



# HS ANATOMY AND PHYSIOLOGY CURRICULUM

Middle Township Public Schools

216 S. Main Street

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## Middle Township Public Schools

<b>Content Area:</b>	Anatomy and Physiology	Grade(s) 10-12
<b>Unit Plan Title:</b>	Terminology, Cells, Tissues	
<b>Unit Topics:</b>	Organization and General Plan of Human Body, Basic Chemistry	
<b>Standard(s) Number and Description (Established Goals)</b>		
<p>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</p> <p>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.]</p> <p>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.]</p> <p>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.]</p>		
<b>Enduring Understandings: (What are the big ideas? What specific understandings about them are desired? What misunderstandings are predictable?)</b>		
<p><i>Students will understand that...</i></p> <ol style="list-style-type: none"> <li>1. Systems of specialized cells within organisms help them perform the essential functions of life (HS-LS1-1)</li> <li>2. 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)</li> <li>3. Multi-cellular 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)</li> <li>4. 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</li> </ol>		

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encourage (through positive feedback) or discourage (negative feedback) what is going on inside the human body. (HS-LS1-3)

**Essential Questions : (What provocative questions will foster inquiry, understanding, and transfer of learning?)**

1. How do we determine when a group of cells can be called a tissue or when a group of tissues can be called an organ?
2. How do the systems of the body work together to sustain life?
3. To what extent can we infer the functional role of a cell, tissue or organ from its structural characteristics?
4. How are locations within the body communicated?
5. What is the formation and purpose of ionic bonds, covalent bonds, disulfide bonds, and hydrogen bonds?
6. Why is water essential to the functioning of the human body?
7. What are the functions of organic compounds (carbohydrates, proteins (enzymes), lipids, and nucleic acids) in the human body?

**Student Learning Goals/Objectives: (What key knowledge and skills will students acquire as a result of this unit? What should they eventually be able to do as a result of such knowledge and skill?)**

*Students will know....*

1. Systems of specialized cells within organisms help them perform the essential functions of life (HS-LS1-1)
2. 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)
3. Multi-cellular 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)
4. 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)

*Students will be able to (do)...*

1. Build models of tissues that can be used to show specific features that highlight how structure determines function in human beings. (HS-LS1-2)
2. Observe patterns of cells to assist in identification and classification from cell to tissue to organ to organ system by making sketches from the microscope. (HS-LS1-1)
3. . Investigate structures with a microscope to reveal detailed characteristics of cells and tissues; using these features to communicate connections between the structure and function. (HS-LS1-1)
4. Explain how feedback mechanisms are used in the human body to maintain a constant internal environment.(HS-LS1-3)
5. Describe changes at the cellular, tissue and organ level that result in certain human diseases. (HS-LS3-3)
6. Explain how diagnostic tests show abnormalities at the cellular and organ levels (HS-LS1-1)

General for all units.

A. Develop and carry out scientific investigations.

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<p>what is going on inside the human body. (HS-LS1-3)</p>	<p>B. Obtain, evaluate and communicate information to develop technological and scientific literacy, and an understanding of the role of information technologies in modern scientific endeavors.</p> <p>C. Develop and use models to explain complex processes and the functionality of systems within the human body.</p> <p>D. Analyze and interpret data and communicate information using a variety of modalities.</p> <p>E. Use mathematics and computational thinking to support scientific conclusions.</p> <p>F. Engage in argument from evidence to explain natural phenomena as observed within the human body.</p> <p>G. Construct explanations and design solutions for complex real world enviro-engineering problems impacting the integrity and vitality of the human organism.</p>
<p><b>Key Vocabulary and Terms:</b></p>	
<p><i>Metabolism, Plane, Positive Feedback, Negative Feedback, Position Terms, Ionic Bonds, Covalent Bonds, Cellular Respiration, Acids, Bases, Carbohydrates, Lipids, Proteins, Enzymes, Nucleic Acids, Solvent, Solution</i></p>	

<b>Content Area:</b>	Anatomy and Physiology	Grade(s) 10-12
<b>Unit Plan Title:</b>	Integumentary System	
<b>Unit Topics:</b>	The Skin, Epidermis, Dermis, Subcutaneous System, Aging	
<b>Standard(s) Number and Description (Established Goals)</b>		
<p>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</p> <p>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</p>		

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<p>deliver the proper amount of blood within the circulatory system.]  <b>HS-LS1-3 Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis</b>  <b>[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.]</b>  <b>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.]</b></p>	
<p><b>Enduring Understandings: (What are the big ideas? What specific understandings about them are desired? What misunderstandings are predictable?)</b></p>	
<p><b>Students will understand that...</b></p> <ol style="list-style-type: none"> <li><b>1. The skin's composition reveals its roles in protecting the human body and in maintaining homeostasis of body temperature.</b></li> <li><b>2. The skin interacts with other organ-systems in a complex feedback pattern that helps regulate body temperature.</b></li> <li><b>3. The cells, tissues and organs of the skin work together to fulfill functions that each could not complete by itself.</b></li> </ol>	
<p><b>Essential Questions : (What provocative questions will foster inquiry, understanding, and transfer of learning?)</b></p>	
<ol style="list-style-type: none"> <li><b>1. Which role of the skin, protection or homeostasis, is more important to the body?</b></li> <li><b>2. To what extent can we infer the skin's functional roles from its structure?</b></li> <li><b>3. How would we predict the structure of skin to differ in different parts of the body?</b></li> <li><b>4. What are the major layers of skin? What tissues are in each layer?</b></li> <li><b>5. What is the function of the Langerhan cells?</b></li> <li><b>6. Why are melanocytes important?</b></li> <li><b>7. What are the cutaneous senses?</b></li> <li><b>8. How do arterioles in the dermis respond to heat, cold, and stress?</b></li> </ol>	
<p><b>Student Learning Goals/Objectives: (What key knowledge and skills will students acquire as a result of this unit? What should they eventually be able to do as a result of such knowledge and skill?)</b></p>	
<p><i>Students will know....</i></p> <ol style="list-style-type: none"> <li><b>1. Systems of specialized cells within organisms help them perform the essential functions of life (HS-LS1-1)</b></li> <li><b>2. All cells contain genetic information in the form of</b></li> </ol>	<p><i>Students will be able to (do)...</i></p> <ol style="list-style-type: none"> <li><b>1. 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)</b></li> </ol>

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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)

3. 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)
4. 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)

2. Construct an explanation based on observations from microscopic slides from the cat dissection to identify patterns that relate the structure of the skin to its function (HS-LS1-1)
3. 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)
4. Describe changes at the cellular, tissue and organ level that result in certain human diseases (HS-LS3-3)

General for all units.

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

### Key Vocabulary and Terms:

*Epidermis, Dermis, Arterioles, Ceruminous Glands, Eccrine Glands, Hair Follicle, Keratin, Melanin, Melanocyte, Nail Follicle, Sebaceous Glands, Vasoconstriction, Vasodialation*

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<b>Content Area:</b>	Anatomy and Physiology	Grade(s) 10-12
<b>Unit Plan Title:</b>	Skeletal System	
<b>Unit Topics:</b>	Functions of the Skeleton, Types of Bone Tissue, Classification of Bones, Embryonic Growth of Bone, Factors that affect Bone Growth and Maintenance	
	<b>Standard(s) Number and Description (Established Goals)</b>	
	<p>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</p> <p>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.]</p> <p>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.]</p> <p>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.]</p>	
	<b>Enduring Understandings: (What are the big ideas? What specific understandings about them are desired? What misunderstandings are predictable?)</b>	
	<p>Students will understand that...</p> <ol style="list-style-type: none"> <li>1. The skeletal system provides a framework for protection and leverage in the human body.</li> <li>2. The skeletal system is responsible for red blood cell production and essential mineral and lipid storage</li> </ol>	
	<b>Essential Questions : (What provocative questions will foster inquiry, understanding, and transfer of learning?)</b>	
	<ol style="list-style-type: none"> <li>1. How is the skeletal system of the body both similar to and different from the structural framework of a house?</li> <li>2. What are the functions of the skeleton?</li> <li>3. How are bones classified?</li> <li>4. How is the embryonic skeletal model replaced by bone?</li> <li>5. What nutrients and hormones are involved in bone growth and what are their functions?</li> <li>6. What is bone exercise?</li> </ol>	

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### 7. How are joints classified and what movements do they allow?

**Student Learning Goals/Objectives: (What key knowledge and skills will students acquire as a result of this unit? What should they eventually be able to do as a result of such knowledge and skill?)**

#### *Students will know....*

1. Systems of specialized cells within organisms help them perform the essential functions of life (HS-LS1-1)
2. 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)
3. 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)
4. 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)
5. Although the skeletal system can function independently, many of its activities are integrated with other organ systems. (HS-LS1-1)

#### *Students will be able to (do)...*

1. Construct an explanation based on observations of joints to identify patterns that relate the structure of joints to its function (HS-LS1-2)
2. Summarize how the skeletal system integrates with other body systems to maintain homeostasis (HS-LS1-3)
3. Construct an explanation based on observations from microscopic slides to identify patterns that relate the structure of bone to its function (HS-LS1-1)
4. 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)
5. Describe changes at the cellular, tissue and organ level that result in certain human diseases. (HS-LS3-3)
6. Pose questions and explain how connective tissue abnormalities result in physical and emotional manifestations(HS-LS3-3)

General for all units.

- A. Develop and carry out scientific investigations.
- B. Obtain, evaluate and communicate information to develop technological and scientific literacy, and an understanding of the role of information technologies in modern scientific endeavors.
- C. Develop and use models to explain complex processes and the functionality of systems within the human body.
- D. Analyze and interpret data and communicate information using a variety of modalities.
- E. Use mathematics and computational thinking to support

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	<p>scientific conclusions.</p> <p>F. Engage in argument from evidence to explain natural phenomena as observed within the human body.</p> <p>G. Construct explanations and design solutions for complex real world enviro-engineering problems impacting the integrity and vitality of the human organism.</p>
<b>Key Vocabulary and Terms:</b>	
<p><i>Appendicular, Articulation, Axial, Bursa, Diaphysis, Epiphyseal Disc, Epiphysis, Fontanel, Haversian System, Ligament, Ossification, Osteoblast, Osteoclast, Paranasal Sinus, Periosteum, Suture, Symphysis, Synovial Fluid</i></p>	

<b>Content Area:</b>	Anatomy and Physiology	Grade(s) 10-12
<b>Unit Plan Title:</b>	Muscular System	
<b>Unit Topics:</b>	Muscle Structure, Muscle Tone, Exercise, Muscle Sense, Energy Sources, Contraction, Aging	
<b>Standard(s) Number and Description (Established Goals)</b>		
<p>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</p> <p>HS-LS1-2 Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multi-cellular 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.]</p> <p>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.]</p> <p>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.]</p>		

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<b>Enduring Understandings: (What are the big ideas? What specific understandings about them are desired? What misunderstandings are predictable?)</b>	
<b>Students will understand that...</b> 1. Movement, posture, and support are made possible by the three types of muscle tissue. 2. Muscles use energy to provide heat which maintains body temperature.	
<b>Essential Questions : (What provocative questions will foster inquiry, understanding, and transfer of learning?)</b>	
1. Why are heat and muscle-movement inextricably connected? 2. How does the muscular system turn bones into levers? 3. How does muscle tone us? 4. What are the major muscles in the body and where are they located? 5. What organ systems are directly involved in movement and how are they involved? 6. What is the difference between antagonistic and synergistic muscles? 7. Why are both isotonic and isometric exercise important?	
<b>Student Learning Goals/Objectives: (What key knowledge and skills will students acquire as a result of this unit? What should they eventually be able to do as a result of such knowledge and skill?)</b>	
<i>Students will know....</i> <ol style="list-style-type: none"> <li>1. Systems of specialized cells within organisms help them perform the essential functions of life (HS-LS1-1)</li> <li>2. 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)</li> <li>3. 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)</li> <li>4. Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional</li> </ol>	<i>Students will be able to (do)...</i> <ol style="list-style-type: none"> <li>1. Summarize patterns that explain how muscles are attached to bones (HS-LS1-2)</li> <li>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)</li> <li>3. Identify how a muscle is an organ composed of many tissues that perform various functions (HS-LS1-2)</li> <li>4. Summarize how the muscular system integrates with other body systems to maintain homeostasis (HS-LS1-3)</li> <li>5. Describe changes at the cellular, tissue and organ level that result in certain human diseases. (HS-LS3-3)</li> <li>6. Develop a model that explains the mechanism involved in muscle contraction (HS-LS1-2)</li> </ol> <p style="text-align: right;">General for all units.</p>

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<p>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)</p> <p>5. Although the muscular system can function independently, many of its activities are integrated with other organ systems. (HS-LS1-1)</p>	<p>A. Develop and carry out scientific investigations.</p> <p>B. Obtain, evaluate and communicate information to develop technological and scientific literacy, and an understanding of the role of information technologies in modern scientific endeavors.</p> <p>C. Develop and use models to explain complex processes and the functionality of systems within the human body.</p> <p>D. Analyze and interpret data and communicate information using a variety of modalities.</p> <p>E. Use mathematics and computational thinking to support scientific conclusions.</p> <p>F. Engage in argument from evidence to explain natural phenomena as observed within the human body.</p> <p>G. Construct explanations and design solutions for complex real world enviro-engineering problems impacting the integrity and vitality of the human organism.</p>
<b>Key Vocabulary and Terms:</b>	
<p><i>Actin, Antagonistic muscles, Creatine Phosphate, Depolarization, Fascia, Insertion, Isometric, Isotonic, Lactic Acid, Muscle Fatigue, Muscle Sense, Muscle Tone, Myoglobin, Myosin, Neuromuscular Junction, Origin, Oxygen Debt, Polarization, Prime Mover, Sarcolemma, Sacomeres, Synergistic Muscles, Tendon</i></p>	

<b>Content Area:</b>	Anatomy and Physiology	Grade(s) 10-12
<b>Unit Plan Title:</b>	Nervous System	
<b>Unit Topics:</b>	Nervous System Divisions, Nerve Tissue, Synapses, Types of Neurons, Nerves and Nerve Tracks, Nerve Impulse, Spinal Cord, Spinal Cord Reflexes, Brain, Meninges & Cerebrospinal Fluid, Autonomic Nervous System, Aging	
<b>Standard(s) Number and Description (Established Goals)</b>		

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**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.]

**Enduring Understandings:** (What are the big ideas? What specific understandings about them are desired? What misunderstandings are predictable?)

*Students will understand that...*

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

**Essential Questions :** (What provocative questions will foster inquiry, understanding, and transfer of learning?)

1. What are the steps involved in making a split-second decision while completing complicated tasks?
2. How do different parts of the brain acquire specialized function?
3. Why do some neurons secrete acetylcholine and other neurons secrete serotonin?
4. What are the divisions of the nervous system, the parts, and the functions of each?
5. What is the importance of Schwann Cells?
6. How do electrical impulses work?
7. Explain the importance of the sympathetic and parasympathetic divisions/

**Student Learning Goals/Objectives:** (What key knowledge and skills will students acquire as a result of this unit? What should they eventually be able to do as a result of such knowledge and skill?)

*Students will know....*

1. Systems of specialized cells within organisms help them perform the essential functions of life (HS-LS1-1)

*Students will be able to (do)...*

1. Summarize how the nervous system integrates with other body systems to maintain homeostasis (HS-LS1-3)

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2. 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)
3. 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)
4. 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)
5. Although the nervous system can function independently, many of its activities are integrated with other organ systems. (HS-LS1-1)

2. Describe changes at the cellular, tissue and organ level that result in certain human diseases. (HS-LS3-3)
3. Model how a nerve impulse is generated (HS-LS1-2)
4. Compare and contrast the mechanisms used in sensory reception and processing (HS-LS1-2)

General for all units.

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

### Key Vocabulary and Terms:

*Afferent, Autonomic Nervous System, Cauda Equina, Cerebral Cortex, Cerebrospinal Fluid, Choroid Plexus, Corpus Callosum, Cranial Nerves, Efferent, Gray Matter, Neuroglia, Neurolemma, Parasympathetic, Reflex, Somatic, Spinal Nerves, Sympathetic, Ventricles, Visceral, White Matter, Alzheimer's Disease, Aphasia*

<b>Content Area:</b>	Anatomy and Physiology	Grade(s) 10-12
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<b>Unit Plan Title:</b>	Endocrine System
<b>Unit Topics:</b>	Chemistry of Hormones, Regulation of Hormones, Pituitary Gland, Thyroid Gland, Parathyroid Gland, Pancreas, Adrenal Glands, Ovaries, Testes, Mechanism of Hormone Action, Aging
<b>Standard(s) Number and Description (Established Goals)</b>	
<p>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</p> <p>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.]</p> <p>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.]</p> <p>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.]</p>	
<b>Enduring Understandings: (What are the big ideas? What specific understandings about them are desired? What misunderstandings are predictable?)</b>	
<i>Students will understand that...</i>	
<p>1. The endocrine system provides a mechanism for long-term regulation that targets specific body tissue with chemical messengers.</p>	
<b>Essential Questions : (What provocative questions will foster inquiry, understanding, and transfer of learning?)</b>	
<p>1. How is it that a person is capable of lifting a car that has just pinned his best friend to the ground?</p> <p>2. What are the names of the endocrine glands and the hormones secreted by each?</p>	

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### 3. Why is negative feedback important in the endocrine system?

**Student Learning Goals/Objectives: (What key knowledge and skills will students acquire as a result of this unit? What should they eventually be able to do as a result of such knowledge and skill?)**

*Students will know....*

1. Systems of specialized cells within organisms help them perform the essential functions of life (HS-LS1-1)
2. 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)
3. 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)
4. 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)
5. Although the endocrine system can function independently, many of its activities are integrated with other organ systems. (HS-LS1-1)
6. Summarize how the endocrine system integrates with other body systems to maintain homeostasis (HS-LS1-3) (HS-LS1-2)

*Students will be able to (do)...*

1. Explain how feedback mechanisms in the endocrine system are used in the human body to maintain a constant internal environment.(HS-LS1-3)
2. Summarize how the endocrine system integrates with other body systems to maintain homeostasis (HS-LS1- 3)
3. Obtain, evaluate and communicate information that distinguishes the difference in structure and function between endocrine and exocrine glands (HS-LS1-1)
4. Model how the differences in mechanisms used by steroid and non-steroid hormones affect target cells (HS-LS1-3)
5. Explain the role of the nervous system in regulating hormone secretion (HS-LS1-2)
6. 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)

General for all units.

- A. Develop and carry out scientific investigations.
- B. Obtain, evaluate and communicate information to develop technological and scientific literacy, and an understanding of the role of information technologies in modern scientific endeavors.
- C. Develop and use models to explain complex processes and the functionality of systems within the human body.
- D. Analyze and interpret data and communicate information using a variety of modalities.
- E. Use mathematics and computational thinking to support

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	<p>scientific conclusions.</p> <p>F. Engage in argument from evidence to explain natural phenomena as observed within the human body.</p> <p>G. Construct explanations and design solutions for complex real world enviro-engineering problems impacting the integrity and vitality of the human organism.</p>
<b>Key Vocabulary and Terms:</b>	
<i>Alpha Cells, Beta Cells, Catecholamines, Corpus Luteum, Gluconeogenesis, Hyperglycemia, Hypophysis, Islets of Langerhans, Prostaglandins, Goiter, Graves Disease, Pituitary Dwarfism</i>	

<b>Content Area:</b>	Anatomy and Physiology	Grade(s) 10-12
<b>Unit Plan Title:</b>	Reproductive System	
<b>Unit Topics:</b>	Meiosis, Male Reproductive System, Female Reproductive System	
<b>Standard(s) Number and Description (Established Goals)</b>		
<p>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</p> <p>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.]</p> <p>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.]</p> <p>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.]</p>		
<b>Enduring Understandings: (What are the big ideas? What specific understandings about them are desired? What</b>		

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<p><b>misunderstandings are predictable?)</b></p>	
<p style="text-align: center;"><i>Students will understand that...</i></p> <ol style="list-style-type: none"> <li>1. The reproductive system depends on the regulation of a combination of hormones in both the male and female bodies.</li> <li>2. Physical health can affect the reproductive system.</li> </ol>	
<p style="text-align: center;"><b>Essential Questions : (What provocative questions will foster inquiry, understanding, and transfer of learning?)</b></p>	
<ol style="list-style-type: none"> <li>1. Why does the reproductive system of Olympic Gymnasts pause during training?</li> <li>2. What hormones are necessary to form gametes?</li> <li>3. Why is the pH of semen important for successful impregnation?</li> <li>4. How does the menstrual cycle work?</li> </ol>	
<p><b>Student Learning Goals/Objectives: (What key knowledge and skills will students acquire as a result of this unit? What should they eventually be able to do as a result of such knowledge and skill?)</b></p>	
<p><i>Students will know....</i></p> <ol style="list-style-type: none"> <li>1. Systems of specialized cells within organisms help them perform the essential functions of life (HS-LS1-1)</li> <li>2. 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)</li> <li>3. 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)</li> <li>4. Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate</li> </ol>	<p><i>Students will be able to (do)...</i></p> <ol style="list-style-type: none"> <li>1. Model the structure of the reproductive system and relate how each component contributes to the overall function of the reproductive system (HS-LS1-1 (HS-LS1-2)</li> <li>2. Explain how feedback mechanisms are used in the human body to regulate the birthing process and milk production (HS-LS1-2)</li> <li>3. Summarize how the reproductive system integrates with other body systems to maintain homeostasis (HS-LS1-3)</li> <li>4. Describe changes at the cellular, tissue and organ level that result in certain human diseases. (HS-LS3-3)</li> <li>5. Create a presentation showing trends in infertility and what is thought to cause them (HS-LS1-6)</li> </ol> <p style="text-align: center;">General for all units.</p>

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<p>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)</p> <p>5. Although the reproductive system appears to function independently, many of its activities are integrated with other organ systems. (HS-LS1-1)</p>	<p>A. Develop and carry out scientific investigations.</p> <p>B. Obtain, evaluate and communicate information to develop technological and scientific literacy, and an understanding of the role of information technologies in modern scientific endeavors.</p> <p>C. Develop and use models to explain complex processes and the functionality of systems within the human body.</p> <p>D. Analyze and interpret data and communicate information using a variety of modalities.</p> <p>E. Use mathematics and computational thinking to support scientific conclusions.</p> <p>F. Engage in argument from evidence to explain natural phenomena as observed within the human body.</p> <p>G. Construct explanations and design solutions for complex real world enviro-engineering problems impacting the integrity and vitality of the human organism.</p>	
<b>Key Vocabulary and Terms:</b>		
<p><i>Alimentary Tube, Chemical Digestion, Common Bile Duct, Defecation Reflex, Duodenum, Emulsify, Enamel, Amino Acids, External Anal Sphincter, Ileocecal Valve, Internal Anal Sphincter, Mechanical Digestion, Normal Flora, Periodontal Membrane, Rugae, Villi, Appendicitis, Diverticulitis, Gastric Ulcer, Lactose Intolerance</i></p>		
<b>Content Area:</b>	Anatomy and Physiology	Grade(s) 10-12
<b>Unit Plan Title:</b>	Digestive System	
<b>Unit Topics:</b>	Divisions, Types of Digestion, Oral Cavity, Pharynx, Esophagus, Structural Layers of the Alimentary Tube, Stomach, Small Intestine, Liver, Gallbladder, Pancreas, Absorption, Elimination of Feces, Aging	
<b>Standard(s) Number and Description (Established Goals)</b>		
<p>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</p> <p>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</p>		

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<p>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.]</p> <p>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.]</p> <p>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.]</p>	
<p><b>Enduring Understandings: (What are the big ideas? What specific understandings about them are desired? What misunderstandings are predictable?)</b></p>	
<p style="text-align: center;"><i>Students will understand that...</i></p> <ol style="list-style-type: none"> <li>1. The digestive system breaks down food mechanically and chemically to provide the materials for energy use and maintenance of body cells.</li> <li>2. Physical health is achieved through a combination of sound nutritional habits and a lifetime of daily exercise</li> </ol>	
<p><b>Essential Questions : (What provocative questions will foster inquiry, understanding, and transfer of learning?)</b></p>	
<ol style="list-style-type: none"> <li>1. What happens when you starve to death?</li> <li>2. Why are diets often considered fads?</li> <li>3. What causes constipation?</li> <li>4. How do mechanical and chemical digestion work together to complete digestion?</li> </ol>	
<p><b>Student Learning Goals/Objectives: (What key knowledge and skills will students acquire as a result of this unit? What should they eventually be able to do as a result of such knowledge and skill?)</b></p>	
<p><i>Students will know....</i></p> <ol style="list-style-type: none"> <li>1. Systems of specialized cells within organisms help them perform the essential functions of life (HS-LS1-1)</li> <li>2. All cells contain genetic information in the form of</li> </ol>	<p><i>Students will be able to (do)...</i></p> <ol style="list-style-type: none"> <li>1. 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)</li> </ol>

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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)

3. 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)
4. 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)
5. Although the digestive system can function independently, many of its activities are integrated with other organ systems. (HS-LS1-1)

2. Explain how feedback mechanisms are used in the human body to regulate nutrient uptake and utilization (HS-LS1-2)
3. Summarize how the digestive system integrates with other body systems to maintain homeostasis (HS-LS1-3)
4. Describe changes at the cellular, tissue and organ level that result in certain human diseases. (HS-LS3-3)
5. Create a presentation showing how the processes, structures and molecules breakdown and absorb a turkey or tofu sandwich (HS-LS1-6)

General for all units.

- A. Develop and carry out scientific investigations.
- B. Obtain, evaluate and communicate information to develop technological and scientific literacy, and an understanding of the role of information technologies in modern scientific endeavors.
- C. Develop and use models to explain complex processes and the functionality of systems within the human body.
- D. Analyze and interpret data and communicate information using a variety of modalities.
- E. Use mathematics and computational thinking to support scientific conclusions.
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### Key Vocabulary and Terms:

*Alimentary Tube, Chemical Digestion, Common Bile Duct, Defecation Reflex, Duodenum, Emulsify, Enamel, Amino Acids, External Anal Sphincter, Ileocecal Valve, Internal Anal Sphincter, Mechanical Digestion, Normal Flora, Periodontal Membrane, Rugae, Villi, Appendicitis, Diverticulitis, Gastric Ulcer, Lactose Intolerance*

