



## **Anatomy and Physiology II**

Approved by KSD Board of Education: 2019

### **Course Description:**

Anatomy and Physiology is a course that will enable students to develop an understanding of the relationships between the structures and functions of the human body. Students will also learn the mechanisms for maintaining homeostasis and the impacts of damage and diseases on the body systems.

**Grade Level:** 10th-12th

### **Unit Scope and Sequence**

**Unit 5:** Cardiovascular and Respiratory Systems

**Unit 6:** Lymphatic and Immune System

**Unit 7:** Nervous System

**Unit 8:** Endocrine System

### **Course Enduring Understandings:**

- Students will understand that the organization of the human body is a complex and hierarchical system,
- Students will understand that the anatomy and physiology of the body systems are fundamental to how the human body functions as an integrated whole.
- Students will identify the structures and functions of each system, which is crucial for understanding their roles in maintaining homeostasis, supporting life processes, and enabling the body to respond to internal and external changes.
- Students will develop a comprehensive knowledge of these systems, which forms the basis for analyzing health, diagnosing medical conditions, and developing effective treatments.

### **Course Essential Questions:**

- How do the different levels of human structures—organelles, cells, tissues, organs, and organ systems—work together to maintain homeostasis, and how do disruptions at these levels lead to disease?
- How can we use anatomical terms effectively to accurately describe the features and positions of structures within the human body

## ANATOMY AND PHYSIOLOGY II

### Unit 5: Cardiovascular and Respiratory Systems

This unit explores the intricate functions and interconnections of the cardiovascular and respiratory systems, essential for maintaining homeostasis and supporting the body's metabolic needs. Students will investigate these systems' structures, functions, and physiological responses, examining how they work independently and collaboratively to ensure efficient circulation and respiration. Emphasis will be placed on understanding the cause-and-effect relationships within these systems and their relevance to overall health and disease.

| Unit Essential Learning Targets                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                                                                                                                                                                                                                                                                                                            |
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| <i>Enduring Understandings</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <i>Essential Questions</i>                                                                                                                                                                                                                                                                                                                                                                                 |
| <ul style="list-style-type: none"> <li>The cardiovascular and respiratory systems are interconnected, working collaboratively to deliver oxygen to tissues and remove carbon dioxide, thus maintaining homeostasis in the body.</li> <li>Physiological responses of the cardiovascular and respiratory systems to internal and external stimuli can significantly influence overall health, and understanding these responses is essential for identifying and addressing health disparities.</li> </ul> | <ul style="list-style-type: none"> <li>How do the structures and functions of the cardiovascular and respiratory systems work together to support life processes in the human body?</li> <li>How can diseases and disorders of the cardiovascular and respiratory systems impact an individual's health, and how can knowledge of these systems inform health care practices and interventions?</li> </ul> |
| <i>Students must know:</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | <i>Students must be able to:</i>                                                                                                                                                                                                                                                                                                                                                                           |
| <ul style="list-style-type: none"> <li>Straightforward facts, concepts, and vocabulary</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                        | <ul style="list-style-type: none"> <li>Identify and explain the critical structures and functions of both the cardiovascular and respiratory systems.</li> <li>Evaluate the impact of lifestyle choices, environmental factors, and health disparities on the function of the cardiovascular and respiratory systems.</li> </ul>                                                                           |

# ANATOMY AND PHYSIOLOGY II

## Unit 5: Cardiovascular and Respiratory Systems

### Missouri Learning Standards

**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-LS1-1).**

Supporting Standards:

- Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, and peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future (HS-LS1-1).
- 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).
- Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem (HS-LS1-1))

**Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms (HS-LS1-2).**

Supporting Standards:

- Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system (HS-LS1-2).
- 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).
- Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales (HS-LS1-2).

**Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis (HS-LS1-3).**

Supporting Standards:

- Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly (HS-LS1-3).
- 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 within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system (HS-LS1-3).

## ANATOMY AND PHYSIOLOGY II

### Unit 6: Lymphatic and Immune Systems

In this unit, students will explore the intricate and vital roles of the lymphatic and immune systems in maintaining health and homeostasis. The unit will provide a comprehensive overview of the structures and functions of these systems, emphasizing their interconnection and collective response to pathogens and tissue damage. Through examining key concepts such as immunity, disease transmission, and the body's defensive strategies, students will develop a deeper understanding of how these systems protect the body from various health threats.

| Unit Essential Learning Targets                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                     |
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| <i>Enduring Understandings</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | <i>Essential Questions</i>                                                                                                                                                                                                                                                                                                                                                          |
| <ul style="list-style-type: none"> <li>The lymphatic and immune systems work collaboratively to protect the body from pathogens and maintain homeostasis, demonstrating the interconnectedness of bodily systems in health and disease.</li> <li>Various factors—including genetic, environmental, social, and economic—impact the effectiveness of the immune response and the prevalence of diseases, highlighting the importance of a holistic approach to health.</li> </ul>                                                                                                                                                                      | <ul style="list-style-type: none"> <li>How do the structures and functions of the lymphatic and immune systems work together to defend the body against infections and diseases?</li> <li>In what ways do societal and environmental factors influence the prevalence and management of immune-related diseases?</li> </ul>                                                         |
| <i>Students must know:</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | <i>Students must be able to:</i>                                                                                                                                                                                                                                                                                                                                                    |
| <ul style="list-style-type: none"> <li>atrium</li> <li>ventricle</li> <li>superior vena cava</li> <li>inferior vena cava</li> <li>pulmonary artery</li> <li>pulmonary vein</li> <li>aorta</li> <li>coronary arteries</li> <li>coronary veins</li> <li>atrioventricular valves</li> <li>tricuspid valve</li> <li>bicuspid (mitral) valve</li> <li>pulmonary valve</li> <li>aortic valve</li> <li>plasma</li> <li>erythrocytes</li> <li>white blood cells</li> <li>platelets</li> <li>blood pressure</li> <li>cardiac output</li> <li>trachea</li> <li>bronchi</li> <li>bronchiole</li> <li>alveoli</li> <li>contraction</li> <li>conduction</li> </ul> | <ul style="list-style-type: none"> <li>Identify and describe the key structures and functions of the lymphatic and immune systems.</li> <li>Evaluate the impacts of different diseases on the immune system and the body's overall health.</li> <li>Discuss the social, economic, and environmental factors affecting health outcomes and disease prevention strategies.</li> </ul> |

## ANATOMY AND PHYSIOLOGY II

### Unit 6: Lymphatic and Immune Systems

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| <ul style="list-style-type: none"><li>• reflux</li><li>• cardiac cycle</li><li>• cardiac output</li><li>• systole</li><li>• diastole</li><li>• depolarization</li><li>• repolarization</li><li>• vasodilation</li><li>• vasoconstriction</li><li>• ventilation</li><li>• ischemia</li><li>• oxygenated</li><li>• deoxygenated</li><li>• tidal volume</li><li>• inspiration</li><li>• expiration</li><li>• vital capacity</li><li>• inspiratory reserve volume</li><li>• expiratory reserve volume</li><li>• residual volume</li><li>• hemostasis</li><li>• hypoxia</li><li>• murmur</li><li>• bradycardia</li><li>• tachycardia</li><li>• EKG</li><li>• arrhythmia</li><li>• bypass</li><li>• arteriosclerosis</li><li>• varicose veins</li></ul> |  |
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## **ANATOMY AND PHYSIOLOGY II**

### **Unit 6: Lymphatic and Immune Systems**

#### **Missouri Learning Standards**

**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-LS1-1).**

Supporting Standards:

- Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, and peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future (HS-LS1-1).
- 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).
- Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem (HS-LS1-1))

**Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms (HS-LS1-2).**

Supporting Standards:

- Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system (HS-LS1-2).
- 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).
- Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales (HS-LS1-2).

**Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis (HS-LS1-3).**

Supporting Standards:

- Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly (HS-LS1-3).
- 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 within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system (HS-LS1-3).

# ANATOMY AND PHYSIOLOGY II

## Unit 7: Nervous System

In this unit, students will explore the complex and intricate systems of the human nervous system, including the central nervous system (CNS) and peripheral nervous system (PNS). By examining key anatomical structures, physiological functions, and neurological processes, students will understand how the nervous system facilitates sensory input, integration, and motor output.

The unit will cover the anatomy of the brain, spinal cord, and nerves while delving into the roles of neurons and neurotransmission. Students will learn about the various sensory organs—specifically the eye and ear—and investigate how they function to process visual and auditory information. By examining reflexes, the impacts of neurological diseases, and the influence of drugs on neurotransmission, students will gain insights into how the nervous system maintains homeostasis and responds to stimuli.

Students will engage with crosscutting concepts such as cause and effect, systems and system models, and structure and function through this exploration. They will develop skills in identifying anatomical features, correlating structure with function and analyzing the effects of various factors on nervous system health.

| Unit Essential Learning Targets                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
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| <i>Enduring Understandings</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <i>Essential Questions</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <ul style="list-style-type: none"> <li>The nervous system is a complex network that integrates sensory information and coordinates responses, playing a crucial role in maintaining homeostasis and overall health.</li> <li>The structure of neurons and the mechanisms of neurotransmission are essential for effective communication within the nervous system and between the nervous system and other body systems.</li> <li>External factors, such as environmental stimuli and drug use, can significantly affect the functioning of the nervous system, influencing behavior, health, and overall well-being.</li> </ul> | <ul style="list-style-type: none"> <li>How do the structures of the nervous system work together to process sensory information and coordinate motor responses?</li> <li>In what ways do neurotransmitters influence behavior, and how can disruptions in their function lead to neurological disorders?</li> <li>How can understanding the nervous system's response to stimuli inform treatments for conditions such as addiction, anxiety, and neurodegenerative diseases?</li> </ul> |
| <i>Students must know:</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <i>Students must be able to:</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <ul style="list-style-type: none"> <li>Hemisphere</li> <li>Corpus callosum</li> <li>Cerebrum</li> <li>Cerebellum</li> <li>Brain stem</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | <ul style="list-style-type: none"> <li>Identify and describe the major structures and functions of the central and peripheral nervous systems.</li> <li>Explain the sensory input, integration, and motor output processes, and illustrate how these processes maintain homeostasis.</li> </ul>                                                                                                                                                                                          |

# ANATOMY AND PHYSIOLOGY II

## Unit 7: Nervous System

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| <ul style="list-style-type: none"> <li>● Frontal lobe</li> <li>● Temporal lobe</li> <li>● Occipital lobe</li> <li>● Parietal lobe</li> <li>● Hypothalamus</li> <li>● Meninges</li> <li>● Pia mater</li> <li>● Arachnoid layer</li> <li>● Dura mater</li> <li>● Cerebral spinal fluid</li> <li>● Convolutions</li> <li>● Gray matter</li> <li>● White matter</li> <li>● Motor cortex</li> <li>● Sensory cortex</li> <li>● Neuron</li> <li>● Myelination</li> <li>● Cervical spine</li> <li>● Thoracic spine</li> <li>● Lumbar spine</li> <li>● Sacrum</li> <li>● Blood-brain barrier</li> <li>● Cell body</li> <li>● Dendrites</li> <li>● Axon</li> <li>● Axon terminal</li> <li>● Neurotransmitters</li> <li>● Synapse</li> <li>● Schwann cells</li> <li>● Depolarization</li> <li>● Repolarization</li> <li>● Hyperpolarization</li> <li>● Refractory period</li> <li>● Action potential</li> <li>● Resting potential</li> <li>● Threshold</li> <li>● Saltatory conduction</li> <li>● Excitatory</li> <li>● Inhibitory</li> <li>● Pleasure reward center</li> <li>● Dopamine</li> <li>● Serotonin</li> <li>● Epinephrine/adrenaline</li> <li>● GABA</li> <li>● Cranial nerves</li> <li>● Optic nerve</li> <li>● Olfactory nerve</li> <li>● Facial nerve</li> </ul> | <ul style="list-style-type: none"> <li>● Analyze the roles of neurons, synapses, and neurotransmitters in nervous system communication.</li> <li>● Evaluate the impact of various factors (e.g., diseases, drugs, environmental stimuli) on the functioning of the nervous system.</li> <li>● Conduct experiments or simulations to observe reflexes and responses in the nervous system.</li> <li>● Connect the functions of the nervous system to other systems in the body and assess how they interact to maintain overall health.</li> </ul> |
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## ANATOMY AND PHYSIOLOGY II

### Unit 7: Nervous System

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| <ul style="list-style-type: none"><li>• Vagus nerve</li><li>• Spinal nerves</li><li>• Dermatome</li><li>• Homunculus</li><li>• Reflexes</li><li>• Sympathetic nervous system</li><li>• Parasympathetic nervous system</li><li>• Ear canal</li><li>• Eardrum</li><li>• Stapes</li><li>• Malleus</li><li>• Incus</li><li>• Cochlear</li><li>• Semicircular canals</li><li>• Auditory nerve</li><li>• Sensorineural hearing loss</li><li>• Conductive hearing loss</li><li>• Cornea</li><li>• Iris</li><li>• Pupil</li><li>• Aqueous humor</li><li>• Vitreous humor</li><li>• Retina</li><li>• Blind spot</li><li>• Sclera</li><li>• Tear duct</li></ul> |  |
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## ANATOMY AND PHYSIOLOGY II

### Unit 7: Nervous System

#### Missouri Learning Standards

**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-LS1-1).**

Supporting Standards:

- Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, and peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future (HS-LS1-1).
- 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).
- Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem (HS-LS1-1).

**Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms (HS-LS1-2).**

Supporting Standards:

- Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system (HS-LS1-2).
- 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).
- Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales (HS-LS1-2).

**Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis (HS-LS1-3).**

Supporting Standards:

- Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly (HS-LS1-3).
- 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 within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system (HS-LS1-3).

# ANATOMY AND PHYSIOLOGY

## Unit 8: Endocrine System

This unit explores the intricate network of glands and hormones that play a crucial role in regulating various physiological processes and maintaining homeostasis in the body. By studying the endocrine system, students will understand how hormones are produced, released, and function within feedback loops to influence growth, metabolism, reproduction, and overall health. The unit will also cover the impact of hormonal imbalances and the implications of medical interventions, such as hormone replacement therapy.

| Unit Essential Learning Targets                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
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| <i>Enduring Understandings</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | <i>Essential Questions</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <ul style="list-style-type: none"> <li>The endocrine system is essential for regulating various bodily functions through hormones, which act as chemical messengers influencing growth, metabolism, and homeostasis.</li> <li>The interplay of negative and positive feedback loops is critical for maintaining hormonal balance, and disruptions in these pathways can lead to significant health issues.</li> <li>Understanding the effects of hormonal imbalances and the treatment options available, such as hormone replacement therapy, is crucial for managing health conditions related to the endocrine system.</li> </ul> | <ul style="list-style-type: none"> <li>How do hormones interact with target organs to regulate physiological processes, and what happens when these interactions are disrupted?</li> <li>In what ways do feedback mechanisms within the endocrine system maintain homeostasis, and how can they be affected by internal and external factors?</li> <li>What are the implications of hormonal imbalances on health, and how do medical interventions like hormone replacement therapy provide solutions for these conditions?</li> </ul>                                                                                                                                                                                                                                                                                             |
| <i>Students must know:</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <i>Students must be able to:</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <ul style="list-style-type: none"> <li>Hormones</li> <li>Endocrine gland</li> <li>Exocrine gland</li> <li>Hypothalamus</li> <li>Pituitary gland</li> <li>Thyroid</li> <li>Parathyroid</li> <li>Placenta</li> <li>Adrenal glands</li> <li>Pancreas</li> <li>Ovaries</li> <li>Testes</li> <li>Negative feedback loop</li> <li>Positive feedback loop</li> <li>Growth hormone</li> <li>Thyroid-stimulating hormone (TSH)</li> <li>Luteinizing hormone (LH)</li> <li>Follicle-stimulating hormone (FSH)</li> <li>Oxytocin</li> <li>T3/T4</li> <li>Calcitonin</li> </ul>                                                                  | <ul style="list-style-type: none"> <li>Students will be able to identify major glands of the endocrine system and describe their functions and the hormones they produce.</li> <li>Students can construct and interpret diagrams illustrating hormonal pathways and feedback mechanisms involved in regulating homeostasis.</li> <li>Students will develop the ability to analyze case studies involving hormonal imbalances and predict potential health impacts.</li> <li>Students will assess the effectiveness of various treatment options for hormonal disorders, including hormone replacement therapy and lifestyle modifications.</li> <li>Students will connect the endocrine system to other body systems, understanding how it interacts with systems such as the nervous, reproductive, and immune systems.</li> </ul> |

# ANATOMY AND PHYSIOLOGY

## Unit 8: Endocrine System

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| <ul style="list-style-type: none"><li>• Parathyroid hormone (PTH)</li><li>• Insulin</li><li>• Glucagon</li><li>• Estrogen</li><li>• Testosterone</li><li>• Progesterone</li><li>• Epinephrine</li><li>• Human chorionic gonadotropin (HCG)</li><li>• Gigantism</li><li>• Dwarfism</li><li>• Acromegaly</li><li>• Diabetes</li><li>• Hyperthyroidism</li><li>• Hypothyroidism</li></ul> |  |
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# ANATOMY AND PHYSIOLOGY

## Unit 8: Endocrine System

### Missouri Learning Standards

**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-LS1-1).**

Supporting Standards:

- Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, and peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future (HS-LS1-1).
- 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).
- Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem (HS-LS1-1))

**Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms (HS-LS1-2).**

Supporting Standards:

- Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system (HS-LS1-2).
- 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).
- Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales (HS-LS1-2).

**Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis (HS-LS1-3).**

Supporting Standards:

- Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly (HS-LS1-3).
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