



# PISCATAWAY TOWNSHIP SCHOOLS

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## Human Anatomy and Physiology

**Content Area:** Science  
**Grade Span:** 11-12  
**Revised by:** Dr. John T. Murphy & Jessica Pritchard  
**Presented by:** Jessica Pritchard  
**Approval date:** August 12, 2021

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## COURSE OVERVIEW

Description		
<p>Anatomy and Physiology focuses on structures and functions of the human body. Sequential development of major body systems is followed in an organized and structured curriculum. The course is designed to give the students a selective overview of human anatomical structure and an analysis of human physiological principles. Labs include slide work, dissection of various animals and studies of the human skeleton. Computer simulated dissection are also incorporated. The study of the structure and function of the human body is necessary as a basic science prerequisite. This will prepare the student for all other basic science and clinical courses. This introductory course includes lectures and lab components of Anatomy and Physiology. It will also include basic chemistry and microbiology. The description of the standards that encompass this course are as follows:  <b>HS-LS1-1.</b> Structure and Function: Systems of specialized cells within organisms help them perform the essential functions of life; <b>HS-LS1-2</b> 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; and <b>HS-LS1-3</b> 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.</p>		
Goals		
<p>The goals of this course are for students to understand that within the human body structure is always related to function. This course will guide the students to utilize the language of anatomy to describe levels of structural organization and example of homeostasis; apply basic concepts of chemistry and biochemistry. Students will be able to identify microscopic structures as presented in the lab. Students will identify and explain the structure and function of the major body systems and explain their interrelationships with one another in maintaining homeostasis; students will be able to identify and locate gross anatomical structures of the human anatomy.</p>		
Scope and Sequence		
Unit	Topic	Length
<b>Unit 1</b>	<b>Levels of Organization</b> 1A. Introduction to Anatomy and Physiology	5 days
<b>Unit 2</b>	<b>Support and Movement</b> 2A. Skeletal System (5 days) 2B. Muscular System (8 days)	13 days
<b>Unit 3</b>	<b>Integration and Coordination</b> 3A. Nervous System (10 days) 3B. The Senses (8 days) 3C. Endocrine System (7 days)	25 days
<b>Unit 4</b>	<b>Transport</b> 4A. Blood (7 days) 4B. Cardiovascular System (8 days)	15 days

Unit 5	<p align="center"><b>Absorption and Secretion</b></p> <p align="center">5A. Digestive System and Nutrition (8 days)  5B. Respiratory System (6 days)  Urinary System (8 days)</p>	23 days
Unit 6	<p align="center"><b>The Human Life Cycle</b></p> <p align="center">6A. Reproductive System</p>	8 days
<b>Resources</b>		
<p><b>Core Text:</b> Longenbaker, Susan Nelson 2008. <i>Understanding Human Anatomy and Physiology</i> 6<sup>th</sup> Edition, New York, McGraw Hill and related McGraw Hill.</p> <p>Shier,Butler, Lewis 2000. <i>Holes Essentials of Human Anatomy and Physiology</i> 7<sup>th</sup> Edition, New York, McGraw Hill and related McGraw Hill</p> <p>Textbook related student/teacher websites.</p>		

# UNIT 1: LEVELS OF ORGANIZATION

## Introduction to Anatomy and Physiology

### Summary and Rationale

There are basic themes that run throughout the course of Human Anatomy and Physiology. This unit serves to introduce students to the basic functions of living organisms, reviews the concept of homeostasis and introduces positive and negative feedback systems in response to homeostatic regulation. Also included in this unit are the anatomical terms to describe body sections, body regions, and relative positions. These terms will serve as the student's core of understanding and will be extremely important to the study of human anatomy and physiology.

### Recommended Pacing

5 days

### State Standards

**HS-LS1-1.** Structure and Function: Systems of specialized cells within organisms help them perform the essential functions of life.

**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-LS1-3** 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.

### Instructional Focus

#### Unit Enduring Understandings

- Organisms are composed of complex biochemical systems that are designed to maintain homeostasis.
- Survival of organisms is dependent on the relationship between structure and function.
- Scientific investigation requires selection of suitable technology and use of appropriate methods based on intended purpose to collect, analyze, and interpret data to test prediction/hypotheses and diagnose disease.

#### Unit 1 Essential Questions

- How are anatomy and physiology related and how are they separate as branches of science?
- How is anatomical vocabulary used to describe locations of organs, direction on the body, as well as body regions and planes of dissection?
- How does each body system work to maintain homeostasis (life) in the human body?
- How do positive and negative feedback models control various conditions in the body necessary for life?

#### Objectives

##### Students will know

- The relationship between anatomy and physiology
- The major characteristics of and requirements for living things
- Homeostasis and why is it important to survival
- The difference between a negative feedback loop and a positive feedback mechanism
- The different levels of organization found in the body
- The major cavities of the body, and what organs are found in each

- The major organ systems and the organs found **in** each
- The function of each organ system
- The terminology anatomists use to describe relative positions, body sections, and body regions
- Careers that involve a study of anatomy and physiology.
- Several medical specialties and name their associated specialists.

**Students will be able to:**

- Define anatomy and physiology and explain how they are related
- List and describe the major characteristics of life and requirements of organisms
- Define homeostasis and explain its importance to survival
- Describe a homeostatic mechanism
- Explain the biological levels of organization
- Describe the location of the major body cavities and list the organs located in each
- Name the major organ systems and list the organs associated with each
- Describe the general functions of each organ system
- Properly use the anatomical terms that describe relative positions, body sections and body regions
- Describe several medical specialties and name their associated specialists.

## UNIT 2: SUPPORT AND MOVEMENT

<b>Summary and Rationale</b>	
<p><b>UNIT 2A: Skeletal System</b> The human body would not have a shape without the skeletal system, nor would it be able to support its own weight. Bones also work with muscles to maintain position and produce movement. The unit begins with a look at the different types of bone tissue, an overview of how bone grows and repairs itself, and then focuses on the bones of the axial and appendicular skeleton.</p> <p><b>UNIT 2B: Muscular System</b> Movement, blood flow, breathing, and digestion cannot occur without muscle tissue. The unit begins with skeletal muscle tissue, and then an account of smooth and cardiac muscle tissue. There is a focus on the physiology of the muscle tissues as well.</p>	
<b>Recommended Pacing</b>	
<b>13 days</b>	
<b>State Standards</b>	
<b>LS1.A</b>	<b>Structure and Function: Systems of specialized cells within organisms help them perform the essential functions of life.</b>
<b>(HS-LS1-1 )</b>	<b>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.</b>
<b>HS-LS1-2)</b>	<b>Fe 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.</b>
<b>Instructional Focus</b>	
<b>Unit Enduring Understandings</b>	
<ul style="list-style-type: none"> <li>● Organisms are composed of complex biochemical systems that are designed to maintain homeostasis.</li> <li>● Survival of organisms is dependent on the relationship between structure and function.</li> <li>● Scientific investigation requires selection of suitable technology and use of appropriate methods based on intended purpose to collect, analyze, and interpret data to test prediction/hypotheses and diagnose disease.</li> </ul>	
<b>Unit 1 Overall Essential Questions</b>	
<ul style="list-style-type: none"> <li>● How is the skeletal system organized?</li> <li>● How do bones repair themselves?</li> <li>● What role does the skeletal system play in maintaining homeostasis?</li> <li>● What is the anatomy of a muscle fiber?</li> <li>● How is the muscular system organized?</li> <li>● How are muscles activated?</li> <li>● How are muscle contractions controlled?</li> </ul>	
<b>Objectives</b>	
<b>The students will know:</b>	
<ul style="list-style-type: none"> <li>● The general structure of a bone and list the functions of its parts.</li> </ul>	

- The difference between compact and spongy bone, and where each can be found.
- The difference between intramembranous and endochondral bones, and how each develops and grows.
- The major functions of bones.
- The difference between the axial and appendicular skeletons and name the major parts of each.
- How to locate and identify the bones and major features of the bones that comprise the skull, vertebral column, thoracic cage, pectoral girdle, upper limb, pelvic girdle, and lower limb.
- The three classes of joints describe their characteristics and give an example of each.
- The six types of synovial joints and describe the actions of each.
- That skeletal muscles produce movements at joints and identify several types of such movements
- The functions of bones, muscles, and supporting structures.
- The major bones and muscles of the body.
- The structures of the two main divisions of the skeletal system.
- The four main types of bones.
- The functions of the vertebral column and list its parts.
- The main classifications of joints.
- The purpose of bone markings, projections and depressions.
- How to distinguish between the three types of muscles and where they are located
- How to describe the structure and 5 functions of skeletal muscles.
- How skeletal muscles are innervated and how they contract
- How ATP is used in a muscle contraction.
- The differences between slow twitch and fast twitch muscles.
- The categories by which muscles are named.
- The locations and actions of major skeletal muscles in each body region
- Describe how the muscular system works with other systems in the body to maintain homeostasis.

**Students will be able to....**

- Identify the general structure of a bone and list the functions of its parts.
- Know the difference between compact and spongy bone, and where each can be found.
- Know the difference between intramembranous and endochondral bones, and how each develops and grows.
- Identify the major functions of bones.
- Know the difference between the axial and appendicular skeletons and name the major parts of each.
- Locate and identify the bones and major features of the bones that comprise the skull, vertebral column, thoracic cage, pectoral girdle, upper limb, pelvic girdle, and lower limb.
- Identify the three classes of joints describe their characteristics and give an example of each.
- List the six types of synovial joints and describe the actions of each.
- Know that skeletal muscles produce movements at joints and identify several types of such movements
- List the functions of bones, muscles, and supporting structures.
- Identify the major bones and muscles of the body.
- Identify the structures of the two main divisions of the skeletal system.
- List the four main types of bones.
- Understand the functions of the vertebral column and list its parts.
- List the main classifications of joints.
- Understand the purpose of bone markings, projections and depressions.
- Distinguish between the three types of muscles and where they are located
- Describe the structure and 5 functions of skeletal muscles.
- Explain how skeletal muscles are innervated and how they contract
- Describe how ATP is used in a muscle contraction.

- Contrast slow twitch and fast twitch muscles.
- Describe the categories by which muscles are named.
- Describe the locations and actions of major skeletal muscles in each body region
- Describe how the muscular system works with other systems in the body to maintain homeostasis.



## UNIT 3 INTEGRATION AND COORDINATION

<b>Summary and Rationale</b>	
<p><b>UNIT 3A: Nervous System</b> The nervous system maintains total control over the entire body and serves as the hub of its communication. Every action, emotion, and thought is reflected in the activity of this system. The nervous system is one of the two systems that are essential in maintain homeostasis.</p> <p><b>UNIT 3B: The Senses</b> Sensory receptors vary greatly but fall into two major categories. Receptors associated with the somatic senses of touch, pressure, temperature and pain form one group. These receptors are widely distributed throughout the skin and deeper tissues and are structurally simple. Receptors of the second type are parts of complex specialized sensory organs that provide the special senses of smell, taste, hearing, equilibrium and vision.</p> <p><b>UNIT 3C: Endocrine System</b> The physiology of hormonal action is described in detail as is the control of hormonal secretions. Students are introduced to the principal components of the endocrine system in terms of location, structure, hormones secreted, physiological effects, and disorders that result from abnormal secretion levels. Emphasis throughout is placed on the regulation of hormone secretions by negative feedback system. The activities of endocrine tissues and its importance in the maintenance of homeostasis is emphasized within this chapter.</p>	
<b>Recommended Pacing</b>	
25 days	
<b>State Standards</b>	
LS1.A	<b>Structure and Function: Systems of specialized cells within organisms help them perform the essential functions of life.</b>
(HS-LS1-1)	<b>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.</b>
HS-LS1-2)	<b>Fe 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.</b>
<b>Instructional Focus</b>	
<b>Unit Enduring Understandings</b>	
<ul style="list-style-type: none"> <li>● Organisms are composed of complex biochemical systems that are designed to maintain homeostasis.</li> <li>● Survival of organisms is dependent on the relationship between structure and function.</li> <li>● Scientific investigation requires selection of suitable technology and use of appropriate methods based on intended purpose to collect, analyze, and interpret data to test prediction/hypotheses and diagnose disease.</li> </ul>	
<b>Unit 3A Overall Essential Questions</b>	
<ul style="list-style-type: none"> <li>● What are the functions and divisions of the nervous system?</li> <li>● What is the general structure of a neuron?</li> <li>● How does a neuron conduct an impulse?</li> <li>● What are the major parts and functions of the brain?</li> <li>● What are the categories of sensory receptors to five types of stimuli?</li> <li>● What is the anatomy of the eye and the function of each part?</li> <li>● What are the major structures of the ear and what are their functions?</li> <li>● What is the relationship between receptors and special sense organs?</li> </ul>	

- What are the major endocrine glands of the body and what are the hormones they secrete?
- What is the transportation process of hormones and their interaction with target cell receptors?
- How hormones promote homeostasis of the body?
- What is negative feedback and how does it regulate hormonal secretions?

## Objectives

### Students will know....

- The general functions and divisions of the nervous system.
- The general structure of a neuron.
- The differences in structure and function are used to classify neurons.
- The four types of neuroglia and describe the functions of each.
- How a membrane becomes polarized.
- The events that lead to the conduction of a nerve impulse.
- How information passes from one neuron to another.
- The parts of a reflex arc, and describe the function of each part.
- The coverings of the brain and spinal cord.
- The major parts and functions of the brain.
- How to distinguish among motor, sensory and association areas of the cerebral cortex.
- The formation and function of cerebrospinal fluid.
- The cranial nerves and list their major functions.
- The functions of the autonomic nervous system.
- How to distinguish between the sympathetic and parasympathetic divisions of the autonomic nervous system.
- The sympathetic and a parasympathetic nerve pathway.
- The structure and function of the nervous system.
- Label the major structures of the brain and lobes of the cerebral cortex.
- Several types of mental disorders.
- The pharmacology related to the nervous system.
- The pathological conditions associated with the nervous system.
- The categories of sensory receptors to five types of stimuli
- The function of proprioceptors
- The specific sensory receptors in the skin to particular senses of the skin
- The phenomenon of referred pain.
- The chemoreceptors for taste and smell, and state their anatomy, location, and mechanism of action.
- The anatomy and function of the accessory organs of the eye.
- The anatomy of the eye and give the function of each part.
- The sensory receptors for sight.
- The common disorders of sight.
- Each of the special senses of the body.
- The major structures of the eye and identify their function.
- The major structures of the ear and describe their function.
- The relationship between receptors and special sense organs.
- How to identify all the glands and tissues that make up the endocrine system.
- How to differentiate between endocrine and exocrine glands.
- The major endocrine glands of the body and list the hormones they secrete.
- How to differentiate between the anterior and posterior pituitary gland.
- The term hormone and describe the functions of hormones.

- The functions of the hormones secreted by the endocrine glands.
- The transportation process of hormones and their interaction with target cell receptors.
- How hormones promote homeostasis of the body and give three examples of hormonal actions.
- What is negative feedback, how it regulates hormonal secretions and give two examples.
- The functional relationship between the hypothalamus and the pituitary gland.
- How to differentiate between physical and psychological stress.
- The effects of aging on the endocrine system.
- The disease/disorders associated with the endocrine system.
- The actions of insulin and glucagon.
- The important terminology of the endocrine system.

**Students will be able to...**

- Explain the general functions and divisions of the nervous system.
- Describe the general structure of a neuron.
- Explain how differences in structure and function are used to classify neurons.
- Name the four types of neuroglia and describe the functions of each.
- Explain how a membrane becomes polarized.
- Describe the events that lead to the conduction of a nerve impulse.
- Explain how information passes from one neuron to another.
- Name the parts of a reflex arc, and describe the function of each part.
- Describe the coverings of the brain and spinal cord.
- Name the major parts and functions of the brain.
- Distinguish among motor, sensory and association areas of the cerebral cortex.
- Describe the formation and function of cerebrospinal fluid.
- Name the cranial nerves and list their major functions.
- Describe the functions of the autonomic nervous system.
- Distinguish between the sympathetic and parasympathetic divisions of the autonomic nervous system.
- Describe a sympathetic and a parasympathetic nerve pathway.
- Demonstrate understanding of the structure and function of the nervous system.
- Label the major structures of the brain and lobes of the cerebral cortex.
- Recognize several types of mental disorders.
- Explain the pharmacology related to the nervous system.
- Identify and discuss pathological conditions associated with the nervous system.
- Categorize sensory receptors to five types of stimuli
- Discuss the function of proprioceptors
- Relate specific sensory receptors in the skin to particular senses of the skin
- Discuss the phenomenon of referred pain.
- Name the chemoreceptors for taste and smell, and state their anatomy, location, and mechanism of action.
- describe the anatomy and function of the accessory organs of the eye.
- Describe the anatomy of the eye and give the function of each part.
- Describe the sensory receptors for sight.
- Describe some common disorders of sight.
- List and describe each of the special senses of the body.
- Label the major structures of the eye and identify their function.
- Label the major structures of the ear and describe their function.
- Demonstrate understanding of the relationship between receptors and special sense organs.
- On a diagram, identify all the glands and tissues that make up the endocrine system.

- Differentiate between endocrine and exocrine glands.
- Describe the major endocrine glands of the body and list the hormones they secrete.
- Differentiate between the anterior and posterior pituitary gland.
- Define the term hormone and describe the functions of hormones.
- Describe the functions of the hormones secreted by the endocrine glands.
- Describe the transportation process of hormones and their interaction with target cell receptors.
- Discuss how hormones promote homeostasis of the body and give three examples of hormonal actions.
- Describe negative feedback, how it regulates hormonal secretions and give two examples.
- Describe the functional relationship between the hypothalamus and the pituitary gland.
- Differentiate between physical and psychological stress.
- Describe the effects of aging on the endocrine system.
- List and describe disease/disorders associated with the endocrine system.
- Contrast the actions of insulin and glucagon.
- Define important terminology of the endocrine system.

## UNIT 4 TRANSPORT

Summary and Rationale	
<p><b>UNIT 4A: Blood</b> Blood supplies life and for good reason. , it has many vital functions. The complex mixture of cells and dissolved biochemical transports nutrients, oxygen, wastes, and hormones; helps maintain stability of the interstitial fluid and distributes heat. The blood, heart and blood vessels form the cardiovascular system and link the bodies internal and external environments.</p> <p><b>UNIT 4B: Cardiovascular System</b> The cardiovascular system, a powerful pump connected to an extensive system system of tubes brings oxygen and nutrients to all body cells and removes wastes. A functional cardiovascular system is vital for survival because without circulation tissues lack a supply of oxygen and nutrients.</p>	
Recommended Pacing	
15 days	
State Standards	
Standard	
LS1.A	<b>Structure and Function: Systems of specialized cells within organisms help them perform the essential functions of life.</b>
(HS-LS1-1)	<b>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.</b>
HS-LS1-2)	<b>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.</b>
Instructional Focus	
Unit Enduring Understandings	
<ul style="list-style-type: none"> <li>● Living systems, from the organismal to the cellular level, demonstrate the complementary nature of structure and function.</li> <li>● Organisms are composed of complex biochemical systems that are designed to maintain homeostasis.</li> </ul>	
Unit Essential Questions	
<ul style="list-style-type: none"> <li>● What are the composition and components found in the blood and why is it necessary for each of these components to exist in order for blood to be functional?</li> <li>● How do those components of blood provide functionality?</li> <li>● How are blood disorders caused and what is happening on a cellular level to initiate those disorders?</li> <li>● How are new blood cells created and old cells destroyed?</li> <li>● What are the different blood types?</li> <li>● What is the function of the lymphatic system?</li> <li>● What are the different blood cell types and their functions?</li> <li>● What are the structures of the cardiovascular system and describe their functions?</li> <li>● How does blood flow through the heart?</li> <li>● What are the structures and function of arteries, capillaries, and veins?</li> </ul>	

- What are the pulmonary and systemic circuits of the cardiovascular system?

## Objectives

### Students will know:

- The functions of the lymphatic system.
- The composition of plasma and discussion its importance in the body.
- The formed elements found in the blood.
- The stages involved in blood clotting and explain the various facets that promote and inhibit blood clotting.
- The basis for blood typing.
- How blood reactions may occur between the fetal and maternal tissues.
- The basis of physiological jaundice seen in some newborn babies.
- The disease/disorders associate with the blood.
- The important terminology related to the blood.
- The structures of the cardiovascular system and describe their functions.
- How to identify the major parts of the heart and describe their functions.
- How to describe the flow of blood through the heart.
- How to describe the coronary circulation.
- How to compare the structures and function of arteries, capillaries, and veins.
- The mechanism that helps in the return of venous blood to the heart.
- The physiological basis for arterial pulse and describe how pulse is measured.
- The factors which create and control blood pressure.
- The definition of blood pressure and give its relationship to blood flow and resistance.
- How blood pressure is measured.
- The pulmonary and systemic circuits of the cardiovascular system.
- How to trace a drop of blood through the pulmonary and systemic circulations.
- List and describe diseases/disorders associated with the cardiovascular system.
- Define important terminology of the cardiovascular system.

### Students will be able to:

- Describe the functions of the lymphatic system.
- Describe the composition of plasma and discussion its importance in the body.
- Distinguish between the formed elements found in the blood.
- Identify the stages involved in blood clotting and explain the various facets that promote and inhibit blood clotting.
- Explain the basis for blood typing.
- Describe how blood reactions may occur between the fetal and maternal tissues.
- Explain the basis f physiological jaundice seen in some newborn babies.
- List and describe disease/disorders associate with the blood.
- Define important terminology related to the blood.
- What are the structures of the cardiovascular system and describe their functions.
- What are the major parts of the heart and describe their functions.
- Describe the flow of blood through the heart.
- Describe the coronary circulation.
- Compare the structures and function of arteries, capillaries, and veins.
- What is the mechanism that helps in the return of venous blood to the heart.
- Give the physiological basis for arterial pulse and describe how pulse is measured.
- Describe the factors which create and control blood pressure.
- Define blood pressure and give its relationship to blood flow and resistance.

- Explain and demonstrate how blood pressure is measured.
- Contrast the pulmonary and systemic circuits of the cardiovascular system.
- Trace a drop of blood through the pulmonary and systemic circulations.
- List and describe diseases/disorders associated with the cardiovascular system.
- Define important terminology of the cardiovascular system.

## UNIT 5: ABSORPTION AND EXCRETION

Summary and Rationale	
<p><b>UNIT 5A: Digestive System</b> Because many food molecules are too large to enter the cells, the organs of the digestive system mechanically and chemically break them down to a size that can cross cell membranes. Specifically, the digestive system ingests foods, breaks large particles into smaller ones, secretes enzymes that decompose food molecules, absorbs the products, and eliminates unused residues. Nutrition includes the process that ingest, assimilate and utilize nutrients.</p> <p>Cells require oxygen to oxidize nutrients, release energy, produce ATP and excrete the carbon dioxide that results. Obtaining oxygen and removing carbon dioxide are the primary functions of the respiratory system. The respiratory organs also trap particles from incoming air, help control the temperature and water content of incoming air, produce vocal sounds and play an important roles in smell and regulation of blood pH.</p> <p><b>UNIT 5B: Respiratory System</b> Cells require oxygen to oxidize nutrients, release energy, produce ATP and excrete the carbon dioxide that results. Obtaining oxygen and removing carbon dioxide are the primary functions of the respiratory system. The respiratory organs also trap particles from incoming air, help control the temperature and water content of incoming air, produce vocal sounds and play an important roles in smell and regulation of blood pH.</p> <p><b>UNIT 5C: Urinary System</b> Cells produce a variety of wastes which if they accumulate will become toxic to the body. Body fluids such as blood and lymph carry wastes from the tissues that produce them and transport them to the outside. The urinary system removes certain salts and nitrogenous wastes, and it also maintains normal concentrations of water and electrolytes within body fluids and helps control red blood cell production and blood pressure.</p>	
Recommended Pacing	
23 days	
State Standards	
Standard	
LS1.A	<b>Structure and Function: Systems of specialized cells within organisms help them perform the essential functions of life.</b>
(HS-LS1-1 )	<b>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.</b>
HS-LS1-2)	<b>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.</b>
Instructional Focus	
Unit Enduring Understandings	
<ul style="list-style-type: none"> <li>• Living systems, from the organismal to the cellular level, demonstrate the complementary nature of structure and function.</li> <li>• Organisms are composed of complex biochemical systems that are designed to maintain homeostasis.</li> </ul>	
Unit Essential Questions	



- What are the structures and organs of the digestive system?
- What are the functions of the digestive system and the liver?
- What is the mechanism of peristalsis and its role in the G.I. tract?
- How are nutrients absorbed in the small intestine?
- What are the structures and functions of the organs that make up the respiratory system?
- What are the events involved in inspiration and preparation?
- How do the lungs perform the process of gas exchange within the lungs and tissues?
- How does the breath of air move through the respiratory system from nose to alveoli?
- What are the structures and organs of the urinary system and describe their general functions?
- How does a nephron work and how do their major parts function?
- What is the structure of the ureters, urinary bladder, and urethra and what are their functions?

## Objectives

### Students will know:

- The structures and organs of the digestive system.
- The functions of the digestive system and the liver.
- The composition and functions of saliva.
- The basic anatomy of the teeth and oral cavity and explain their functions in the digestive system.
- The mechanism of swallowing, vomiting and defecation.
- The mechanism peristalsis and its role in the G.I. tract.
- The enzymes secreted by the various digestive organs and describe the function of each.
- How gastric secretions are regulated.
- The four layers of the wall of the G.I. tract.
- The structure and function of the liver and gall bladder
- The pancreatic structure.
- The digestive function of the pancreatic secretions.
- The structure and function of the small intestine.
- The structure and function of the large intestine and the rectum.
- How the processes in the stomach, liver, pancreas, gall bladder, and small intestines are coordinated.
- The absorption of nutrients in the small intestine.
- The definitions of enzyme, metabolism, anabolism, and catabolism.
- How to list in sequence each structure through which a bite of food passes on its way through the digestive system.
- The general functions of the respiratory system.
- The structure and organs of the respiratory system.
- The functions of the structures and organs of the respiratory system.
- The protective mechanisms in the respiratory system.
- The events involved in inspiration and preparation.
- How to list and describe each of the respiratory air volumes.
- The types of non-respiratory air movements and describe how each occurs.
- How the respiratory muscles cause volume changes that lead to air flow into and out of the lungs.
- The process of gas exchanges in the lungs and tissues.
- How respiratory gasses are carried by the blood.
- The main areas involved in the control of respiration.
- The three factors that influence respiratory rate.
- The major events that occur during cellular respiration.
- How oxygen is used by cells.
- How the breath of air moves through the respiratory system from nose to alveoli.

- The symptoms and probable causes of Chronic Obstructive Pulmonary Disease and lung cancer.
- The diseases/disorders associated with the respiratory system.
- The important terminology related to the respiratory system
- The structures and organs of the urinary system and describe their general functions.
- The location and the structure of the kidneys.
- The pathway of blood through the major vessels within a kidney.
- How a nephron works and describe how the major parts function.
- How glomerular filtrate is produced and its composition.,
- The factors which affect the rate of glomerular filtration and how it is regulated.
- The role that tubular reabsorption plays in urine formation.
- The structure of the ureters, urinary bladder, and urethra.
- The diseases/disorders associated with the urinary system.
- The important terminology and definitions of the terms associated with the urinary system.

**Students will be able to:**

- Name, describe and locate the structures and organs of the digestive system.
- Describe the functions of the digestive system and the liver.
- Describe the composition and functions of saliva.
- Describe the basic anatomy of the teeth and oral cavity and explain their functions in the digestive system.
- Describe the mechanism of swallowing, vomiting and defecation.
- Describe the mechanism peristalsis and its role in the G.I. tract.
- List the enzymes secreted by the various digestive organs and describe the function of each.
- Explain how gastric secretions are regulated.
- List and describe the four layers of the wall of the G.I. tract.
- Describe the structure and function of the liver and gall bladder
- Describe the pancreatic structure.
- List and explain the digestive function of the pancreatic secretions.
- Describe the structure and function of the small intestine.
- Describe the structure and function of the large intestine and the rectum.
- Explain how the processes in the stomach, liver, pancreas, gall bladder, and small intestines are coordinated.
- Describe the absorption of nutrients in the small intestine.
- Define enzyme, metabolism, anabolism, and catabolism.
- List in sequence each structure through which a bite of food passes on its way through the digestive system.
- List and describe diseases/disorders associated with the digestive system
- Define important terminology of the digestive system.
- Describe the general functions of the respiratory system.
- List and describe the structure and organs of the respiratory system.
- Describe the functions of the structures and organs of the respiratory system.
- Describe the protective mechanisms in the respiratory system.
- Describe the events involved in inspiration and preparation.
- List and describe each of the respiratory air volumes.
- Outline the types of non-respiratory air movements and describe how each occurs.
- Explain how the respiratory muscles cause volume changes that lead to air flow into and out of the lungs.
- Describe the process of gas exchanges in the lungs and tissues.
- Explain how respiratory gasses are carried by the blood.
- Name the main areas involved in the control of respiration.
- List three factors that influence respiratory rate.

- Explain the major events that occur during cellular respiration.
- Explain how oxygen is used by cells.
- Trace the breath of air through the respiratory system from nose to alveoli.
- Describe the symptoms and probable causes of Chronic Obstructive Pulmonary Disease and lung cancer.
- Describe diseases/disorders associated with the respiratory system.
- Define important terminology relate to the respiratory system.
- List the structures and organs of the urinary system and describe their general functions.
- Describe the location and the structure of the kidneys.
- Describe the pathway of blood through the major vessels within a kidney.
- Explain how a nephron works and describe how the major parts function.
- Describe the production of glomerular filtrate and its composition.,
- Describe the factors which affect the rate of glomerular filtration and how it is regulated.
- Describe the role that tubular re absorption plays in urine formation.
- Describe the structure of the ureters, urinary bladder, and urethra.
- List and describe diseases/disorders associated with the urinary system.
- Define important terminology of the urinary system.

## UNIT 6: THE HUMAN LIFE CYCLE

### Reproductive System

<b>Summary and Rationale</b>	
<p>Most organ systems function almost continuously to maintain the wellbeing of the individual. The reproductive system however appears to “slumber” until puberty. The primary sex organs, or gonads are the testes in males. The gonads produce sex cells called gametes and secrete a variety steroid hormones. The remaining reproductive structures ie. Ducts, glands and external genitalia are the accessory reproductive organs.</p>	
<b>Recommended Pacing</b>	
<b>8 days</b>	
<b>State Standards</b>	
<b>Standard</b>	
<b>LS1.A</b>	<b>Structure and Function: Systems of specialized cells within organisms help them perform the essential functions of life.</b>
<b>(HS-LS1-1)</b>	<b>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.</b>
<b>HS-LS1-2)</b>	<b>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.</b>
<b>Instructional Focus</b>	
<b>Unit Enduring Understandings</b>	
<ul style="list-style-type: none"> <li>● Living systems, from the organismal to the cellular level, demonstrate the complementary nature of structure and function.</li> <li>● Organisms are composed of complex biochemical systems that are designed to maintain homeostasis.</li> </ul>	
<b>Unit Essential Questions</b>	
<ul style="list-style-type: none"> <li>● What is the structure and function of the male and female reproductive system?</li> <li>● What are the diseases/disorders associated with the male and female reproductive systems?</li> <li>● What is the structure of the ovary and how do egg cells and follicles form?</li> <li>● What are the hormones that control the female reproductive system and in the development of the menstrual cycle?</li> <li>● What is fertilization and what structures are involved in the process?</li> </ul>	
<b>Objectives</b>	
<p><b>Students will know:</b></p> <ul style="list-style-type: none"> <li>● The function of the male reproductive system.</li> <li>● The parts of the male reproductive system and describe the function of each part.</li> <li>● The endocrine and exocrine products of the testes.</li> <li>● The importance of semen and name the glands that produce it.</li> <li>● The structure of sperm and relate the structure to its function.</li> </ul>	

- The pathway followed by sperm from the testes to the exterior of the body.
- The symptoms and causes of sexually transmitted diseases.
- The diseases/disorders associated with the male reproductive system.
- The functions of the female reproductive system.
- The parts of the female reproductive system and describe the functions of each part.
- The structure of the ovary and how egg cells and follicles are formed.
- The role that hormones play in control of the female reproductive system and in the development of secondary sexual characteristics.
- The major events that occur during the menstrual cycle.
- The process of fertilization and identify the time of the menstrual cycle at which sexual intercourse is most likely to result in pregnancy.
- The major events of pregnancy.
- The functions of the amnion and placenta.
- The stages of birth and role that hormones play in this process.
- The structure and function of mammary glands.
- The several methods of birth control and evaluate the effectiveness of each method.
- The symptoms and causes of sexually transmitted diseases.
- The diseases/disorders associated with the female reproductive system.
- The important terminology related to the male reproductive system and the definitions to those terms.

**Students will be able to:**

- State the function of the male reproductive system.
- List the parts of the male reproductive system and describe the function of each part.
- Name the endocrine and exocrine products of the testes.
- Discuss the importance of semen and name the glands that produce it.
- Describe the structure of sperm and relate the structure to its function.
- Trace the pathway followed by sperm from the testes to the exterior of the body.
- Explain the symptoms and causes of sexually transmitted diseases.
- List and describe diseases/disorders associated with the male reproductive system.
- Define important terminology related to the male reproductive system.
- State the functions of the female reproductive system.
- List the parts of the female reproductive system and describe the functions of each part.
- Describe the structure of the ovary and how egg cells and follicles are formed.
- Describe the role that hormones play in control of the female reproductive system and in the development of secondary sexual characteristics.
- List the major events that occur during the menstrual cycle.
- Describe the process of fertilization and identify the time of the menstrual cycle at which sexual intercourse is most likely to result in pregnancy.
- Describe the major events of pregnancy.
- Describe the functions of the amnion and placenta.
- Describe the stages of birth and role that hormones play in this process.
- Describe the structure and function of mammary glands.
- Identify several methods of birth control and evaluate the effectiveness of each method.