



West Windsor-Plainsboro Regional School District
Course Title: Human Anatomy and Physiology
Grades: 11-12

The Mission of the West Windsor-Plainsboro Science Department

Our mission is to cultivate science learners who have the foundational knowledge to make ethical, scientifically literate decisions and the ability to apply scientific practices in order to contribute to the needs of society and a changing world.

- **Vision**

We envision a K-12 science experience that supports and challenges every student in their science learning journey. We will:

- *Capitalize on diversity by reaching and exciting students at all levels and interests by differentiating learning within classrooms and by offering a robust program of studies.*
- *Emphasize authentic science and engineering practices and leverage the interdisciplinary nature of science with arts, technology, math, reading, and writing.*
- *Integrate scientific knowledge and 21st century competencies to prepare students to make informed decisions and take action to address real world problems.*

Theme 1: Strength and Movement

Unit 1 The Skeletal System

Content Area: Science

Course & Grade Level: Human Anatomy and Physiology , 9-12

Summary and Rationale

The skeletal system is composed of a complex combination of tissues. Many of these tissues are embedded in a non-living matrix. Together they provide the body with a framework for structure and movement. The skeleton also contributes to homeostasis in surprising ways.

Recommended Pacing

4 weeks

NGSS Standards/Performance Expectations

Standard	
HS-LS1-1	Construct an explanation based on evidence for how the structure of proteins which carry out the essential functions of life through systems of specialized cells
HS-LS1-2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms <i>[Clarification Statement: Emphasis is on functions at the organism system level such as nutrient uptake, water delivery, and organism movement in response to neural stimuli. An example of an interacting system could be an artery depending on the proper function of elastic tissue and smooth muscle to regulate and deliver the proper amount of blood within the circulatory system.]</i>
HS-ESS3-1	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.

Social Justice & Equity in the Science Classroom

Denial of Green Space

- Students recognize and examine the connection between access to green space and musculoskeletal health

Socioeconomic Status & Bone Mineral Density

Diseases of the Musculoskeletal Systems

- Students explore and share how disruptions to homeostasis result in disease

Climate Change Integration

Denial of Green Space & impact of climate change on denial

- In what ways is the climate crisis exacerbating existing threats to our well being (longer droughts- food insecurities; rising seas; air quality)

New Jersey Student Learning Standards for English Language Arts Companion Standards

English Language Arts/Literacy

- Cite specific textual evidence to support analysis of science and technical texts describing the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
- Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring, resolving conflicting information when possible.
- Cite specific textual evidence to support analysis of science and technical texts describing the ways that inheritable genetic variation occurs, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
- Write arguments, based on evidence, that inheritable genetic variations may result from new genetic combinations through meiosis, viable errors occurring during replication, and/or mutations caused by environmental factors.

New Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills	
9.1.12.CFR.1:	Compare and contrast the role of philanthropy, volunteer service, and charities in community development and quality of life in a variety of cultures.
9.4.12.CI.2:	Identify career pathways that highlight personal talents, skills, and abilities
9.4.12.CT.3:	Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice)
9.4.12.IML.2:	Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources
9.4.12.IML.5:	Evaluate, synthesize, and apply information on climate change from various sources appropriately
9.4.12.IML.7:	Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change
Interdisciplinary Standards	
<i>Mathematics</i>	
<ul style="list-style-type: none"> Represent symbolically evidence that inheritable genetic variations may result from new genetic combinations through meiosis, viable errors occurring during replication, and/or mutations caused by environmental factors, and manipulate the representing symbols. Make sense of quantities and relationships to describe and predict the ways in which inheritable genetic variation occurs. Represent the variation and distribution of expressed traits in a population symbolically and manipulate the representing symbols. Make sense of quantities and relationships to describe and predict the variation and distribution of expressed traits in a population. 	
<i>Social Studies</i>	
<p>Standard 6.1 U.S. History: America in the World. All students will acquire the knowledge and skills to think analytically about how past and present interactions of people, cultures, and the environment shape the American heritage. Such knowledge and skills enable students to make informed decisions that reflect fundamental rights and core democratic values as productive citizens in local, national, and global communities.</p> <p>Standard 6.2 World History: Global Studies: All students will acquire the knowledge and skills to think analytically and systematically about how past interactions of people, cultures, and the environment affect issues across time and cultures. Such knowledge and skills enable students to make informed decisions as socially and ethically responsible world citizens in the 21st century.</p>	

Instructional Focus
Unit Enduring Understandings
<ul style="list-style-type: none"> The skeletal system provides a framework for protection and leverage in the human body. The skeletal system is responsible for red blood cell production and essential mineral and lipid storage.
Unit Essential Questions
<ul style="list-style-type: none"> How is the skeletal system of the body both similar to and different from the structural framework of a house?
Content Statement
<ul style="list-style-type: none"> Systems of specialized cells within organisms help them perform the essential functions of life (HS-LS1-1) All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells.(HS-LS1-1) Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. ((HS-LS1-2) Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change with some. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the human body. (HS-LS1-3) Although the skeletal system can function independently, many of its activities are integrated with other organ systems. (HS-LS1-1)
Ability Objectives: General for all units.

- Develop and carry out scientific investigations.
- Obtain, evaluate and communicate information to develop technological and scientific literacy, and an understanding of the role of information technologies in modern scientific endeavors.
- Develop and use models to explain complex processes and the functionality of systems within the human body.
- Analyze and interpret data and communicate information using a variety of modalities.
- Use mathematics and computational thinking to support scientific conclusions.
- Engage in argument from evidence to explain natural phenomena as observed within the human body.
- Construct explanations and design solutions for complex real world enviro-engineering problems impacting the integrity and vitality of the human organism.

Sample Performance Tasks - Specific for Unit : SWBAT:

- Construct an explanation based on observations of joints to identify patterns that relate the structure of joints to its function (HS-LS1-2)
- Summarize how the skeletal system integrates with other body systems to maintain homeostasis (HS-LS1-3)
- Construct an explanation based on observations from microscope slides to identify patterns that relate the structure of bone to its function (HS-LS1-1)
- Differentiate between the types of osseous tissue in the body using the differences in structural features present in each type of tissue (HS-LS1-1)
- Describe changes at the cellular, tissue and organ level that result in certain human diseases. (HS-LS3-3)
- Pose questions and explain how connective tissue abnormalities result in physical and emotional manifestations(HS-LS3-3)

Evidence of Learning

Assessment

Common Assessment and/or
Unit Assessment

Unit 2 The Muscular System

Content Area: Science

Course & Grade Level: Human Anatomy and Physiology, 9-12

Summary and Rationale

Having studied the skeleton, students engage in an analysis of the muscles that move the skeleton, as well as the muscle tissue responsible for involuntary movements and heart contractions.

Recommended Pacing

4 weeks

NGSS Standards/Performance Expectations

Standard	
HS-LS1-1	Construct an explanation based on evidence for how the structure of proteins which carry out the essential functions of life through systems of specialized cells
HS-LS1-2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms [Clarification Statement: Emphasis is on functions at the organism system level such as nutrient uptake, water delivery, and organism movement in response to neural stimuli. An example of an interacting system could be an artery depending on the proper function of elastic tissue and smooth muscle to regulate and deliver the proper amount of blood within the circulatory system.]
HS-LS1-3	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis [Clarification Statement: Examples of investigations could include heart rate response to exercise, stomate response to moisture and temperature, and root development in response to water levels.]
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 [Clarification Statement: Emphasis is on using data to support arguments for the way variation occurs.]
HS-ESS3-1	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.

Social Justice & Equity in the Science Classroom

Denial of Green Space

- Students recognize and examine the connection between access to green space and musculoskeletal health

Diseases of the Musculoskeletal Systems

- Students explore and share how disruptions to homeostasis result in disease

Climate Change Integration

Denial of Green Space & impact of climate change on denial

- In what ways is the climate crisis exacerbating existing threats to our well being (longer droughts- food insecurities; rising seas; air quality)

Effects of Climate on Vertebrate Skeletal Muscle

New Jersey Student Learning Standards for English Language Arts Companion Standards

English Language Arts/Literacy

- Cite specific textual evidence to support analysis of science and technical texts describing the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
- Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring, resolving conflicting information when possible.
- Cite specific textual evidence to support analysis of science and technical texts describing the ways that inheritable genetic variation occurs, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
- Write arguments, based on evidence, that inheritable genetic variations may result from new genetic combinations through meiosis, viable errors occurring during replication, and/or mutations caused by environmental factors.

New Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills

9.1.12.CFR.1:	Compare and contrast the role of philanthropy, volunteer service, and charities in community development and quality of life in a variety of cultures.
9.4.12.CI.2:	Identify career pathways that highlight personal talents, skills, and abilities
9.4.12.CT.3:	Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice)
9.4.12.IML.2:	Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources
9.4.12.IML.5:	Evaluate, synthesize, and apply information on climate change from various sources appropriately
9.4.12.IML.7:	Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change

Interdisciplinary Standards (fill-in Science, or SS, or Math, etc..)

Mathematics

- Represent symbolically evidence that inheritable genetic variations may result from new genetic combinations through meiosis, viable errors occurring during replication, and/or mutations caused by environmental factors, and manipulate the representing symbols. Make sense of quantities and relationships to describe and predict the ways in which inheritable genetic variation occurs.
- Represent the variation and distribution of expressed traits in a population symbolically and manipulate the representing symbols. Make sense of quantities and relationships to describe and predict the variation and distribution of expressed traits in a population.

Social Studies

Standard 6.1 U.S. History: America in the World. All students will acquire the knowledge and skills to think analytically about how past and present interactions of people, cultures, and the environment shape the American heritage. Such knowledge and skills enable students to make informed decisions that reflect fundamental rights and core democratic values as productive citizens in local, national, and global communities.

Standard 6.2 World History: Global Studies: All students will acquire the knowledge and skills to think analytically and systematically about how past interactions of people, cultures, and the environment affect issues across time and cultures. Such knowledge and skills enable students to make informed decisions as socially and ethically responsible world citizens in the 21st century.

Instructional Focus

Unit Enduring Understandings

- Movement, posture, and support are made possible by the three types of muscle tissue.
- Muscles use energy to provide heat which maintains body temperature.

Unit Essential Questions

- Why are heat and muscle-movement inextricably connected?
- How does the muscular system turn bones into levers?

<ul style="list-style-type: none"> How does muscle tonus tone us?
Content Statement
<ul style="list-style-type: none"> Systems of specialized cells within organisms help them perform the essential functions of life (HS-LS1-1) All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells.(HS-LS1-1) Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2) Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change with some. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the human body. (HS-LS1-3) Although the muscular system can function independently, many of its activities are integrated with other organ systems. (HS-LS1-1)
Ability Objectives: General for all units. <ul style="list-style-type: none"> Develop and carry out scientific investigations. Obtain, evaluate and communicate information to develop technological and scientific literacy, and an understanding of the role of information technologies in modern scientific endeavors. Develop and use models to explain complex processes and the functionality of systems within the human body. Analyze and interpret data and communicate information using a variety of modalities. Use mathematics and computational thinking to support scientific conclusions. Engage in argument from evidence to explain natural phenomena as observed within the human body. Construct explanations and design solutions for complex real world enviro-engineering problems impacting the integrity and vitality of the human organism.
Sample Performance Tasks - Specific for Unit : SWBAT: <ul style="list-style-type: none"> Summarize patterns that explain how muscles are attached to bones (HS-LS1-2) Construct an explanation based on observations from microscopic slides to identify patterns that relate the structure of muscle to its function (HS-LS1-1) Identify how a muscle is an organ composed of many tissues that perform various functions (HS-LS1-2) Summarize how the muscular system integrates with other body systems to maintain homeostasis (HS-LS1-3) Describe changes at the cellular, tissue and organ level that result in certain human diseases. (HS-LS3-3) Develop a model that explains the mechanism involved in muscle contraction (HS-LS1-2)
Evidence of Learning
Assessment
Common Assessment and/or Unit Assessment and/or Presentation of Model

Theme II: Pump & Pipes

Unit 3 The Cardiovascular System

Content Area: Science

Course & Grade Level: Human Anatomy and Physiology , 9-12

Summary and Rationale

In this unit students study blood, its components, and how it's distributed throughout the body. As in previous units there is a heavy emphasis on the relationship between structure and function.

Recommended Pacing

4 weeks

NGSS Standards/Performance Expectations

Standard	
HS-LS1-1	Construct an explanation based on evidence for how the structure of proteins which carry out the essential functions of life through systems of specialized cells
HS-LS1-2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms [Clarification Statement: Emphasis is on functions at the organism system level such as nutrient uptake, water delivery, and organism movement in response to neural stimuli. An example of an interacting system could be an artery depending on the proper function of elastic tissue and smooth muscle to regulate and deliver the proper amount of blood within the circulatory system.]
HS-LS1-3	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis [Clarification Statement: Examples of investigations could include heart rate response to exercise, stomate response to moisture and temperature, and root development in response to water levels.]
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 [Clarification Statement: Emphasis is on using data to support arguments for the way variation occurs.]
HS-ESS3-1	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.

Social Justice & Equity in the Science Classroom

[Environmental Racism](#)

Access to Healthcare

[Asthma in Urban Spaces](#)

Diseases of the Cardiovascular System

- Students explore and share how disruptions to homeostasis result in disease

Climate Change Integration

Impact of Pollution on Cardiovascular System

New Jersey Student Learning Standards for English Language Arts Companion Standards

English Language Arts/Literacy

- Cite specific textual evidence to support analysis of science and technical texts describing the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

- Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring, resolving conflicting information when possible.
- Cite specific textual evidence to support analysis of science and technical texts describing the ways that inheritable genetic variation occurs, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
- Write arguments, based on evidence, that inheritable genetic variations may result from new genetic combinations through meiosis, viable errors occurring during replication, and/or mutations caused by environmental factors.

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9.4.12.IML.2:	Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources
9.4.12.IML.5:	Evaluate, synthesize, and apply information on climate change from various sources appropriately
9.4.12.IML.7:	Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change

Interdisciplinary Standards (fill-in Science, or SS, or Math, etc..)

Mathematics

- Represent symbolically evidence that inheritable genetic variations may result from new genetic combinations through meiosis, viable errors occurring during replication, and/or mutations caused by environmental factors, and manipulate the representing symbols. Make sense of quantities and relationships to describe and predict the ways in which inheritable genetic variation occurs.
- Represent the variation and distribution of expressed traits in a population symbolically and manipulate the representing symbols. Make sense of quantities and relationships to describe and predict the variation and distribution of expressed traits in a population.

Social Studies

Standard 6.1 U.S. History: America in the World. All students will acquire the knowledge and skills to think analytically about how past and present interactions of people, cultures, and the environment shape the American heritage. Such knowledge and skills enable students to make informed decisions that reflect fundamental rights and core democratic values as productive citizens in local, national, and global communities.

Standard 6.2 World History: Global Studies: All students will acquire the knowledge and skills to think analytically and systematically about how past interactions of people, cultures, and the environment affect issues across time and cultures. Such knowledge and skills enable students to make informed decisions as socially and ethically responsible world citizens in the 21st century.

Instructional Focus

Unit Enduring Understandings

- The cardiovascular system delivers essential materials and provides a means of waste removal by pumping blood through a system of vessels.
- Blood is a unique fluid tissue whose components allow for homeostasis of both temperature and chemical composition in the body.

Unit Essential Questions

- What story does your blood tell?

<ul style="list-style-type: none"> • What sets a HAPPY heart apart? • If arteries and veins have different structure for different functions, then why do cardiac surgeons use veins in coronary artery bypass surgery?
Content Statement <ul style="list-style-type: none"> • Systems of specialized cells within organisms help them perform the essential functions of life (HS-LS1-1) • All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells.(HS-LS1-1) • Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. ((HS-LS1-2) • Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change with some. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the human body. (HS-LS1-3) • Although the cardiovascular system can function independently, many of its activities are integrated with other organ systems. (HS-LS1-1)
Ability Objectives: General for all units. <ul style="list-style-type: none"> • Develop and carry out scientific investigations. • Obtain, evaluate and communicate information to develop technological and scientific literacy, and an understanding of the role of information technologies in modern scientific endeavors. • Develop and use models to explain complex processes and the functionality of systems within the human body. • Analyze and interpret data and communicate information using a variety of modalities. • Use mathematics and computational thinking to support scientific conclusions. • Engage in argument from evidence to explain natural phenomena as observed within the human body. • Construct explanations and design solutions for complex real world enviro-engineering problems impacting the integrity and vitality of the human organism.
Sample Performance Tasks - Specific for Unit : SWBAT: <ul style="list-style-type: none"> • Construct visual explanations that summarize how defects in the structure of the heart causes defects in the functioning of the heart (HS-LS1-2) • Model the structure of the heart and relate how each component contributes to its function (HS-LS1-1 (HS-LS1-2) • Describe changes at the cellular, tissue and organ level that result in certain human diseases. (HS-LS3-3) • Explain how feedback mechanisms in the cardiovascular system are used in the human body to maintain a constant internal environment.(HS-LS1-3)(HS-LS1-2) • Model how the flow of blood through the parts of the human body involves multiple blood vessel circuits (HS-LS1-2) • Explain the cause and effect relationship between injury, the blood clotting cascade and tissue repair (HS-LS1-1) • Summarize how the cardiovascular system integrates with other body systems to maintain homeostasis (HS-LS1-3)
Evidence of Learning
Assessment Common Assessment and/or Unit Assessment

Unit 4: The Respiratory System

Content Area: Science

Course & Grade Level: Human Anatomy and Physiology, 9-12

Summary and Rationale

The exchange of oxygen and carbon dioxide with the environment is a problem all aerobic species have solved albeit in different ways. As terrestrial organisms humans must exchange these gases with air. The human respiratory system is well adapted to performing this task. In this unit students study the structure and function of the system that facilitates the exchange of respiratory gasses.

Recommended Pacing

2 weeks

NGSS Standards/Performance Expectations

Standard	
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HS-LS1-2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms [Clarification Statement: Emphasis is on functions at the organism system level such as nutrient uptake, water delivery, and organism movement in response to neural stimuli. An example of an interacting system could be an artery depending on the proper function of elastic tissue and smooth muscle to regulate and deliver the proper amount of blood within the circulatory system.]
HS-LS1-3	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis [Clarification Statement: Examples of investigations could include heart rate response to exercise, stomate response to moisture and temperature, and root development in response to water levels.]
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 [Clarification Statement: Emphasis is on using data to support arguments for the way variation occurs.]
HS-ESS3-1	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.

Social Justice in the Science Classroom

Environmental Racism

Asthma in Urban Spaces

Diseases of the Respiratory System

- Students explore and share how disruptions to homeostasis result in disease

Climate Change Integration

Particulate Matter impacting Cardiovascular System

Impact of Pollution on Respiratory System

- [Video](#)
- [Global Pandemic Ted Talk](#)

Increased Respiratory diseases

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9.4.12.IML.7:	Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change

Interdisciplinary Standards (fill-in Science, or SS, or Math, etc..)

Mathematics

- Represent symbolically evidence that inheritable genetic variations may result from new genetic combinations through meiosis, viable errors occurring during replication, and/or mutations caused by environmental factors, and manipulate the representing symbols. Make sense of quantities and relationships to describe and predict the ways in which inheritable genetic variation occurs.
- Represent the variation and distribution of expressed traits in a population symbolically and manipulate the representing symbols. Make sense of quantities and relationships to describe and predict the variation and distribution of expressed traits in a population.

Social Studies

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Standard 6.2 World History: Global Studies: All students will acquire the knowledge and skills to think analytically and systematically about how past interactions of people, cultures, and the environment affect issues across time and cultures. Such knowledge and skills enable students to make informed decisions as socially and ethically responsible world citizens in the 21st century.

Instructional Focus

Unit Enduring Understandings

- The respiratory system provides a physiological mechanism for gas exchange and a means for vocalization.

Unit Essential Questions

- Why do we drown?

<ul style="list-style-type: none"> • Why can't chimps speak but we can? • Why do many endurance athletes train at high altitudes?
Content Statement <ul style="list-style-type: none"> • Systems of specialized cells within organisms help them perform the essential functions of life (HS-LS1-1) • All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells.(HS-LS1-1) • Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. ((HS-LS1-2) • Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change with some. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the human body. (HS-LS1-3) • Although the respiratory system can function independently, many of its activities are integrated with other organ systems. (HS-LS1-1)
Ability Objectives: General for all units. <ul style="list-style-type: none"> • Develop and carry out scientific investigations. • Obtain, evaluate and communicate information to develop technological and scientific literacy, and an understanding of the role of information technologies in modern scientific endeavors. • Develop and use models to explain complex processes and the functionality of systems within the human body. • Analyze and interpret data and communicate information using a variety of modalities. • Use mathematics and computational thinking to support scientific conclusions. • Engage in argument from evidence to explain natural phenomena as observed within the human body. • Construct explanations and design solutions for complex real world enviro-engineering problems impacting the integrity and vitality of the human organism.
Sample Performance Tasks - Specific for Unit : SWBAT: <ul style="list-style-type: none"> • Describe changes at the cellular, tissue and organ level that result in certain human diseases. (HS-LS3-3) • Model the structures of the respiratory system and relate how each component contributes to the overall function and mechanics of breathing (HS-LS1-1 (HS-LS1-2) • Construct a graphic to compare and contrast the physiological mechanisms of gas exchange and transport of carbon dioxide and oxygen(HS-LS1-1) • Summarize how the respiratory system integrates with other body systems to maintain homeostasis (HS-LS1-3)
Evidence of Learning
Assessment
Common Assessment and/or Unit Assessment and/or Presentation

Theme III: Nutrition

Unit 5: The Digestive System	
Content Area: Science	
Course & Grade Level: Human Anatomy and Physiology, 9-12	
Summary and Rationale	
Every animal needs to obtain nutrients and energy from its environment, make these nutrients usable, and get these nutrients to all of the cells of the body. The human digestive system is well adapted to the mechanical and chemical breakdown of nutrients and to absorbing them for distribution. In this unit students will explore the structure and function of the gastro-intestinal tract from the mouth to the anus, including the ancillary organs such as the liver and pancreas.	
Recommended Pacing	
4 weeks	
NGSS Standards/Performance Expectations	
Standard 5.1	
Standard	
HS-LS1-1	Construct an explanation based on evidence for how the structure of proteins which carry out the essential functions of life through systems of specialized cells
HS-LS1-2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms [Clarification Statement: Emphasis is on functions at the organism system level such as nutrient uptake, water delivery, and organism movement in response to neural stimuli. An example of an interacting system could be an artery depending on the proper function of elastic tissue and smooth muscle to regulate and deliver the proper amount of blood within the circulatory system.]
HS-LS1-3	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis [Clarification Statement: Examples of investigations could include heart rate response to exercise, stomate response to moisture and temperature, and root development in response to water levels.]
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 [Clarification Statement: Emphasis is on using data to support arguments for the way variation occurs.]
HS-LS1-6.	Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules. [Clarification Statement: Emphasis is on using evidence from models and simulations to support explanations.]
HS-ESS3-1	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.
Social Justice & Equity in the Science Classroom	
Food deserts	
Climate Change Integration	
Changing climate changes where crops can grow	
New Jersey Student Learning Standards for English Language Arts Companion Standards	
<i>English Language Arts/Literacy</i>	

- Cite specific textual evidence to support analysis of science and technical texts describing the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
- Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring, resolving conflicting information when possible.
- Cite specific textual evidence to support analysis of science and technical texts describing the ways that inheritable genetic variation occurs, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
- Write arguments, based on evidence, that inheritable genetic variations may result from new genetic combinations through meiosis, viable errors occurring during replication, and/or mutations caused by environmental factors.

New Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills

9.1.12.CFR.1:	Compare and contrast the role of philanthropy, volunteer service, and charities in community development and quality of life in a variety of cultures.
9.4.12.CI.2:	Identify career pathways that highlight personal talents, skills, and abilities
9.4.12.CT.3:	Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice)
9.4.12.IML.2:	Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources
9.4.12.IML.5:	Evaluate, synthesize, and apply information on climate change from various sources appropriately
9.4.12.IML.7:	Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change

Interdisciplinary Standards (fill-in Science, or SS, or Math, etc..)

Mathematics

- Represent symbolically evidence that inheritable genetic variations may result from new genetic combinations through meiosis, viable errors occurring during replication, and/or mutations caused by environmental factors, and manipulate the representing symbols. Make sense of quantities and relationships to describe and predict the ways in which inheritable genetic variation occurs.
- Represent the variation and distribution of expressed traits in a population symbolically and manipulate the representing symbols. Make sense of quantities and relationships to describe and predict the variation and distribution of expressed traits in a population.

Social Studies

Standard 6.1 U.S. History: America in the World. All students will acquire the knowledge and skills to think analytically about how past and present interactions of people, cultures, and the environment shape the American heritage. Such knowledge and skills enable students to make informed decisions that reflect fundamental rights and core democratic values as productive citizens in local, national, and global communities.

Standard 6.2 World History: Global Studies: All students will acquire the knowledge and skills to think analytically and systematically about how past interactions of people, cultures, and the environment affect issues across time and cultures. Such knowledge and skills enable students to make informed decisions as socially and ethically responsible world citizens in the 21st century.

Instructional Focus

Unit Enduring Understandings

- The digestive system breaks down food mechanically and chemically to provide the materials for energy use and maintenance of body cells.
- Physical health is achieved through a combination of sound nutritional habits and a lifetime of daily exercise.

Unit Essential Questions
<ul style="list-style-type: none"> • What happens when you starve to death? • What is the eventual fate of the average couch potato? • How do you get the perfect body?
Content Statement
<ul style="list-style-type: none"> • Systems of specialized cells within organisms help them perform the essential functions of life (HS-LS1-1) • All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells.(HS-LS1-1) • Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. ((HS-LS1-2) • Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change with some. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the human body. (HS-LS1-3) • Although the digestive system can function independently, many of its activities are integrated with other organ systems. (HS-LS1-1)
Ability Objectives: General for all units. <ul style="list-style-type: none"> • Develop and carry out scientific investigations. • Obtain, evaluate and communicate information to develop technological and scientific literacy, and an understanding of the role of information technologies in modern scientific endeavors. • Develop and use models to explain complex processes and the functionality of systems within the human body. • Analyze and interpret data and communicate information using a variety of modalities. • Use mathematics and computational thinking to support scientific conclusions. • Engage in argument from evidence to explain natural phenomena as observed within the human body. • Construct explanations and design solutions for complex real world enviro-engineering problems impacting the integrity and vitality of the human organism.
Sample Performance Tasks - Specific for Unit : SWBAT: <ul style="list-style-type: none"> • Model the structure of the digestive system and relate how each component contributes to the overall function of the digestive system (HS-LS1-1 (HS-LS1-2) • Explain how feedback mechanisms are used in the human body to regulate nutrient uptake and utilization (HS-LS1-2) • Summarize how the digestive system integrates with other body systems to maintain homeostasis (HS-LS1-3) • Describe changes at the cellular, tissue and organ level that result in certain human diseases. (HS-LS3-3) • Create a presentation showing how the processes, structures and molecules breakdown and absorb a turkey or tofu sandwich (HS-LS1-6)
Evidence of Learning
Assessment
Common Assessment and/or Unit Assessment and/or Presentation

Unit 6 The Excretory System

Content Area: Science

Course & Grade Level: Human Anatomy and Physiology, 9-12

Summary and Rationale

Metabolism produces toxic wastes that must be removed from the body. The human body is faced with the challenge of ridding itself of these wastes without also losing water, a limited commodity for terrestrial species. In this unit students explore the structure and function of the excretory system from the cellular level to the organ level, and learn how the kidney's nephrons are constantly balancing the removal of wastes with the regulation of water and a host of solutes.

Recommended Pacing

2 weeks

NGSS Standards/Performance Expectations

Standard	
HS-LS1-1	Construct an explanation based on evidence for how the structure of proteins which carry out the essential functions of life through systems of specialized cells
HS-LS1-2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms [Clarification Statement: Emphasis is on functions at the organism system level such as nutrient uptake, water delivery, and organism movement in response to neural stimuli. An example of an interacting system could be an artery depending on the proper function of elastic tissue and smooth muscle to regulate and deliver the proper amount of blood within the circulatory system.]
HS-LS1-3	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis [Clarification Statement: Examples of investigations could include heart rate response to exercise, stomate response to moisture and temperature, and root development in response to water levels.]
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 [Clarification Statement: Emphasis is on using data to support arguments for the way variation occurs.]
HS-ESS3-1	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.

Social Justice & Equity in the Science Classroom

[Socioeconomic status and the risk of colorectal cancer](#)

Climate Change Integration

[Changing climate changes where crops can grow](#)

New Jersey Student Learning Standards for English Language Arts Companion Standards

English Language Arts/Literacy

- Cite specific textual evidence to support analysis of science and technical texts describing the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
- Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring, resolving conflicting information when possible.

- Cite specific textual evidence to support analysis of science and technical texts describing the ways that inheritable genetic variation occurs, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
- Write arguments, based on evidence, that inheritable genetic variations may result from new genetic combinations through meiosis, viable errors occurring during replication, and/or mutations caused by environmental factors.

New Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills

9.1.12.CFR.1:	Compare and contrast the role of philanthropy, volunteer service, and charities in community development and quality of life in a variety of cultures.
9.4.12.CI.2:	Identify career pathways that highlight personal talents, skills, and abilities
9.4.12.CT.3:	Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice)
9.4.12.IML.2:	Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources
9.4.12.IML.5:	Evaluate, synthesize, and apply information on climate change from various sources appropriately
9.4.12.IML.7:	Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change

Interdisciplinary Standards (fill-in Science, or SS, or Math, etc..)

Mathematics

- Represent symbolically evidence that inheritable genetic variations may result from new genetic combinations through meiosis, viable errors occurring during replication, and/or mutations caused by environmental factors, and manipulate the representing symbols. Make sense of quantities and relationships to describe and predict the ways in which inheritable genetic variation occurs.
- Represent the variation and distribution of expressed traits in a population symbolically and manipulate the representing symbols. Make sense of quantities and relationships to describe and predict the variation and distribution of expressed traits in a population.

Social Studies

Standard 6.1 U.S. History: America in the World. All students will acquire the knowledge and skills to think analytically about how past and present interactions of people, cultures, and the environment shape the American heritage. Such knowledge and skills enable students to make informed decisions that reflect fundamental rights and core democratic values as productive citizens in local, national, and global communities.

Standard 6.2 World History: Global Studies: All students will acquire the knowledge and skills to think analytically and systematically about how past interactions of people, cultures, and the environment affect issues across time and cultures. Such knowledge and skills enable students to make informed decisions as socially and ethically responsible world citizens in the 21st century.

Instructional Focus

Unit Enduring Understandings

- The excretory system provides the body with multiple homeostatic mechanisms that result in fluid and electrolyte balance.

Unit Essential Questions

- Why can't you live without your kidneys?
- If you were stranded on a desert island would you drink your urine to stay alive?
- We have two kidneys, why don't we have two of every organ?
- Why do some people have better bladder control than other?
- When can some organisms live without drinking water for long periods of time while other organisms cannot?

Content Statement
<ul style="list-style-type: none"> • Systems of specialized cells within organisms help them perform the essential functions of life (HS-LS1-1) • All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells.(HS-LS1-1) • Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. ((HS-LS1-2) • Feedback mechanisms maintain a living system’s internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change with some. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the human body. (HS-LS1-3) • Although the excretory system can function independently, many of its activities are integrated with other organ systems. (HS-LS1-1)
Ability Objectives: General for all units. <ul style="list-style-type: none"> • Develop and carry out scientific investigations. • Obtain, evaluate and communicate information to develop technological and scientific literacy, and an understanding of the role of information technologies in modern scientific endeavors. • Develop and use models to explain complex processes and the functionality of systems within the human body. • Analyze and interpret data and communicate information using a variety of modalities. • Use mathematics and computational thinking to support scientific conclusions. • Engage in argument from evidence to explain natural phenomena as observed within the human body. • Construct explanations and design solutions for complex real world enviro-engineering problems impacting the integrity and vitality of the human organism.
Sample Performance Tasks - Specific for Unit : SWBAT: <ul style="list-style-type: none"> • Summarize how the excretory system integrates with other body systems to maintain homeostasis (HS-LS1-3) • Describe changes at the cellular, tissue and organ level that result in certain human diseases. (HS-LS3-3) • Relate the specialized structure of the glomerulus to the process of filtration in the nephron (HS-LS1-2) • Develop a model that illustrates how countercurrent flow functions in secretion and reabsorption in the various components of the nephron (HS-LS1-2) • Examine the structure of a kidney and identify how each component contributes to the overall function of the excretory system (HS-LS1-2) • Discuss the interplay between the endocrine system, the nephron and the circulatory system in regulating blood pressure (HS-LS1-2)
Evidence of Learning
Assessment
Common Assessment and/or Unit assessment and/or Presentation

Unit 7: The Immune System

Content Area: Science

Course & Grade Level: Human Anatomy and Physiology, 9-12

Summary and Rationale

The Immune system is integral to homeostasis of the human body. Proper nutrition provides strength to the immune system. White blood cells travel through the vessels of the cardiovascular system. The Immune system changes as humans grow and develop, which provides an interesting perspective for discussion. In our current world where we are surviving a pandemic, learning how our bodies combat disease, whether it be viral, bacterial, or auto-immune, not to mention treatment and cures for disease is of the utmost importance. How do vaccines work? Why can't antibiotics treat viral infections? Students will gain a greater perspective of public health in addition to structure/function of the system.

Recommended Pacing

4 weeks

NGSS Standards/Performance Expectations

Standard 5.1

Standard

HS-LS1-1	Construct an explanation based on evidence for how the structure of proteins which carry out the essential functions of life through systems of specialized cells
HS-LS1-2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms [Clarification Statement: Emphasis is on functions at the organism system level such as nutrient uptake, water delivery, and organism movement in response to neural stimuli. An example of an interacting system could be an artery depending on the proper function of elastic tissue and smooth muscle to regulate and deliver the proper amount of blood within the circulatory system.]
HS-LS1-3	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis [Clarification Statement: Examples of investigations could include heart rate response to exercise, stomate response to moisture and temperature, and root development in response to water levels.]
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 [Clarification Statement: Emphasis is on using data to support arguments for the way variation occurs.]
HS-LS1-6.	Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules. [Clarification Statement: Emphasis is on using evidence from models and simulations to support explanations.]
HS-ESS3-1	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.

Social Justice & Equity in the Science Classroom

Tuskegee Syphilis Study & Connection to Disproportionate COVID-19 Rollout

(https://www.youtube.com/watch?v=B0Vb7O121_8&t=6s)

[Miss Evers' Boys](#)

[COVID-19 and Racial/Ethnic Disparities](#)

Climate Change Integration

[Climate Change Affects Allergies & Immune Response](#)

**New Jersey Student Learning Standards for English Language Arts
Companion Standards**

English Language Arts/Literacy

- Cite specific textual evidence to support analysis of science and technical texts describing the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
- Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring, resolving conflicting information when possible.
- Cite specific textual evidence to support analysis of science and technical texts describing the ways that inheritable genetic variation occurs, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
- Write arguments, based on evidence, that inheritable genetic variations may result from new genetic combinations through meiosis, viable errors occurring during replication, and/or mutations caused by environmental factors.

New Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills

9.1.12.CFR.1:	Compare and contrast the role of philanthropy, volunteer service, and charities in community development and quality of life in a variety of cultures.
9.4.12.CI.2:	Identify career pathways that highlight personal talents, skills, and abilities
9.4.12.CT.3:	Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice)
9.4.12.IML.2:	Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources
9.4.12.IML.5:	Evaluate, synthesize, and apply information on climate change from various sources appropriately
9.4.12.IML.7:	Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change

Interdisciplinary Standards (fill-in Science, or SS, or Math, etc..)

Mathematics

- Represent symbolically evidence that inheritable genetic variations may result from new genetic combinations through meiosis, viable errors occurring during replication, and/or mutations caused by environmental factors, and manipulate the representing symbols. Make sense of quantities and relationships to describe and predict the ways in which inheritable genetic variation occurs.
- Represent the variation and distribution of expressed traits in a population symbolically and manipulate the representing symbols. Make sense of quantities and relationships to describe and predict the variation and distribution of expressed traits in a population.

Social Studies

Standard 6.1 U.S. History: America in the World. All students will acquire the knowledge and skills to think analytically about how past and present interactions of people, cultures, and the environment shape the American heritage. Such knowledge and skills enable students to make informed decisions that reflect fundamental rights and core democratic values as productive citizens in local, national, and global communities.

Standard 6.2 World History: Global Studies: All students will acquire the knowledge and skills to think analytically and systematically about how past interactions of people, cultures, and the environment affect issues across time and cultures. Such knowledge and skills enable students to make informed decisions as socially and ethically responsible world citizens in the 21st century.

Instructional Focus

Unit Enduring Understandings

- Viruses replicate inside of cells, whereas bacteria may live independently
- Antibodies (and antibiotics) work outside of cells, so they are effective against bacteria rather than viruses

<ul style="list-style-type: none"> • T cells and interferons are the primary defenses against viral infection • Cell-mediated immunity involves close physical contact between activated
Unit Essential Questions
<ul style="list-style-type: none"> • How do the specific and nonspecific of the immune system compare and contrast in terms of structure and function? • How does the structure of the antibody allow for its function? • How do the primary and secondary immune responses differ to antigen exposure? • How are allergic reactions and autoimmune disorders disruptions to homeostasis?
Content Statement
<ul style="list-style-type: none"> • The immune system is organized in several components: vessels, fluid, lymphocytes, lymphoid tissues, and organs • The functions of the lymphatic system are: <ul style="list-style-type: none"> o production maintenance, and distribution of lymphocytes o return of fluid and solutes from peripheral tissues to blood o distribution of hormones, nutrients, and waste from tissues • Lymphoid organs are: lymph nodes, thymus, and spleen • There are nonspecific and specific defenses
Ability Objectives: General for all units. <ul style="list-style-type: none"> • Develop and carry out scientific investigations. • Obtain, evaluate and communicate information to develop technological and scientific literacy, and an understanding of the role of information technologies in modern scientific endeavors. • Develop and use models to explain complex processes and the functionality of systems within the human body. • Analyze and interpret data and communicate information using a variety of modalities. • Use mathematics and computational thinking to support scientific conclusions. • Engage in argument from evidence to explain natural phenomena as observed within the human body. • Construct explanations and design solutions for complex real world enviro-engineering problems impacting the integrity and vitality of the human organism.
Sample Performance Tasks - Specific for Unit : SWBAT: <ul style="list-style-type: none"> • Model the structure of the immune system and relate how each component contributes to the overall function of the immune system (HS-LS1-1 (HS-LS1-2) • Explain how feedback mechanisms are used in the human body to regulate nutrient uptake and utilization (HS-LS1-2) • Summarize how the immune system integrates with other body systems to maintain homeostasis (HS-LS1-3) • Describe changes at the cellular, tissue and organ level that result in certain human diseases. (HS-LS3-3)
Evidence of Learning
Assessment
Common Assessment and/or Unit Assessment and/or Presentation

Theme IV: Regulation & Control

Unit 8 The Endocrine System

Content Area: Science

Course & Grade Level: Human Anatomy and Physiology, 9-12

Summary and Rationale

The endocrine system includes cells, tissues and organs that secrete hormones directly into the body fluids. They help regulate many homeostatic functions and play important roles in reproduction.

Recommended Pacing

4 weeks

NGSS Standards/Performance Expectations

Standard

HS-LS1-1	Construct an explanation based on evidence for how the structure of proteins which carry out the essential functions of life through systems of specialized cells
HS-LS1-2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms [Clarification Statement: Emphasis is on functions at the organism system level such as nutrient uptake, water delivery, and organism movement in response to neural stimuli. An example of an interacting system could be an artery depending on the proper function of elastic tissue and smooth muscle to regulate and deliver the proper amount of blood within the circulatory system.]
HS-LS1-3	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis [Clarification Statement: Examples of investigations could include heart rate response to exercise, stomate response to moisture and temperature, and root development in response to water levels.]
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 [Clarification Statement: Emphasis is on using data to support arguments for the way variation occurs.]
HS-ESS3-1	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.

Social Justice & Equity in the Science Classroom

Hormones and LGBTQ+:

- [How early hormones shape gender development;](#)
- [Caring for the transgender adolescent and young adult;](#)
- [Hormone therapy for transgender patients](#)
- [Of Mice, Men & Women](#)

Diseases of the Endocrine System:

- Students explore and share how disruptions to homeostasis result in disease

Climate Change Integration

Pesticides as Endocrine Disruptors

New Jersey Student Learning Standards for English Language Arts Companion Standards

English Language Arts/Literacy

- Cite specific textual evidence to support analysis of science and technical texts describing the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
- Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring, resolving conflicting information when possible.
- Cite specific textual evidence to support analysis of science and technical texts describing the ways that inheritable genetic variation occurs, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
- Write arguments, based on evidence, that inheritable genetic variations may result from new genetic combinations through meiosis, viable errors occurring during replication, and/or mutations caused by environmental factors.

New Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills

9.1.12.CFR.1:	Compare and contrast the role of philanthropy, volunteer service, and charities in community development and quality of life in a variety of cultures.
9.4.12.CI.2:	Identify career pathways that highlight personal talents, skills, and abilities
9.4.12.CT.3:	Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice)
9.4.12.IML.2:	Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources
9.4.12.IML.5:	Evaluate, synthesize, and apply information on climate change from various sources appropriately
9.4.12.IML.7:	Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change

Interdisciplinary Standards (fill-in Science, or SS, or Math, etc..)

Mathematics

- Represent symbolically evidence that inheritable genetic variations may result from new genetic combinations through meiosis, viable errors occurring during replication, and/or mutations caused by environmental factors, and manipulate the representing symbols. Make sense of quantities and relationships to describe and predict the ways in which inheritable genetic variation occurs.
- Represent the variation and distribution of expressed traits in a population symbolically and manipulate the representing symbols. Make sense of quantities and relationships to describe and predict the variation and distribution of expressed traits in a population.

Social Studies

Standard 6.1 U.S. History: America in the World. All students will acquire the knowledge and skills to think analytically about how past and present interactions of people, cultures, and the environment shape the American heritage. Such knowledge and skills enable students to make informed decisions that reflect fundamental rights and core democratic values as productive citizens in local, national, and global communities.

Standard 6.2 World History: Global Studies: All students will acquire the knowledge and skills to think analytically and systematically about how past interactions of people, cultures, and the environment affect issues across time and cultures. Such knowledge and skills enable students to make informed decisions as socially and ethically responsible world citizens in the 21st century.

Instructional Focus

Unit Enduring Understandings

- The endocrine system provides a mechanism for long-term regulation that targets specific body tissue with chemical messengers

Unit Essential Questions

- How is it that a person is capable of lifting a car that has just pinned his best friend to the ground?

Content Statement

- Systems of specialized cells within organisms help them perform the essential functions of life (HS-LS1-1)
- All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells.(HS-LS1-1)
- Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. ((HS-LS1-2)
- Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change with some. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the human body. (HS-LS1-3)
- Although the endocrine system can function independently, many of its activities are integrated with other organ systems. (HS-LS1-1)
- Summarize how the endocrine system integrates with other body systems to maintain homeostasis (HS-LS1-3) (HS-LS1-2)

Ability Objectives: General for all units.

- Develop and carry out scientific investigations.
- Obtain, evaluate and communicate information to develop technological and scientific literacy, and an understanding of the role of information technologies in modern scientific endeavors.
- Develop and use models to explain complex processes and the functionality of systems within the human body.
- Analyze and interpret data and communicate information using a variety of modalities.
- Use mathematics and computational thinking to support scientific conclusions.
- Engage in argument from evidence to explain natural phenomena as observed within the human body.
- Construct explanations and design solutions for complex real world enviro-engineering problems impacting the integrity and vitality of the human organism.

Sample Performance Tasks - Specific for Unit : SWBAT:

- Explain how feedback mechanisms in the endocrine system are used in the human body to maintain a constant internal environment.(HS-LS1-3)
- Summarize how the endocrine system integrates with other body systems to maintain homeostasis (HS-LS1-3)
- Obtain, evaluate and communicate information that distinguishes the difference in structure and function between endocrine and exocrine glands (HS-LS1-1)
- Model how the differences in mechanisms used by steroid and non-steroid hormones affect target cells (HS-LS1-3)
- Explain the role of the nervous system in regulating hormone secretion (HS-LS1-2)
- Discuss examples of disorders at the cellular, tissue and organ level that result from over or under secretion of a specific hormone, as well as potential therapies for treating the disorder (HS-LS3-3)

Evidence of Learning

Assessment

Common Assessment and/or
Unit Assessments and/or
Presentations

Unit 9 The Nervous System

Content Area: Science

Course & Grade Level: Human Anatomy and Physiology, 9-12

Summary and Rationale

The structure and function of the nervous system forms the basis of this unit of study. Students explore major components of the nervous system as well as the physiology of nervous impulse conduction.

Recommended Pacing

4 weeks

NGSS Standards/Performance Expectations

Standard	
HS-LS1-1	Construct an explanation based on evidence for how the structure of proteins which carry out the essential functions of life through systems of specialized cells
HS-LS1-2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms [Clarification Statement: Emphasis is on functions at the organism system level such as nutrient uptake, water delivery, and organism movement in response to neural stimuli. An example of an interacting system could be an artery depending on the proper function of elastic tissue and smooth muscle to regulate and deliver the proper amount of blood within the circulatory system.]
HS-LS1-3	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis [Clarification Statement: Examples of investigations could include heart rate response to exercise, stomate response to moisture and temperature, and root development in response to water levels.]
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 [Clarification Statement: Emphasis is on using data to support arguments for the way variation occurs.]
HS-ESS3-1	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.

Social Justice & Equity in the Science Classroom

Opioid Epidemic

Equity and Brain Health:

- From the [Global Brain Health Institute](#)

Diseases of the Nervous System

- Students explore and share how disruptions to homeostasis result in disease

Climate Change Integration

[Impact of Pollution on Brain Health](#)

Lead in Drinking Water

New Jersey Student Learning Standards for English Language Arts Companion Standards

English Language Arts/Literacy

- Cite specific textual evidence to support analysis of science and technical texts describing the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.

- Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring, resolving conflicting information when possible.
- Cite specific textual evidence to support analysis of science and technical texts describing the ways that inheritable genetic variation occurs, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
- Write arguments, based on evidence, that inheritable genetic variations may result from new genetic combinations through meiosis, viable errors occurring during replication, and/or mutations caused by environmental factors.

New Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills

9.1.12.CFR.1:	Compare and contrast the role of philanthropy, volunteer service, and charities in community development and quality of life in a variety of cultures.
9.4.12.CI.2:	Identify career pathways that highlight personal talents, skills, and abilities
9.4.12.CT.3:	Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice)
9.4.12.IML.2:	Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources
9.4.12.IML.5:	Evaluate, synthesize, and apply information on climate change from various sources appropriately
9.4.12.IML.7:	Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change

Interdisciplinary Standards (fill-in Science, or SS, or Math, etc..)

Mathematics

- Represent symbolically evidence that inheritable genetic variations may result from new genetic combinations through meiosis, viable errors occurring during replication, and/or mutations caused by environmental factors, and manipulate the representing symbols. Make sense of quantities and relationships to describe and predict the ways in which inheritable genetic variation occurs.
- Represent the variation and distribution of expressed traits in a population symbolically and manipulate the representing symbols. Make sense of quantities and relationships to describe and predict the variation and distribution of expressed traits in a population.

Social Studies

Standard 6.1 U.S. History: America in the World. All students will acquire the knowledge and skills to think analytically about how past and present interactions of people, cultures, and the environment shape the American heritage. Such knowledge and skills enable students to make informed decisions that reflect fundamental rights and core democratic values as productive citizens in local, national, and global communities.

Standard 6.2 World History: Global Studies: All students will acquire the knowledge and skills to think analytically and systematically about how past interactions of people, cultures, and the environment affect issues across time and cultures. Such knowledge and skills enable students to make informed decisions as socially and ethically responsible world citizens in the 21st century.

Instructional Focus

Unit Enduring Understandings

- The nervous system provides a mechanism for rapid regulation and integration.

Unit Essential Questions

- What are the steps involved in making a split-second decision while completing complicated tasks?
- How do different parts of the brain acquire specialized function?
- Why do some neurons secrete acetylcholine and other neurons secrete serotonin?

Content Statement
<ul style="list-style-type: none"> ● Systems of specialized cells within organisms help them perform the essential functions of life (HS-LS1-1) ● All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells.(HS-LS1-1) ● Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. ((HS-LS1-2) ● Feedback mechanisms maintain a living system’s internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change with some. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the human body. (HS-LS1-3) ● Although the nervous system can function independently, many of its activities are integrated with other organ systems. (HS-LS1-1)
Ability Objectives: General for all units. <ul style="list-style-type: none"> ● Develop and carry out scientific investigations. ● Obtain, evaluate and communicate information to develop technological and scientific literacy, and an understanding of the role of information technologies in modern scientific endeavors. ● Develop and use models to explain complex processes and the functionality of systems within the human body. ● Analyze and interpret data and communicate information using a variety of modalities. ● Use mathematics and computational thinking to support scientific conclusions. ● Engage in argument from evidence to explain natural phenomena as observed within the human body. ● Construct explanations and design solutions for complex real world enviro-engineering problems impacting the integrity and vitality of the human organism.
Sample Performance Tasks - Specific for Unit : SWBAT: <ul style="list-style-type: none"> ● Summarize how the nervous system integrates with other body systems to maintain homeostasis (HS-LS1-3) ● Describe changes at the cellular, tissue and organ level that result in certain human diseases. (HS-LS3-3) ● Model how a nerve impulse is generated (HS-LS1-2) ● Compare and contrast the mechanisms used in sensory reception and processing (HS-LS1-2)
Evidence of Learning
Assessment
Common Assessment and/or Unit Assessment

Unit 10: The Integumentary System

Content Area: Science

Course & Grade Level: Human Anatomy and Physiology, 9-12

Summary and Rationale

As the largest organ of the body, as well as its interface with the environment, the skin is an excellent place to begin a formal study of anatomy and physiology. As is the case throughout the course students will correlate structure with function. The role of the skin in homeostasis gets special emphasis.

Recommended Pacing

4 weeks

NGSS Standards/Performance Expectations

Standard	
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-LS1-2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms [Clarification Statement: Emphasis is on functions at the organism system level such as nutrient uptake, water delivery, and organism movement in response to neural stimuli. An example of an interacting system could be an artery depending on the proper function of elastic tissue and smooth muscle to regulate and deliver the proper amount of blood within the circulatory system.]
HS-LS1-3	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis [Clarification Statement: Examples of investigations could include heart rate response to exercise, stomate response to moisture and temperature, and root development in response to water levels.]
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 [Clarification Statement: Emphasis is on using data to support arguments for the way variation occurs.]
HS-ESS3-1	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.

Social Justice & Equity in the Science Classroom

Race as a Social Construct: [Scientific American - Race is a Social Construct](#)

Biology of Skin Color: [Rick Kittles TED Talk](#); [HHMI Biology of Skin Color](#);

Climate Change Integration

Climate change impacts skin diseases (changing temperatures, humidity levels, irritants, etc.)

New Jersey Student Learning Standards for English Language Arts Companion Standards

English Language Arts/Literacy

- Cite specific textual evidence to support analysis of science and technical texts describing the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
- Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring, resolving conflicting information when possible.

- Cite specific textual evidence to support analysis of science and technical texts describing the ways that inheritable genetic variation occurs, attending to important distinctions the author makes and to any gaps or inconsistencies in the account.
- Write arguments, based on evidence, that inheritable genetic variations may result from new genetic combinations through meiosis, viable errors occurring during replication, and/or mutations caused by environmental factors.

New Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills

9.1.12.CFR.1:	Compare and contrast the role of philanthropy, volunteer service, and charities in community development and quality of life in a variety of cultures.
9.4.12.CI.2:	Identify career pathways that highlight personal talents, skills, and abilities
9.4.12.CT.3:	Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice)
9.4.12.IML.2:	Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources
9.4.12.IML.5:	Evaluate, synthesize, and apply information on climate change from various sources appropriately
9.4.12.IML.7:	Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change

Interdisciplinary Standards (fill-in Science, or SS, or Math, etc..)

Mathematics

- Represent symbolically evidence that inheritable genetic variations may result from new genetic combinations through meiosis, viable errors occurring during replication, and/or mutations caused by environmental factors, and manipulate the representing symbols. Make sense of quantities and relationships to describe and predict the ways in which inheritable genetic variation occurs.
- Represent the variation and distribution of expressed traits in a population symbolically and manipulate the representing symbols. Make sense of quantities and relationships to describe and predict the variation and distribution of expressed traits in a population.

Social Studies

Standard 6.1 U.S. History: America in the World. All students will acquire the knowledge and skills to think analytically about how past and present interactions of people, cultures, and the environment shape the American heritage. Such knowledge and skills enable students to make informed decisions that reflect fundamental rights and core democratic values as productive citizens in local, national, and global communities.

Standard 6.2 World History: Global Studies: All students will acquire the knowledge and skills to think analytically and systematically about how past interactions of people, cultures, and the environment affect issues across time and cultures. Such knowledge and skills enable students to make informed decisions as socially and ethically responsible world citizens in the 21st century.

Instructional Focus

Unit Enduring Understandings

- The skin's composition reveals its roles in protecting the human body and in maintaining homeostasis of body temperature.
- The skin interacts with other organ-systems in a complex feedback pattern that helps regulate body temperature.
- The cells, tissues and organs of the skin work together to fulfill functions that each could not effect by itself.

Unit Essential Questions

- Which role of the skin, protection or homeostasis, is more important to the body?
- To what extent can we infer the skin's functional roles from its structure?
- How would we predict the structure of skin to differ in different parts of the body?

<p>Content Statement</p> <ul style="list-style-type: none"> ● Systems of specialized cells within organisms help them perform the essential functions of life (HS-LS1-1) ● All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells.(HS-LS1-1) ● Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. ((HS-LS1-2) ● Feedback mechanisms maintain a living system’s internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change with some. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the human body. (HS-LS1-3) ● Although the integumentary system can function independently, many of its activities are integrated with other organ systems. (HS-LS1-1)
<p>Ability Objectives: General for all units.</p> <ul style="list-style-type: none"> ● Develop and carry out scientific investigations. ● Obtain, evaluate and communicate information to develop technological and scientific literacy, and an understanding of the role of information technologies in modern scientific endeavors. ● Develop and use models to explain complex processes and the functionality of systems within the human body. ● Analyze and interpret data and communicate information using a variety of modalities. ● Use mathematics and computational thinking to support scientific conclusions. ● Engage in argument from evidence to explain natural phenomena as observed within the human body. ● Construct explanations and design solutions for complex real world enviro-engineering problems impacting the integrity and vitality of the human organism.
<p>Sample Performance Tasks - Specific for Unit : SWBAT:</p> <ul style="list-style-type: none"> ● Summarize how the layers of the skin and the entire integumentary system integrates with other body systems to maintain homeostasis (HS-LS1-2)(HS-LS1-1) ● Construct an explanation based on observations from microscope slides to identify patterns that relate the structure of the skin to its function (HS-LS1-1) ● Design and present a public service announcement about the integumentary system that differentiates between cause and correlation and makes claims about specific causes and effects (HS-LS1-1) (HS-LS1-2) ● Describe changes at the cellular, tissue and organ level that result in certain human diseases (HS-LS3-3)
<p>Evidence of Learning</p>
<p>Assessment</p>
<p>Common Assessment and/or Unit Assessment and/or Video</p>

Final Wrap Up

Unit 11 Body System Integration	
Content Area: Science	
Course & Grade Level: Human Anatomy and Physiology, 9-12	
Summary and Rationale	
This unit represents the culminating experience for students in this course. Working in pairs students systematically dissect a fetal pig beginning with the integument. Each organ-system is cataloged and the major components identified. As has been the case throughout the course, students must relate structure to function.	
Recommended Pacing	
2 weeks	
SNGSS Standards/Performance Expectations	
Standard	
HS-LS1-1	Construct an explanation based on evidence for how the structure of proteins which carry out the essential functions of life through systems of specialized cells
HS-LS1-2	Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms [Clarification Statement: Emphasis is on functions at the organism system level such as nutrient uptake, water delivery, and organism movement in response to neural stimuli. An example of an interacting system could be an artery depending on the proper function of elastic tissue and smooth muscle to regulate and deliver the proper amount of blood within the circulatory system.]
HS-LS1-3	Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis [Clarification Statement: Examples of investigations could include heart rate response to exercise, stomate response to moisture and temperature, and root development in response to water levels.]
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 [Clarification Statement: Emphasis is on using data to support arguments for the way variation occurs.]
HS-ESS3-1	Construct an explanation based on evidence for how the availability of natural resources, occurrence of natural hazards, and climate change have influenced human activity.

New Jersey Student Learning Standards for English Language Arts Companion Standards	
<i>English Language Arts/Literacy</i>	
<ul style="list-style-type: none"> • Cite specific textual evidence to support analysis of science and technical texts describing the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. • Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring, resolving conflicting information when possible. • Cite specific textual evidence to support analysis of science and technical texts describing the ways that inheritable genetic variation occurs, attending to important distinctions the author makes and to any gaps or inconsistencies in the account. 	

<ul style="list-style-type: none"> Write arguments, based on evidence, that inheritable genetic variations may result from new genetic combinations through meiosis, viable errors occurring during replication, and/or mutations caused by environmental factors. 	
New Jersey Student Learning Standards for Career Readiness, Life Literacies and Key Skills	
9.1.12.CFR.1:	Compare and contrast the role of philanthropy, volunteer service, and charities in community development and quality of life in a variety of cultures.
9.4.12.CI.2:	Identify career pathways that highlight personal talents, skills, and abilities
9.4.12.CT.3:	Enlist input from a variety of stakeholders (e.g., community members, experts in the field) to design a service learning activity that addresses a local or global issue (e.g., environmental justice)
9.4.12.IML.2:	Evaluate digital sources for timeliness, accuracy, perspective, credibility of the source, and relevance of information, in media, data, or other resources
9.4.12.IML.5:	Evaluate, synthesize, and apply information on climate change from various sources appropriately
9.4.12.IML.7:	Develop an argument to support a claim regarding a current workplace or societal/ethical issue such as climate change
Interdisciplinary Standards (fill-in Science, or SS, or Math, etc..)	
<i>Mathematics</i>	
<ul style="list-style-type: none"> Represent symbolically evidence that inheritable genetic variations may result from new genetic combinations through meiosis, viable errors occurring during replication, and/or mutations caused by environmental factors, and manipulate the representing symbols. Make sense of quantities and relationships to describe and predict the ways in which inheritable genetic variation occurs. Represent the variation and distribution of expressed traits in a population symbolically and manipulate the representing symbols. Make sense of quantities and relationships to describe and predict the variation and distribution of expressed traits in a population. 	
<i>Social Studies</i>	
<p>Standard 6.1 U.S. History: America in the World. All students will acquire the knowledge and skills to think analytically about how past and present interactions of people, cultures, and the environment shape the American heritage. Such knowledge and skills enable students to make informed decisions that reflect fundamental rights and core democratic values as productive citizens in local, national, and global communities.</p> <p>Standard 6.2 World History: Global Studies: All students will acquire the knowledge and skills to think analytically and systematically about how past interactions of people, cultures, and the environment affect issues across time and cultures. Such knowledge and skills enable students to make informed decisions as socially and ethically responsible world citizens in the 21st century.</p>	

Instructional Focus
Unit Enduring Understandings
<ul style="list-style-type: none"> The systems of the mammalian body work synergistically to give life to the animal. The anatomy of one mammal can serve as an excellent model for human anatomy because of relatedness through evolution
Unit Essential Questions
<ul style="list-style-type: none"> Based upon your observations during dissection, how does every system in the pig relate to every other system? We have two kidneys, why don't we have two of every organ?
Content
<ul style="list-style-type: none"> Systems of specialized cells within organisms help them perform the essential functions of life (HS-LS1-1) Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2)
Ability Objectives: General for all units.

- Develop and carry out scientific investigations.
- Obtain, evaluate and communicate information to develop technological and scientific literacy, and an understanding of the role of information technologies in modern scientific endeavors.
- Develop and use models to explain complex processes and the functionality of systems within the human body.
- Analyze and interpret data and communicate information using a variety of modalities.
- Use mathematics and computational thinking to support scientific conclusions.
- Engage in argument from evidence to explain natural phenomena as observed within the human body.
- Construct explanations and design solutions for complex real world enviro-engineering problems impacting the integrity and vitality of the human organism.

Sample Performance Tasks - Specific for Unit : SWBAT:

- Compare and contrast the structural features of the fetal pig with structures in the human body by dissecting a fetal pig(HS-LS1-2)
- Recognize how the body systems in the fetal pig are integrated (HS-LS1-2)
- Identify the major components of the organs and systems they dissect and relate the structure to function (HS-LS1-2)
- Compare structural anomalies found in the fetal pig to human anomalies and explain the similarities and differences to known human anomalies and disorders(HS-LS3-2)

Evidence of Learning

Assessment

HAPpy Museum