

TOWNSHIP OF UNION PUBLIC SCHOOLS



SC 443 HUMAN ANATOMY & PHYSIOLOGY Curriculum Guide January 2019

Mission Statement

The mission of the Township of Union Public Schools is to build on the foundations of honesty, excellence, integrity, strong family, and community partnerships. We promote a supportive learning environment where all students are challenged, inspired, empowered, and respected as diverse learners. Through cultivation of students' intellectual curiosity, skills and knowledge, our students can achieve academically and socially as well as contribute as responsible and productive citizens of our global community Philosophy Statement

Philosophy Statement

The Township of Union Public School District, as a societal agency, reflects democratic ideals and concepts through its educational practices. It is the belief of the Board of Education that a primary function of the Township of Union Public School System is to formulate a learning climate conducive to the needs of all students in general, providing therein for individual differences. The school operates as a partner with the home and community.

Statement of District Goals:

- **Develop reading, writing, speaking, listening, and mathematical skills.**
- **Develop a pride in work and a feeling of self-worth, self-reliance, and self-discipline.**
- **Acquire and use the skills and habits involved in critical and constructive thinking.**
- **Develop a code of behavior based on moral and ethical principles.**
- **Work with others cooperatively.**
- **Acquire a knowledge and appreciation of the historical record of human achievement and failures and current societal issues.**
- **Acquire a knowledge and understanding of the physical and biological sciences.**
- **Participate effectively and efficiently in economic life and the development of skills to enter a specific field of work.**
- **Appreciate and understand literature, art, music, and other cultural activities.**
- **Develop an understanding of the historical and cultural heritage.**
- **Develop a concern for the proper use and/or preservation of natural resources.**
- **Develop basic skills in sports and other forms of recreation.**

Course Description

This course is designed to give the student an understanding and appreciation of the human body's structures and functions. By studying the disorders associated with the body's systems, the student will understand how susceptible to disease the body can be and how decisions made in their everyday lives can affect their health.

The first half of this course will introduce the student to the basic principles of human anatomy and physiology and investigate skeletal, muscular, and nervous systems. Numerous laboratory exercises, audio-visual materials, internet activities, demonstrations, and lectures will be utilized to demonstrate the relationship of the structures and mechanisms of each system to the functions of the entire human body.

The second half will investigate the cardiovascular, lymphatic (immune), respiratory, digestive, urinary, endocrine, and reproductive systems. The course will conclude with a fetal pig dissection.

The twelfth grade human anatomy and physiology student will explore the following content topics that are aligned with the Next Generation Science Standards (NGSS) and New Jersey Student Learning Standards (NJSLS)

Textbook / Internet Resources

Textbook: Marieb, E. Essentials of Human Anatomy and Physiology, 10th Edition. Pearson, 2012

http://wps.pearsoned.com/bc_mariieb_hap_9_oa/218/55856/14299219.cw/index.html Anatomy Book Internet Activities

<http://anatomyarcade.com/games/gamesGeneral.htm> Anatomy Arcade: Anatomy Games

<https://www.merriam-webster.com/> Voice Medical Dictionary

<http://bio-alive.com/animations/anatomy.htm> Biology and Anatomy Animations

<https://www.getbodysmart.com/> Animated Text Narrations and Quizzes to Explain the Structures and Functions of the Human Body Systems.

<https://act.downstate.edu/courseware/haonline/index.htm> Structures and Functions of the Human Body Systems.

<http://www.lonestar.edu/anatomy-and-physiology.htm> Structures and Functions of the Human Body Systems.

<https://www.bartleby.com/107/> The Bartleby.com edition of Gray's *Anatomy of the Human Body*

<http://msjensen.cbs.umn.edu/webanatomy/> University of Minnesota Tests and Quizzes

<https://www.wiley.com/college/apcentral/anatomydrill/> Anatomy Drill and Practice

<https://www.youtube.com/user/crashcourse> Anatomy Videos

https://www.youtube.com/results?search_query=khan+academy+anatomy+and+physiology Anatomy Videos

Course Proficiencies

Students will be able to...

A. Understand the levels of organization

- 1. Utilize the language of anatomy**
- 2. Demonstrate an understanding of the chemical concepts essential to living organisms**
- 3. Demonstrate that cells are the basic units of structure and function in living organisms**
- 4. Understand how cells are organized into tissues and tissues into organs**
- 5. Demonstrate an understanding of the processes of cell reproduction and differentiation**

B. Understand structure/function relationships

- 1. Demonstrate an understanding of the skeletal system**
- 2. Demonstrate an understanding of the muscular system**
- 3. Demonstrate an understanding of the cardiovascular system**
- 4. Demonstrate an understanding of the respiratory system**
- 5. Demonstrate an understanding of the nervous system**
- 6. Demonstrate an understanding of the endocrine system**
- 7. Demonstrate an understanding of the digestive system**
- 8. Demonstrate an understanding of the urinary system**
- 9. Demonstrate an understanding of the reproductive system**

C. Understand interdependence of systems

- 1. Demonstrate an understanding of homeostasis**
- 2. Demonstrate an understanding of what cancer is and how it affects the systems of the body**

Curriculum Units

Unit 1: Principles of Anatomy and Physiology

Unit 2: Cells and Tissues

Unit 3: Skeletal, Muscular, and Nervous Systems

Unit 4: Lymphatic and Cardiovascular Systems

Unit 5: Respiratory and Digestive Systems

Unit 6: Urinary and Reproductive Systems

Pacing Guide- Course

<i>Content</i>	<i>Number of Days</i>
Unit 1: Principles of Anatomy and Physiology	10
Unit 2: Cells and Tissues	30
Unit 3: Skeletal, Muscular, and Nervous Systems	50
Unit 4: Lymphatic and Cardiovascular Systems	45
Unit 5: Respiratory and Digestive Systems	25
Unit 6: Urinary and Reproductive Systems	20

Unit 1: Principles of Anatomy & Physiology (10 Days)

Unit 1 Principles of Anatomy & Physiology introduces and establishes the framework upon which all the other Units are built. This Unit provides the necessary terminology so that instructor and students are all “speaking the same language.” At the end of this unit, students will have an understanding of the organization and terms of the body, the needs the body requires for survival, and how the body controls homeostasis.

What is the difference between anatomy and physiology?

What is the basic human body plan?

What is the importance of homeostasis? How do feedback mechanisms maintain homeostasis?

How do human systems maintain homeostasis?

How do homeostatic imbalances affect human health?

How is the body organized?

What terms are essential to understanding the anatomy of the human body?

Student Learning Objectives

Represent and explain the relationship between the structure and function of each class of complex molecules using a variety of models.

Describe how a disease is the result of a malfunctioning system, organ, and cell, and relate to possible treatment interventions.

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

Provide examples and explain how organisms use feedback systems to maintain their internal environments. ([LS1.A](#))

Plan and conduct an investigation to provide evidence of feedback mechanisms to maintain homeostasis. ([HS-LS1-3](#))

Part A: How do feedback mechanisms maintain homeostasis?

Concepts	Formative Assessment
<ul style="list-style-type: none">• Feedback mechanisms maintain a living system's internal conditions within certain limits, and they mediate behaviors, allowing the system 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.• Feedback (negative or positive) can stabilize or destabilize a system.• Homeostasis, the ability of the organ systems to cohesively function to respond to the ever-changing environment is then introduced, as well as consequent disease states that occur when homeostasis cannot be achieved or resolved. Students appreciate the image of the dynamic body continually striving to maintain balance and equilibrium	<p><i>Students who understand the concepts are able to:</i></p> <ul style="list-style-type: none">• Plan and conduct an investigation individually and collaboratively to produce evidence that feedback mechanisms (negative and positive) maintain homeostasis.• In the planning of the investigation, decide on the types, amount, and accuracy of the data needed to produce reliable measurements, consider limitations on the precision of the data, and refine the design accordingly.• Complete graphic organizer on feedback systems

Part B: How is the body organized?	
Concepts	Formative Assessment
<ul style="list-style-type: none"> • 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. • 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. 	<p><i>Students who understand the concepts are able to:</i></p> <ul style="list-style-type: none"> • Develop and use a model based on evidence to illustrate hierarchical organization of interacting systems that provide specific functions within multicellular organism. • Develop and use a model based on evidence to illustrate the interaction of functions at the organism system level. • Develop and use a model based on evidence to illustrate the flow of matter
Part C: What terms are essential to understanding the anatomy of the human body?	
Concepts	Formative Assessment
<ul style="list-style-type: none"> • Terminology for anterior/posterior body landmarks, body sections and planes, as well as classification of body cavities and their respective components, round out the introduction of medical terminology used in Unit 1 	<ul style="list-style-type: none"> • Make Your Own Cadaver Lab: Students will develop and use a model to identify anterior/posterior body landmarks, body sections and planes, and body cavities. Kinesthetic, oral, and written assessment

Connecting with English Language Arts/Literacy and Mathematics

English Language Arts/Literacy

- Make strategic use of digital media in presentations to enhance understanding of the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
- Conduct short as well as more sustained research to determine how feedback mechanisms maintain homeostasis. Synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation.

Modifications

- Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community. ***How do human systems maintain homeostasis? How do homeostatic imbalances affect human health? How do human systems maintain homeostasis? How do homeostatic imbalances affect human health? Bring in an article from a popular magazine or newspaper describing an environmental problem(s), such as toxic waste disposal, pollution of the ocean, etc., that threatens their homeostasis, even survival. Discuss the changes in medical technology that have occurred over the lifetime of the students in your class. Have them speculate on what new technologies could emerge in the next decade, or even in the next century.***
- Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling). ***Students will represent their understanding using torso model, skeleton model, internet unit activities, oral answer, physically identifying body structures, and written form.***
 - ***IEP Modifications: Use hands on learning tools, provide completed model or example of work, provide study guides, provide completed notes, modify assignments, additional time for assessments, allow oral testing, preferential seating***
- Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences). ***Students will work in various group setting to encourage sharing their ideas***
- Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings. ***Students have home access to Google Classroom site where they can perform various internet activities to demonstrate understanding.***

NGSS and Foundations for the Unit
Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. (HS-LS1-2)
Provide examples and explain how organisms use feedback systems to maintain their internal environments. (LS1.A)
Plan and conduct an investigation to provide evidence of feedback mechanisms to maintain homeostasis. (HS-LS1-3)
Performance expectation, Clarification Statement, Assessment boundary, (NGSS Standard)

The performance expectations above were developed using the following elements from the NRC document A Framework for K-12 Science Education :		
Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
Constructing Explanations and Designing Solutions <ul style="list-style-type: none"> Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, 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) 	LS1.A: Structure and Function <ul style="list-style-type: none"> Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2) Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change 	Systems and System Models <ul style="list-style-type: none"> 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) Stability and Change <ul style="list-style-type: none"> Feedback (negative or positive) can stabilize or destabilize a system. (HS-

<p>Planning and Carrying Out Investigations</p> <ul style="list-style-type: none"> 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) <p>Developing and Using Models</p> <ul style="list-style-type: none"> Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-LS1-2) 	<p>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)</p>	<p>LS1-3)</p>
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Unit 2: Cells and Tissues (30 Days)

“How do the structures of organisms enable life’s functions?”

Unit 2: Cells and Tissues is the transition between microscopic and macroscopic anatomical study. Students are asked to examine the microscopic structure of an individual cell, then to intellectually build those individual cells into body tissues that perform specialized functions.

Students formulate an answer to the question *“How do the structures of organisms enable life’s functions?”* Students investigate explanations for the structure and functions of cells as the basic unit of life, of hierarchical organization of interacting organ systems, and of the role of specialized cells for maintenance and growth. The crosscutting concepts of structure and function, matter and energy, and systems and system models are called out as organizing concepts for the disciplinary core ideas. Students use critical reading, modeling, and conducting investigations. Students also use the science and engineering practices to demonstrate understanding of the disciplinary core ideas.

Student Learning Objectives

Explain the connection between the sequence and the subcomponents of a biomolecule and its properties. ([LS1.A](#))

Create representations that explain how genetic information flows from a sequence of nucleotides in a gene to a sequence of amino acids in a protein. ([LS1.A](#))

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](#))

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

Provide examples and explain how organisms use feedback systems to maintain their internal environments. ([LS1.A](#))

Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms. (HS-LS1-4)	
Identify the defining characteristics of tissues in terms of: types of cells, location, and function Classify tissues: epithelial, connective, muscle, or nervous Compare different types of tissues (microscope, internet images,) and prepare scientific drawings Identify the criteria used when naming epithelial tissue	
Part A: How does the structure of DNA determine the structure of proteins, and what is the function of proteins?	
Concepts	Formative Assessment
<ul style="list-style-type: none"> • Systems of specialized cells within organisms help them perform the essential functions of life. • 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. • 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 their functions and/or solve a problem. 	<p><i>Students who understand the concepts are able to:</i></p> <ul style="list-style-type: none"> • Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) for how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells. • Construct an explanation, based on 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, for how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells. • Conduct a detailed examination of the structure and function of DNA.

Part B: How are structure and function related for each of the types of body tissues?	
Concepts	Formative Assessment
<ul style="list-style-type: none"> Body tissues are classified by structure and function. Classify and state the defining characteristics of epithelial tissue, connective tissue, muscle tissue, and nervous tissue. 	<p><i>Students who understand the concepts are able to:</i></p> <ul style="list-style-type: none"> Identify the four major types of tissues based on structure and function. Describe the functions of each of the four major types of tissues. Evaluate the structure of each tissue and how it relates to its function. <ul style="list-style-type: none"> Tissue Identification Lab Complete Graphic Organizer classifying tissues
Connecting with English Language Arts/Literacy and Mathematics	
<p><i>English Language Arts/Literacy</i></p> <ul style="list-style-type: none"> Cite specific textual evidence that supports how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells. Write an explanation that supports how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells. Draw evidence from informational texts to support how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells. Make strategic use of digital media in presentations to enhance understanding of the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. <ul style="list-style-type: none"> Make strategic use of digital media in presentations to enhance understanding of the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms. 	

Mathematics

- Use a mathematical model to illustrate the role of cellular division and differentiation in producing and maintaining complex organisms. Identify important quantities in the role of cellular division and differentiation in producing and maintaining complex organisms and map their relationships using tools. Analyze those relationships mathematically to draw conclusions, reflecting on the results and improving the model if it has not served its purpose.
- Graph functions expressed symbolically showing the role of cellular division and differentiation in producing and maintaining complex organisms and show key features of the graph, by hand in simple cases and using technology for more complicated cases.

Modifications

- Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques-auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling). ***Students will represent their understanding using internet activities, cell illustrations, microscopic images, cell models. Have students go to the whiteboard/ELMO/smart board to draw out how a substance can be brought into the cell: endocytosis, pinocytosis, receptor-mediated endocytosis.***
- ***IEP Modifications: Use hands on learning tools, provide completed model or example of work, provide study guides, provide completed notes, modify assignments, additional time for assessments, allow oral testing, preferential seating***
- Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community. ***Search for relevant research articles on the web. Visit science websites, such as those listed below, and begin by searching for key terms such as scar treatment, wound healing, scar therapy, stem cell therapy, hypertrophic scar, keloid scar, skin scar, and contracture and see how what you're learning in the course applies to science and medicine today.***
- Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences). ***Students will work in various group setting to encourage sharing their ideas***
- Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings. ***Students have home access to Google Classroom site where they can perform various internet activities to demonstrate understanding.***

NGSS and Foundations for the Unit
Explain the connection between the sequence and the subcomponents of a biomolecule and its properties. (LS1.A)
Create representations that explain how genetic information flows from a sequence of nucleotides in a gene to a sequence of amino acids in a protein. (LS1.A)
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)
Construct models that explain the movement of molecules across membranes with membrane structure and function. (LS1.A)
Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. (HS-LS1-2)
Provide examples and explain how organisms use feedback systems to maintain their internal environments. (LS1.A)
Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. (HS-LS1-3)
Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms (HS-LS1-4)

Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p><u>Constructing Explanations and Designing Solutions</u></p> <ul style="list-style-type: none"> Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, 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) <p><u>Planning and Carrying Out Investigations</u></p> <ul style="list-style-type: none"> 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) <p><u>Developing and Using Models</u></p> <ul style="list-style-type: none"> Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-LS1-2) 	<p><u>NGSS Standards and bullet points</u></p> <ul style="list-style-type: none"> Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. (HS-LS1-2) Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change 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) Regions of DNA called genes determine the structure of proteins, which carry out the essential functions of life through systems of specialized cells. The sequence of genes contains instructions that code for proteins. (LS1.A) Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1) Groups of specialized cells (tissues) use proteins to carry out functions that are essential to the organism. (LS1.A) 	<p><u>Systems and System Models</u></p> <ul style="list-style-type: none"> 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) <p><u>Stability and Change</u></p> <ul style="list-style-type: none"> Feedback (negative or positive) can stabilize or destabilize a system. (HS-LS1-3)

Unit 3: Skeletal, Muscular, and Nervous Systems (50 Days)

Students will analyze the interdependence of the skeletal, muscular, and nervous systems as these relate to the protection, support movement, integration and coordination of body functions of the human body.

Student Learning Objectives

LS1.A: Structure and Function

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)

Provide examples and explain how organisms use feedback systems to maintain their internal environments. (LS1.A)

Part A:

Concepts

Skeletal System Concepts:

Describe of the many functions of bones. Next, bones are classified in one of four groups, depending on their physical shape: long, short, flat, or irregular, each made up of one of two types of osseous tissue, or a combination of both, to meet unique body needs. The macroscopic (gross) anatomy of a long bone provides a conceptual image of bone structure, and the microscopic anatomy helps students to begin to understand the complexity of bone and the

Formative Assessment

List 5 functions of the skeletal system.

Explain how the skeleton maintains homeostasis.

Color and label:

a. a diagram of the structure of a typical long bone.

b. a diagram of the microscopic structure of compact bone.

<p>reasons for its dynamic nature</p> <p>Identify 206 named bones that make up the axial and appendicular skeletons are presented, and their major projections and depressions are identified. A discussion of articulations found in the body follows. Identify the differences observed in the fetal skeleton and other developmental events that occur throughout the life span, including osteoporosis.</p>	<p>c. diagrams of the major bones of the skeleton.</p> <p>Utilize Internet websites to investigate the skeletal system.</p> <p>Identify anatomical structures on a sectioned bone specimen.</p> <p>Write and submit a lab report based on locating and identifying the bones</p> <p>in a human</p> <p>List the steps of bone development, from embryo to adult.</p> <p>Examine and explain information on the skeletal system, found on available software resources.</p> <p>List pathologies of the skeletal system.</p>
Part B:	
Concepts	Formative Assessment
<p><u><i>Muscular System Concepts:</i></u></p> <p>Describe the three types of muscle tissue. Skeletal, smooth, and cardiac muscle characteristics, locations, and level of conscious control of these tissues are compared and contrasted.</p> <p>Identify of the microscopic anatomy of skeletal muscle, describe an overview of the mechanism of muscle contraction</p>	<p>List the functions of the muscular system.</p> <p>Color and label diagrams of:</p> <p>a. the three ways of muscle tissue</p> <p>b. microscopic and gross anatomy of a skeletal muscle.</p> <p>Utilize Internet websites to investigate the muscular system.</p>

<p>State the “5 Golden Rules” of skeletal muscle activity are presented to help students comprehend muscle movements and their related interactions. First, the types of body movements generated by muscles are explained. Then a basic list of criteria for naming muscles is provided to ensure that students understand the logic involved in the naming of most muscles. Finally, the most important of the more than 600 muscles of the human body are presented, along with their points of origin and insertion, as well as function.</p>	<p>List, in sequence, the events of muscle cell contraction (sliding filament theory).</p> <p>Write and submit lab reports based on each of the following lab investigations:</p> <ul style="list-style-type: none"> a. experimental stimulation of frog muscle fibers and the resulting responses. b. microscopic examination of the three types of muscle tissue. c. identification of the major skeletal muscles and their actions. d. analyze muscle fatigue in lab activity <p>Examine and explain information on the muscular system, found on available software resources.</p> <p>List and explain several muscular disorders.</p>
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Part C:	
Concepts	Formative Assessment
<p><u><i>Nervous System Concepts:</i></u></p> <p>Describe the structure and function of nervous tissue. The types and activities of the supporting cells, or neuroglia, are discussed, followed by a complete description of the anatomy of a neuron. Neurons are then classified as either afferent (sensory), efferent (motor), or association neurons, and the role of each type is presented. Discussion of the physiology of nerve impulses is next, focusing on the two functional properties of neurons, irritability and conductivity. Both of these properties are explored, and the mechanisms involved within simple and more complex reflex arcs are explained to help clarify application of these principles.</p> <p>Describe the central nervous system and its components. The structure and function of the cerebral hemispheres, diencephalon, brain stem, cerebellum, and spinal cord are explored, followed by a discussion of the protection provided to the CNS by the meninges and cerebrospinal fluid.</p> <p>Examine the peripheral nervous system, beginning with the cranial and spinal nerves, followed by a discussion of the differences between the somatic and autonomic nervous systems. The autonomic nervous system is then further subdivided into its sympathetic and parasympathetic divisions, and the “fight-or-flight” mechanism of the sympathetic division</p>	<p>List the functions of the nervous system.</p> <p>Color and label diagrams of the nervous system, including the neuron, brain, and spinal cord.</p> <p>Utilize Internet websites to research the nervous system.</p> <p>List, in sequence, the events involved in nerve impulse transmission and synaptic transmission.</p> <p>Write and submit lab reports based on each of the following lab investigations:</p> <ul style="list-style-type: none"> • Microscopic examination of nervous tissue. • Demonstration of nerve tissue properties and reflexes. • Dissection of an animal spinal cord. • Dissection of a sheep brain. <p>Identify six of the twelve pairs of cranial nerves and their functions.</p> <p>List and explain nervous system pathologies.</p> <p>Examine and explain information on the nervous system, found on software resources.</p>

is compared to the “resting and digesting” mechanism of the parasympathetic division. Finally, the developmental aspects of the nervous system are presented, along with a discussion of some of the more common congenital complications, such as cerebral palsy and spina bifida.	
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Connecting with English Language Arts/Literacy and Mathematics
<p><i>English Language Arts/Literacy</i></p> <ul style="list-style-type: none"> • Make strategic use of digital media in presentations to enhance understanding of the hierarchical organization of interacting systems that provide specific functions within multicellular organisms • Construct Argument from Evidence report on various scientific articles provided <p><i>Mathematics</i></p>

Modifications
<ul style="list-style-type: none"> • Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques- auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling). <i>Students will represent their understanding using internet activities, cell illustrations, microscopic images, cell models. Have students go to the whiteboard/ELMO/smart board to identify anatomy and physiology of the skeletal, muscular and nervous systems.</i> • <i>IEP Modifications: Use hands on learning tools, provide completed model or example of work, provide study guides, provide completed notes, modify assignments, additional time for assessments, allow oral testing, preferential seating</i> • Structure lessons around questions that are authentic, relate to students’ interests, social/family background and knowledge of their community. <i>Search for relevant research articles on the web. Visit science websites, such as those listed below, and begin by searching for conditions of the systems covered in this unit; and see how what you’re learning in the course applies to science</i>

and medicine today.

- Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences). ***Students will work in various group setting to encourage sharing their ideas***
- Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings. ***Students have home access to Google Classroom site where they can perform various internet activities to demonstrate***

NGSS and Foundations for the Unit
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)
Provide examples and explain how organisms use feedback systems to maintain their internal environments. (LS1.A)

The performance expectations above were developed using the following elements from the NRC document A Framework for K-12 Science Education :		
Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts
<p><u>Constructing Explanations and Designing Solutions</u></p> <ul style="list-style-type: none"> Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, 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) <p><u>Planning and Carrying Out Investigations</u></p> <ul style="list-style-type: none"> 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 	<p>NGSS Standards and bullet points</p> <ul style="list-style-type: none"> 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) <p>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)</p> <ul style="list-style-type: none"> Systems of specialized cells within 	<p>Systems and System Models</p> <ul style="list-style-type: none"> 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) <p>Stability and Change</p> <ul style="list-style-type: none"> Feedback (negative or positive) can stabilize or destabilize a system. (HS-LS1-3)

<p>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)</p> <p><u>Developing and Using Models</u></p> <p>Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-LS1-2)</p>	<p>organisms help them perform the essential functions of life. (HS-LS1-1)</p> <p>Groups of specialized cells (tissues) use proteins to carry out functions that are essential to the organism. (LS1.A)</p>	
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Unit 4: Lymphatic and Cardiovascular Systems (45 Days)

The Lymphatic and Cardiovascular systems are intertwined and work together to transport substances through the body. In this unit, students will gain an understanding of the structure, components and role of blood. They will examine just how the blood is pumped by the heart through a closed circuit of vessels, in order to deliver nutrients to, and remove wastes from, the cells. Students will then investigate the location, structure, and function of the heart, after which they will move on to the blood vessels and their various circulatory routes.

Student Learning Objectives

LS1.A: Structure and Function

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)

Provide examples and explain how organisms use feedback systems to maintain their internal environments. (LS1.A)

Part A:	
Concepts	Formative Assessment
<p><u><i>Blood Concepts:</i></u></p> <p>Blood, or vascular tissue, is composed of two parts: living blood cells called formed elements and nonliving matrix called plasma that contains soluble protein molecules that are visible during coagulation. The formed elements are erythrocytes, leukocytes, and platelets. The physical characteristics of blood, including color, pH, and temperature, are presented, followed by a description of the plasma composition. These concepts provide a detailed analysis of each of the formed elements.</p>	<ul style="list-style-type: none"> * Describe the composition and volume of whole blood. * Describe the composition of plasma, and discuss its importance in the body. * Describe the blood-clotting process. * Name some factors that may inhibit or enhance the blood-clotting process. * Describe the ABO and Rh blood groups. * Explain the basis for a transfusion reaction. <p>Lab: Blood Microscopic Cell Anatomy</p> <p>Lab: Blood Typing</p>
Part B:	

Concepts	Formative Assessment
<p><u><i>Cardiovascular System Concepts:</i></u></p> <p>This unit will focus the students on the complexity of the cardiovascular system and its significance to all other body systems, as it is the transport system to and from the organs. The structural and mechanical characteristics of the heart are followed by a discussion of its unique intrinsic electrical activity.</p> <p>Arteries, veins, and capillaries are compared for their structural and physiological similarities, as well as their differences. Names of the major vessels are given, as the route of blood is traced from its point of exit from the heart through the aorta to all parts of the body and back to the heart via the superior and inferior venae cavae. A look into the various mechanisms involved in blood pressure precedes a discussion of the special circulatory routes that supply the brain, liver, and developing fetus. Finally, the developmental aspects of circulation are considered</p>	<ul style="list-style-type: none"> * Describe the location of the heart in the body, and identify its major anatomical areas on an appropriate * Trace the pathway of blood through the heart. * Compare the pulmonary and systemic circuits. * Explain the operation of the heart valves. * Name the elements of the intrinsic conduction system of the heart, and describe the pathway of impulses through this system. * Explain what information can be gained from an electrocardiogram. * Compare and contrast the structure and function of arteries, veins, and capillaries. * Identify the body's major arteries and veins, and name the body region supplied by each. * Define <i>pulse</i>, and name several pulse points. * Define <i>blood pressure</i>, and list factors affecting and/or determining blood pressure. * Define <i>hypertension</i> and <i>atherosclerosis</i>, and describe possible health consequences of these conditions. * Describe changes in the cardiovascular system with aging and list several factors that help maintain cardiovascular health <p>Lab: Sheep Heart Dissection</p> <p>Lab: Pulse, Blood Pressure, Heart Sounds, EKG</p>
Part C:	

Concepts	Formative Assessment
<p><u><i>Lymphatic System Concepts:</i></u></p> <p>One of the least recognized of the body systems, the lymphatic system has been gaining ground in recognition and understanding over the past two decades, largely due to research into AIDS, cancer, and autoimmune disorders. It is very important in fighting disease and maintaining healthy homeostatic balance within nearly all body system. Although familiar with the idea of immunity, the students are usually unfamiliar with all of the players involved in this complex body system that is tied intimately with the cardiovascular system and has representatives that are found in all other organ systems in the body to defend against invading pathogens.</p>	<ul style="list-style-type: none"> * Explain how the lymphatic system is functionally related to the cardiovascular and immune systems. * Name the two major types of structures composing the lymphatic system. * Describe the source of lymph, and explain its formation and transport.

Connecting with English Language Arts/Literacy and Mathematics
<p><i>English Language Arts/Literacy</i></p> <ul style="list-style-type: none"> • Make strategic use of digital media in presentations to enhance understanding of the hierarchical organization of interacting systems that provide specific functions within multicellular organisms • Construct Argument from Evidence report on various scientific articles provided • <i>Mathematics</i>

Modifications
<ul style="list-style-type: none"> • Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques- auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling). <i>Students will represent their understanding using internet activities, cell illustrations, microscopic images, models. Have students go to the whiteboard/ELMO/smart board to identify anatomy and physiology of blood, cardiovascular and lymphatic systems.</i> • <i>IEP Modifications: Use hands on learning tools, provide completed model or example of work, provide study guides, provide completed notes, modify assignments, additional time for assessments, allow oral testing, preferential seating</i> • Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community. <i>Search for relevant research articles on the web. Visit science websites, such as those listed below, and begin by searching for conditions of the systems covered in this unit; and see how what you're learning in the course applies to science and medicine today.</i> • Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences). <i>Students will work in various group setting to encourage sharing their ideas</i> • Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings. <i>Students have home access to Google Classroom site where they can perform various internet activities to demonstrate</i>

NGSS and Foundations for the Unit
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)
Provide examples and explain how organisms use feedback systems to maintain their internal environments. (LS1.A)

The performance expectations above were developed using the following elements from the NRC document A Framework for K-12 Science Education:		
Science and Engineering Practices	Disciplinary Core Ideas	Crosscutting Concepts

<p><u>Constructing Explanations and Designing Solutions</u></p> <ul style="list-style-type: none"> Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, 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) <p><u>Planning and Carrying Out Investigations</u></p> <ul style="list-style-type: none"> 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) 	<p><u>NGSS Standards and bullet points</u></p> <ul style="list-style-type: none"> 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) <p>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)</p> <ul style="list-style-type: none"> Systems of specialized cells within organisms help them perform the essential functions of life. (HS-LS1-1) <p>Groups of specialized cells (tissues) use proteins to carry out functions that are essential to the organism. (LS1.A)</p>	<p><u>Systems and System Models</u></p> <ul style="list-style-type: none"> <u>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)</u> <p><u>Stability and Change</u></p> <ul style="list-style-type: none"> <u>Feedback (negative or positive) can stabilize or destabilize a system. (HS-LS1-3)</u>
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Unit 5: Respiratory and Digestive Systems (25 Days)

Students will analyze the Respiratory, and Digestive systems which provide oxygen and nutrients to the body

Student Learning Objectives

LS1.A: Structure and Function

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)

Provide examples and explain how organisms use feedback systems to maintain their internal environments. (LS1.A)

Part A:

Concepts

Respiratory System Concepts:

In the first section of this unit, the anatomy of the respiratory system is outlined. The order of air entry is as follows: nose, pharynx, larynx, trachea, bronchi, and bronchioles. These structures are known as conducting zone structures. The lungs are presented next, including a review of their basic structure and position. The respiratory zone structures, comprised of the bronchioles, alveolar ducts, alveolar sacs, and alveoli within the lungs, are the actual sites of external respiratory gas exchange.

The next section of this unit presents respiratory physiology and the mechanics of the four distinct events of respiration: pulmonary ventilation, external respiration, respiratory gas transport, and

Formative Assessment

Name the organs forming the respiratory passageway from the nasal cavity to the alveoli of the lungs (or identify them on a diagram or model), and describe the function of each. Describe several protective mechanisms of the respiratory system.

Describe the structure and function of the lungs and the pleural coverings. Describe the structure of the respiratory membrane. Define cellular respiration, external respiration, internal respiration, pulmonary ventilation, expiration, and inspiration.

Explain how the respiratory muscles cause volume changes that lead to air flow into and out of the lungs (breathing).

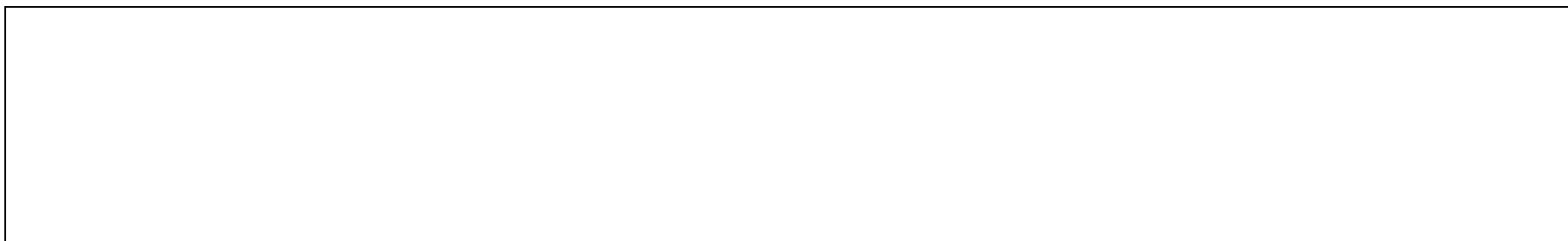
Name several nonrespiratory air movements, and explain how

<p>internal respiration</p> <p>The final section of this unit addresses commonly observed respiratory disorders and age-related changes in the respiratory system.</p>	<p>they modify or differ from normal respiratory air movements</p> <p>Name the brain areas involved in control of respiration.</p> <p>Name several physical factors that influence respiratory rate.</p> <p>Explain the relative importance of oxygen and carbon dioxide in modifying breathing rate and depth.</p> <p>Explain why it is not possible to stop breathing voluntarily</p> <p>Define apnea, hyperventilation, and hypoventilation</p>
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Part B:	
Concepts	Formative Assessment
<p><u><i>Digestive System Concepts:</i></u></p> <p>In outlining digestive system anatomy, the tubular structure of the alimentary canal, with openings at both ends (like a hose), is emphasized. The organs of this canal, discussed in order of food travel through the GI tract are the mouth, pharynx, esophagus, stomach, small intestine, and large intestine. Each of these components is described in detail, and examples of homeostatic imbalances are explained where pertinent. A discussion of the accessory digestive organs and their functions follows the information on the alimentary canal, including the salivary glands, teeth, tongue, pancreas, liver, and gallbladder. The locations where their effects are exerted are also discussed. The overall general functions of the digestive system are presented next. They include ingestion, propulsion, mechanical digestion, chemical digestion, absorption, and defecation. Each of these activities is discussed in relation to the organs in which they occur.</p> <p>The basics of nutrition are presented. It is explained that once foods are digested and absorbed into the bloodstream, the next step involves utilization of the nutrients obtained. The major nutrients include carbohydrates, lipids, proteins, vitamins, and minerals. Metabolism is a term that describes all of the chemical reactions in the body, which can be broken down into two separate processes: catabolism (breakdown reactions) and anabolism (building up/constructing reactions).</p> <p>The final section of this unit explores the relationship</p>	<p>Name the organs of the alimentary canal and accessory digestive organs, and identify each on an appropriate diagram or model.</p> <p>Identify the overall function of the digestive system as digestion and absorption of foodstuffs, and describe the general activities of each digestive system organ.</p> <p>Explain how villi aid digestive processes in the small intestine.</p> <p>List the accessory digestive organs and describe the general function of each.</p> <p>Name the deciduous and permanent teeth, and describe the basic anatomy of a tooth.</p> <p>Describe the composition and function(s) of saliva.</p> <p>Name the main digestive product of the pancreas. Of the liver.</p> <p>List and describe the six main activities of the digestive system. Describe how foodstuffs in the digestive tract are mixed and moved along the tract. Describe the function of local hormones of digestion.</p> <p>List the major enzymes or enzyme groups involved in digestion and name the foodstuffs on which they act.</p>

<p>between energy intake and energy output. Basal metabolic rate is compared with total metabolic rate. Processes involved in body temperature regulation are explained, and the most important developmental aspects are presented, from infancy to old age, as well as the major homeostatic imbalances at the different developmental periods.</p>	<p>Describe the mechanisms of swallowing, vomiting, and defecation. * Name the end products of protein, fat, and carbohydrate digestion.</p>
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Connecting with English Language Arts/Literacy and Mathematics
<p><i>English Language Arts/Literacy</i></p> <ul style="list-style-type: none"> • Make strategic use of digital media in presentations to enhance understanding of the hierarchical organization of interacting systems that provide specific functions within multicellular organisms • Construct Argument from Evidence report on various scientific articles provided <p><i>Mathematics:</i></p> <p>Calculate pulmonary volumes and lung capacity. Interpret pulmonary volume graphs</p> <p><i>calculate food calories, interpret calorie data and graphs</i></p>



Modifications

- Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques- auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling). ***Students will represent their understanding using internet activities, cell illustrations, microscopic images, models. Have students go to the whiteboard/ELMO/smart board to identify anatomy and physiology of the respiratory and digestive systems.***
- ***IEP Modifications: Use hands on learning tools, provide completed model or example of work, provide study guides, provide completed notes, modify assignments, additional time for assessments, allow oral testing, preferential seating***
- Structure lessons around questions that are authentic, relate to students' interests, social/family background and knowledge of their community. ***Search for relevant research articles on the web. Visit science websites, such as those listed below, and begin by searching for conditions of the systems covered in this unit; and see how what you're learning in the course applies to science and medicine today.***
- Provide multiple grouping opportunities for students to share their ideas and to encourage work among various backgrounds and cultures (e.g. multiple representation and multimodal experiences). ***Students will work in various group setting to encourage sharing their ideas***
- Engage students with a variety of Science and Engineering practices to provide students with multiple entry points and multiple ways to demonstrate their understandings. ***Students have home access to Google Classroom site where they can perform various internet activities to demonstrate understanding.***

NGSS and Foundations for the Unit
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Provide examples and explain how organisms use feedback systems to maintain their internal environments. (LS1.A)

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<p>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)</p> <p><u>Developing and Using Models</u></p> <p>Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-LS1-2)</p>	<p>organisms help them perform the essential functions of life. (HS-LS1-1)</p> <p>Groups of specialized cells (tissues) use proteins to carry out functions that are essential to the organism. (LS1.A)</p>	
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Unit 6: Urinary and Reproductive Systems (20 Days)

Students will analyze the Urinary and Reproductive systems.

Student Learning Objectives

LS1.A: Structure and Function

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)

Provide examples and explain how organisms use feedback systems to maintain their internal environments. (LS1.A)

Part A:

Concepts

Urinary System Concepts:

The urinary system rids the body of nitrogenous wastes while regulating water, electrolyte, and acid-base balance of the blood. The first section of this unit discusses the chief organs of the urinary system, the kidneys. The next section of the unit outlines the structure and function of the other organs of the urinary system (e.g., the ureters, urinary bladder, and urethra). Micturition is explained as the act of emptying the bladder, also known as voiding, or urination. The kidney's role in blood fluid and electrolyte balance is explored next, and the link between water and salt is explained. The role of the kidneys in maintaining acid-base balance of the blood is also presented. Of the three mechanisms for regulating blood pH—blood

Formative Assessment

Describe the location of the kidneys in the body.

Identify the following regions of a kidney (longitudinal section): hilum, cortex, medulla, medullary pyramids, calyces, pelvis, and renal columns.

Recognize that the nephron is the structural and functional unit of the kidney, and describe its anatomy

Describe the process of urine formation, identifying the areas of the nephron that are responsible for filtration, reabsorption, and secretion.

Describe the function of the kidneys in excretion of nitrogen-containing wastes. Define anuria and oliguria

<p>buffers, respiratory system controls, and renal mechanisms—the kidney functions, or renal mechanisms, are slower but more potent than other mechanisms, thus enhancing their importance. Finally, development of the urinary system organs as well as aging effects are explored. Several examples of homeostatic imbalance of the urinary system are also presented</p>	<p>Describe the composition of normal urine. List abnormal urinary components.</p> <p>Describe the general structure and function of the ureters, urinary bladder, and urethra. * Compare the course and length of the male urethra to that of the female. * Define micturition. * Describe the difference in control of the external and internal urethral sphincters.</p>
<p>Part B:</p>	
<p>Concepts</p>	<p>Formative Assessment</p>
<p><u><i>Reproductive System Concepts:</i></u></p> <p>In this unit, the male anatomy and reproductive functions are presented first. Following the anatomy of the male reproductive system is an overview of the process of spermatogenesis, or sperm production. Testosterone production is explained and the secondary sex characteristics that this hormone stimulates are outlined</p> <p>The next section of this unit covers the female anatomy and reproductive functions Oogenesis, or egg production, and the ovarian cycles are presented next. The role of hormones in regulating the cyclic changes that occur monthly in the ovary are explained, followed by a discussion of the uterine cycle</p> <p>The final section of this chapter provides a survey of pregnancy and embryonic development.</p>	<p>Discuss the common purpose of the reproductive system organs.</p> <p>When provided with a model or diagram, identify the organs of the male reproductive system, and discuss the general function of each.</p> <p>Name the endocrine and exocrine products of the testes.</p> <p>Discuss the composition of semen, and name the glands that produce it.</p> <p>Trace the pathway followed by a sperm from the testis to the body exterior.</p> <p>Define erection, ejaculation, and circumcision. Define spermatogenesis and meiosis.</p> <p>Describe the structure of a sperm, and relate its structure to its</p>

	<p>function.</p> <p>Describe the effect of FSH and LH on testis functioning. Define endometrium, myometrium, and ovulation.</p> <p>Indicate the location of the following regions of the female uterus: cervix, fundus, body Define oogenesis.</p> <p>Describe the influence of FSH and LH on ovarian function Describe the phases and controls of the menstrual cycle. Define fertilization and zygote. Describe implantation.</p> <p>Distinguish between an embryo and a fetus. List the major functions of the placenta. Describe the importance of the presence/absence of testosterone during embryonic development of the reproductive system organs. * Define menarche and menopause. * List common reproductive system problems seen in adult and aging men and women.</p>
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Modifications

- Provide students with multiple choices for how they can represent their understandings (e.g. multisensory techniques- auditory/visual aids; pictures, illustrations, graphs, charts, data tables, multimedia, modeling). ***Students will represent their understanding using internet activities, cell illustrations, microscopic images, models. Have students go to the whiteboard/ELMO/smart board to identify anatomy and physiology of the urinary and reproductive systems.***
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<p>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)</p> <p><u>Developing and Using Models</u></p> <p>Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. (HS-LS1-2)</p>	<p>organisms help them perform the essential functions of life. (HS-LS1-1)</p> <p>Groups of specialized cells (tissues) use proteins to carry out functions that are essential to the organism. (LS1.A)</p>	
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The following standards are threaded throughout all units of the NJSLS-Science:

21st Century Life and Career Standards: Career Awareness, ELD Standards, and Technology Standards.

WIDA ELD Standards: Teaching with Standards | WIDA

WIDA has established language development standards for English and Spanish. These standards represent the language students need to be successful in early childhood programs and Grades K-12.

The first standard, **Social and Instructional Language**, reflects the ways in which students interact socially to build community and establish working relationships with peers and teachers in ways that support learning.

The remaining four standards present ways multilingual learners can communicate information, ideas and concepts necessary for academic success in **Language Arts, Math, Science** and **Social Studies**.

Specifically in Science Standard 4- Language of Science- English Language learners communicate information, ideas and concepts necessary for academic success in the content area of science.

New Jersey Student Learning Standards

Standard 9

21st Century Life and Careers

In today's global economy, students need to be lifelong learners who have the knowledge and skills to adapt to an evolving workplace and world. To address these demands, Standard 9, 21st Century Life and Careers, which includes the 12 Career Ready Practices, establishes clear guidelines for what students need to know and be able to do in order to be successful in their future careers and to achieve financial independence.

Mission: *21st century life and career skills enable students to make informed decisions that prepare them to engage as active citizens in a dynamic global society and to successfully meet the challenges and opportunities of the 21st century global workplace.*

Vision: To integrate 21st Century life and career skills across the K-12 curriculum and to foster a population that:

- Continually self-reflects and seeks to improve the essential life and career practices that lead to success.
- Uses effective communication and collaboration skills and resources to interact with a global society.
- Is financially literate and financially responsible at home and in the broader community.
- Is knowledgeable about careers and can plan, execute, and alter career goals in response to changing societal and economic conditions.
- Seeks to attain skill and content mastery to achieve success in a chosen career path.

Career Ready Practices

Career Ready Practices describe the career-ready skills that all educators in all content areas should seek to develop in their students. They are practices that have been linked to increase college, career, and life success. Career Ready Practices should be taught and reinforced in all career exploration and preparation programs with increasingly higher levels of complexity and expectation as a student advances through a program of study.

CRP1. Act as a responsible and contributing citizen and employee.

Career-ready individuals understand the obligations and responsibilities of being a member of a community, and they demonstrate this understanding every day through their interactions with others. They are conscientious of the impacts of their decisions on others and the environment around them. They think about the near-term and long-term consequences of their actions and seek to act in ways that contribute to the betterment of their teams, families, community and workplace. They are reliable and consistent in going beyond the minimum expectation and in participating in activities that serve the greater good.

CRP2. Apply appropriate academic and technical skills.

Career-ready individuals readily access and use the knowledge and skills acquired through experience and education to be more productive. They make connections between abstract concepts with real-world applications, and they make correct insights about when it is appropriate to apply the use of an academic skill in a workplace situation.

CRP3. Attend to personal health and financial well-being.

Career-ready individuals understand the relationship between personal health, workplace performance and personal well-being; they act on that understanding to regularly practice healthy diet, exercise and mental health activities. Career-ready individuals also take regular action to contribute to their personal financial wellbeing, understanding that personal financial security provides the peace of mind required to contribute more fully to their own career success.

CRP4. Communicate clearly and effectively and with reason.

Career-ready individuals communicate thoughts, ideas, and action plans with clarity, whether using written, verbal, and/or visual methods. They communicate in the workplace with clarity and purpose to make maximum use of their own and others' time. They are excellent writers; they master conventions, word choice, and organization, and use effective tone and presentation skills to articulate ideas. They are skilled at interacting with others; they are active listeners and speak clearly and with purpose. Career-ready individuals think about the audience for their communication and prepare accordingly to ensure the desired outcome.

CRP5. Consider the environmental, social and economic impacts of decisions.

Career-ready individuals understand the interrelated nature of their actions and regularly make decisions that positively impact and/or mitigate negative impact on other people, organization, and the environment. They are aware of and utilize new technologies, understandings, procedures, materials, and regulations affecting the nature of their work as it relates to the impact on the social condition, the environment and the profitability of the organization.

CRP6. Demonstrate creativity and innovation.

Career-ready individuals regularly think of ideas that solve problems in new and different ways, and they contribute those ideas in a useful and productive manner to improve their organization. They can consider unconventional ideas and suggestions as solutions to issues, tasks or problems, and they discern which ideas and suggestions will add greatest value. They seek new methods, practices, and ideas from a variety of sources and seek to apply those ideas to their own workplace. They take action on their ideas and understand how to bring innovation to an organization.

CRP7. Employ valid and reliable research strategies.

Career-ready individuals are discerning in accepting and using new information to make decisions, changes. They use reliable research process to search for new information. They evaluate the validity of sources when considering the use and adoption of external information or practices in their workplace situation.

CRP8. Utilize critical thinking to make sense of problems and persevere in solving them.

Career-ready individuals readily recognize problems in the workplace, understand the nature of the problem, and devise effective plans to solve the problem. They are aware of problems when they occur and take action quickly to address the problem; they

thoughtfully investigate the root cause of the problem prior to introducing solutions. They carefully consider the options to solve the problem. Once a solution is agreed upon, they follow through to ensure the problem is solved, whether through their own actions or the actions of others.

CRP9. Model integrity, ethical leadership and effective management.

Career-ready individuals consistently act in ways that align personal and community-held ideals and principles while employing strategies to positively influence others in the workplace. They have a clear understanding of integrity and act on this understanding in every decision. They use a variety of means to positively impact the directions and actions of a team or organization, and they apply insights into human behavior to change others' action, attitudes and/or beliefs. They recognize the near-term and long-term effects that management's actions and attitudes can have on productivity, morals and organizational culture.

CRP10. Plan education and career paths aligned to personal goals.

Career-ready individuals take personal ownership of their own education and career goals, and they regularly act on a plan to attain these goals. They understand their own career interests, preferences, goals, and requirements. They have perspective regarding the pathways available to them and the time, effort, experience and other requirements to pursue each, including a path of entrepreneurship. They recognize the value of each step in the education and experiential process, and they recognize that nearly all career paths require ongoing education and experience. They seek counselors, mentors, and other experts to assist in the planning and execution of career and personal goals.

CRP11. Use technology to enhance productivity.

Career-ready individuals find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.

CRP12. Work productively in teams while using cultural global competence.

Career-ready individuals positively contribute to every team, whether formal or informal. They apply an awareness of cultural difference to avoid barriers to productive and positive interaction. They find ways to increase the engagement and contribution of all team members. They plan and facilitate effective team meetings.

2014 New Jersey Core Curriculum Content Standards - Technology

Content Area	Technology
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Standard		8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.	
Strand		A. Technology Operations and Concepts: <i>Students demonstrate a sound understanding of technology concepts, systems and operations.</i>	
Grade Level bands	Content Statement Students will:	Indicator	Indicator
P	Understand and use technology systems.	8.1.P.A.1	Use an input device to select an item and navigate the screen
		8.1.P.A.2	Navigate the basic functions of a browser.
	Select and use applications effectively and productively.	8.1.P.A.3	Use digital devices to create stories with pictures, numbers, letters and words.
		8.1.P.A.4	Use basic technology terms in the proper context in conversation with peers and teachers (e.g., camera, tablet, Internet, mouse, keyboard, and printer).
		8.1.P.A.5	Demonstrate the ability to access and use resources on a computing device.
K-2	Understand and use technology systems.	8.1.2.A.1	Identify the basic features of a digital device and explain its purpose.
	Select and use applications effectively and productively.	8.1.2.A.2	Create a document using a word processing application.
		8.1.2.A.3	Compare the common uses of at least two different digital applications and identify the advantages and disadvantages of using each.
		8.1.2.A.4	Demonstrate developmentally appropriate navigation skills in virtual environments (i.e. games, museums).
		8.1.2.A.5	Enter information into a spreadsheet and sort the information.
		8.1.2.A.6	Identify the structure and components of a database.
		8.1.2.A.7	Enter information into a database or spreadsheet and filter the information.
3-5	Understand and use technology systems.	8.1.5.A.1	Select and use the appropriate digital tools and resources to accomplish a variety of tasks including solving problems.
	Select and use applications effectively and productively.	8.1.5.A.2	Format a document using a word processing application to enhance text and include graphics, symbols and/ or pictures.
		8.1.5.A.3	Use a graphic organizer to organize information about problem or issue.
		8.1.5.A.4	Graph data using a spreadsheet, analyze and produce a report that explains the analysis of the data.
		8.1.5.A.5	Create and use a database to answer basic questions.
		8.1.5.A.6	Export data from a database into a spreadsheet; analyze and produce a report that explains the analysis of the data.
6-8	Understand and use technology systems.	8.1.8.A.1	Demonstrate knowledge of a real world problem using digital tools.

	Select and use applications effectively and productively.	8.1.8.A.2	Create a document (e.g. newsletter, reports, personalized learning plan, business letters or flyers) using one or more digital applications to be critiqued by professionals for usability.
		8.1.8.A.3	Use and/or develop a simulation that provides an environment to solve a real world problem or theory.
		8.1.8.A.4	Graph and calculate data within a spreadsheet and present a summary of the results
		8.1.8.A.5	Create a database query, sort and create a report and describe the process, and explain the report results.
9-12	Understand and use technology systems.	8.1.12.A.1	Create a personal digital portfolio which reflects personal and academic interests, achievements, and career aspirations by using a variety of digital tools and resources.
	Select and use applications effectively and productively.	8.1.12.A.2	Produce and edit a multi-page digital document for a commercial or professional audience and present it to peers and/or professionals in that related area for review.
		8.1.12.A.3	Collaborate in online courses, learning communities, social networks or virtual worlds to discuss a resolution to a problem or issue.
		8.1.12.A.4	Construct a spreadsheet workbook with multiple worksheets, rename tabs to reflect the data on the worksheet, and use mathematical or logical functions, charts and data from all worksheets to convey the results.
		8.1.12.A.5	Create a report from a relational database consisting of at least two tables and describe the process, and explain the report results.
Content Area		Technology	
Standard		8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.	
Strand		B. Creativity and Innovation: Students demonstrate creative thinking, construct knowledge and develop innovative products and process using technology.	
Grade Level bands	Content Statement Students will:	Indicator	Indicator
P	Apply existing knowledge to generate new ideas, products, or processes.	8.1.P.B.1	Create a story about a picture taken by the student on a digital camera or mobile device.
K-2	Create original works as a means of personal or group expression.	8.1.2.B.1	Illustrate and communicate original ideas and stories using multiple digital tools and resources .
3-5		8.1.5.B.1	Collaborative to produce a digital story about a significant local event or

			issue based on first-person interviews.
6-8		8.1.8.B.1	Synthesize and publish information about a local or global issue or event (ex. telecollaborative project, blog, school web).
9-12		8.1.12.B.2	Apply previous content knowledge by creating and piloting a digital learning game or tutorial.
Content Area		Technology	
Standard		8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.	
Strand		C. Communication and Collaboration: <i>Students use digital media and environments to communicate and work collaboratively, including at a distance, to support individual learning and contribute to the learning of others.</i>	
Grade Level bands	Content Statement	Indicator	Indicator
P	Interact, collaborate, and publish with peers, experts, or others by employing a variety of digital environments and media.	8.1.P.C.1	Collaborate with peers by participating in interactive digital games or activities.
K-2	Communicate information and ideas to multiple audiences using a variety of media and formats. Develop cultural understanding and global awareness by engaging with learners of other cultures.	8.1.2.C.1	Engage in a variety of developmentally appropriate learning activities with students in other classes, schools, or countries using various media formats such as online collaborative tools, and social media.
3-5		8.1.5.C.1	Engage in online discussions with learners of other cultures to investigate a worldwide issue from multiple perspectives and sources, evaluate findings and present possible solutions, using digital tools and online resources for all steps.
6-8		8.1.8.C.1	Collaborate to develop and publish work that provides perspectives on a global problem for discussions with learners from other countries.
9-12	Contribute to project teams to produce original works or solve problems.	8.1.12.C.1	Develop an innovative solution to a real world problem or issue in collaboration with peers and experts, and present ideas for feedback through social media or in an online community.
Content Area		Technology	
Standard		8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.	
Strand		D. Digital Citizenship: <i>Students understand human, cultural, and societal issues related to technology and practice legal and ethical behavior.</i>	
Grade Level	Content Statement	Indicator	Indicator

bands			
K-2	Advocate and practice safe, legal, and responsible use of information and technology.	8.1.2.D.1	Develop an understanding of ownership of print and nonprint information.
3-5	Advocate and practice safe, legal, and responsible use of information and technology.	8.1.5.D.1	Understand the need for and use of copyrights.
		8.1.5.D.2	Analyze the resource citations in online materials for proper use.
	Demonstrate personal responsibility for lifelong learning.	8.1.5.D.3	Demonstrate an understanding of the need to practice cyber safety, cyber security, and cyber ethics when using technologies and social media.
	Exhibit leadership for digital citizenship.	8.1.5.D.4	Understand digital citizenship and demonstrate an understanding of the personal consequences of inappropriate use of technology and social media.
6-8	Advocate and practice safe, legal, and responsible use of information and technology.	8.1.8.D.1	Understand and model appropriate online behaviors related to cyber safety, cyber bullying, cyber security, and cyber ethics including appropriate use of social media.
	Demonstrate personal responsibility for lifelong learning.	8.1.8.D.2	Demonstrate the application of appropriate citations to digital content.
		8.1.8.D.3	Demonstrate an understanding of fair use and Creative Commons to intellectual property.
	Exhibit leadership for digital citizenship.	8.1.8.D.4	Assess the credibility and accuracy of digital content.
		8.1.8.D.5	Understand appropriate uses for social media and the negative consequences of misuse.
9-12	Advocate and practice safe, legal, and responsible use of information and technology.	8.1.12.D.1	Demonstrate appropriate application of copyright, fair use and/or Creative Commons to an original work.
	Demonstrate personal responsibility for lifelong learning.	8.1.12.D.2	Evaluate consequences of unauthorized electronic access (e.g., hacking) and disclosure, and on dissemination of personal information.
		8.1.12.D.3	Compare and contrast policies on filtering and censorship both locally and globally.
	Exhibit leadership for digital citizenship.	8.1.12.D.4	Research and understand the positive and negative impact of one's digital footprint.
		8.1.12.D.5	Analyze the capabilities and limitations of current and emerging technology resources and assess their potential to address personal, social, lifelong learning, and career needs.

Content Area		Technology	
Standard		8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.	
Strand		E: Research and Information Fluency: <i>Students apply digital tools to gather, evaluate, and use information.</i>	
Grade Level bands	Content Statement Students will:	Indicator	Indicator
P	Plan strategies to guide inquiry.	8.1.P.E.1	Use the Internet to explore and investigate questions with a teacher's support.
K-2	Plan strategies to guide inquiry Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media. Evaluate and select information sources and digital tools based on the appropriateness for specific tasks.	8.1.2.E.1	Use digital tools and online resources to explore a problem or issue.
3-5	Plan strategies to guide inquiry. Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media. Evaluate and select information sources and digital tools based on the appropriateness for specific tasks.	8.1.5.E.1	Use digital tools to research and evaluate the accuracy of, relevance to, and appropriateness of using print and non-print electronic information sources to complete a variety of tasks.
6-8	Plan strategies to guide inquiry. Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media. Evaluate and select information sources and digital tools based on the	8.1.8.E.1	Effectively use a variety of search tools and filters in professional public databases to find information to solve a real world problem.

	appropriateness for specific tasks. Process data and report results.		
9-12	Plan strategies to guide inquiry. Locate, organize, analyze, evaluate, synthesize, and ethically use information from a variety of sources and media. Evaluate and select information sources and digital tools based on the appropriateness for specific tasks. Process data and report results.	8.1.12.E.1	Produce a position statement about a real world problem by developing a systematic plan of investigation with peers and experts synthesizing information from multiple sources.
		8.1.12.E.2	Research and evaluate the impact on society of the unethical use of digital tools and present your research to peers.
Content Area		Technology	
Standard		8.1 Educational Technology: All students will use digital tools to access, manage, evaluate, and synthesize information in order to solve problems individually and collaborate and to create and communicate knowledge.	
Strand		F: Critical thinking, problem solving, and decision making: <i>Students use critical thinking skills to plan and conduct research, manage projects, solve problems, and make informed decisions using appropriate digital tools and resources.</i>	
Grade Level bands	Content Statement Students will:	Indicator	Indicator
K-2	Identify and define authentic problems and significant questions for investigation. Plan and manage activities to develop a solution or complete a project. Collect and analyze data to identify solutions and/or make informed decisions. Use multiple processes and diverse perspectives to explore alternative	8.1.2.F.1	Use geographic mapping tools to plan and solve problems.

	solutions.		
3-5	<p>Identify and define authentic problems and significant questions for investigation.</p> <p>Plan and manage activities to develop a solution or complete a project.</p> <p>Collect and analyze data to identify solutions and/or make informed decisions.</p> <p>Use multiple processes and diverse perspectives to explore alternative solutions</p>	8.1.5.F.1	Apply digital tools to collect, organize, and analyze data that support a scientific finding.
6-8	<p>Identify and define authentic problems and significant questions for investigation.</p> <p>Plan and manage activities to develop a solution or complete a project.</p> <p>Collect and analyze data to identify solutions and/or make informed decisions.</p> <p>Use multiple processes and diverse perspectives to explore alternative solutions.</p>	8.1.8.F.1	Explore a local issue, by using digital tools to collect and analyze data to identify a solution and make an informed decision.
9-12	<p>Identify and define authentic problems and significant questions for investigation.</p> <p>Plan and manage activities to develop a solution or complete a project.</p> <p>Collect and analyze data to identify solutions and/or make informed decisions.</p>	8.1.12.F.1	Evaluate the strengths and limitations of emerging technologies and their impact on educational, career, personal and or social needs.

	Use multiple processes and diverse perspectives to explore alternative solutions.		
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