Scope and Sequence

<p><b>Basics of Mendelian Genetics</b> This unit will cover the use of a Punnett square to determine genotypes and phenotypes of living things. This unit will also cover multiple trait Punnett squares and how to determine dominant and recessive traits.</p>	HS-LS3-2	Students will be able to explain differences between an autosomal and X-linked dominant and recessive gene through a series of lab experiences.
<p><b>Beyond Mendel</b> This unit will continue to build upon concepts learned in the previous unit with an emphasis on real world scenarios such as cattle breeding, plant breeding and using living things for medical purposes.</p>	HS-LS3-2	Students will 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 by solving real world problems related to the agricultural and medical industries.
<p><b>Linkage and Linkage Mapping</b> This unit will focus on the Hardy-Weinberg Law and its applications.</p>	HS-LS3-2	Students will through a series of activities be able to explain how the unique genotypes and phenotypes of humans such as eye color, skin color and hair color occur.
<p><b>Recombinant DNA and Contemporary Issues</b> This unit will focus on stem cell research and its' implications. This unit will introduce the student to DNA recombination techniques. This unit will address contemporary issues such as designer babies, eugenics and our food supply as it relates to genetically modified foods.</p>	HS-LS3-2	Students will 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. This will be done using a debate format in which students will be given an anti-eugenic view or eugenic view in which the student must defend the practice. Students will also through a series of activities learn about Stem cells and their roll in life development and medical purposes.
<p><b>Population Genetics</b> This unit will focus on the application of genetic principles to living and non-living populations as it relates to genotyping and phenotyping.</p>	HS-LS3-3 HS-LS4-2 HS-LS4-3 HS-LS4-4 HS-LS4-5	Student through a series of activities will apply the Hardy-Weinberg Law to several real-world situations. Students will also work through Howard Hughes Medical Institute data on malaria to discover patterns and evidence of the spread or halt of spreading of the disease. Students will also be introduced to a child who inherited a genetic disease and how that child copes with it.

### Scope and Sequence

<p><b>Geographical Information Systems</b> This unit will focus on documenting genotyping and phenotyping using mapping techniques to look for trends and patterns.</p>	<p>HS-LS4-5</p>	<p>Students, using ArcGIS software, will create a map of a chosen genotype or phenotype in humans. Students will be researching for data to complete their map.</p>
<p><b>Gel Electrophoresis</b> This project will enable students to do a real-world lab experience to obtain a real DNA fingerprint.</p>	<p>HS-LS4-1</p>	<p>Students will communicate scientific information about the results of their lab and how it can be applied or is being applied to real world situations.</p>