



Park Hill School District

Building Successful Futures • Each Student • Every Day

High School Human Anatomy and Physiology Curriculum

Human Anatomy and Physiology explores the inner workings of the human body and focuses on anatomical and medical terminology. This course is the perfect foundation for students wanting to expand their vocabularies and learn about the body and its levels of organization, as well as the cooperation required between those levels. The text used in this course is written at the college level and should facilitate a smooth transition for students pursuing a post-secondary education. Students will participate in at least one dissection where they observe structures closely analogous to the human body. This dissection will focus on our primary units of study for the semester: histology, the cardiovascular system, the skeletal system, the digestive system, and the reproductive system. Students will dissect, observe, and have hands-on experience seeing what these systems look like in an actual specimen.

For Teacher Use:

****This curriculum includes four dissection engaging experiences/scenarios designed to deepen student understanding of anatomical structures and systems. As the teacher, you have the flexibility to decide how to implement these experiences in your classroom. You may:**

- Integrate them into individual units using smaller specimens, providing students with multiple hands-on connections throughout the course, **or**
- Combine them into one larger, culminating dissection at the end of the year for a comprehensive exploration of anatomy.

Both options are supported within the curriculum so you can choose the approach that best fits your teaching style, pacing, and classroom needs.

The three engaging experiences include:

- Unit 2, Engaging Scenario 2
- Unit 4, Topic 1, Engaging Experience 2
- Unit 5, Topic 4, Engaging Experience 1
- Unit 6, Topic 1, Engaging Experience 2

Curriculum Standards:

National Consortium for Health Science Education

Missouri Department of Elementary and Secondary Education Science Learning Standards

Scope and Sequence:

Timeframe	Unit	Instructional Topics
13-15 blocks	<u>Unit 1: Language of Anatomy</u>	<u>Topic 1: Anatomy and Physiology</u> <u>Topic 2: Body Systems</u> <u>Topic 3: Language of Anatomy</u> <u>Topic 4: Homeostasis and Feedback</u>
15-17 blocks	<u>Unit 2: Histology</u>	<u>Topic 1: Epithelial Tissue</u> <u>Topic 2: Connective Tissue</u> <u>Topic 3: Muscle and Nervous Tissue</u>
10 blocks	<u>Unit 3: Blood</u>	<u>Topic 1: Composition & Function of Blood</u> <u>Topic 2: Blood Typing & Transfusions</u> <u>Topic 3: Erythropoiesis</u> <u>Topic 4: Homeostasis of Blood via Hemostasis</u>
8-10 blocks	<u>Unit 4: Cardiovascular System</u>	<u>Topic 1: Structure and Function of the Heart</u> <u>Topic 2: Pathway of Blood</u> <u>Topic 3: Conduction System</u> <u>Topic 4: Heart Disease</u>
18-20 blocks	<u>Unit 5: Musculoskeletal System</u>	<u>Topic 1: Appendicular and Axial Skeleton</u> <u>Topic 2: Classification and Structure of Bone</u> <u>Topic 3: Bone Identification</u> <u>Topic 4: Muscle Identification</u>
10-12 blocks	<u>Unit 6: Digestive System</u>	<u>Topic 1: Accessory Structures vs. Alimentary</u> <u>Topic 2: Digestion of Macromolecules</u> <u>Topic 3: Microscopic Anatomy</u>
6 blocks	<u>Unit 7: Reproductive System</u>	<u>Topic 1: Male Reproductive Anatomy</u> <u>Topic 2: Female Reproductive Anatomy</u> <u>Topic 3: Changes During Pregnancy</u>
**6-10 blocks	<u>Dissection</u> <i>if done at end of course</i>	<u>Unit 2, Engaging Scenario 2</u> <u>Unit 4, Topic 1, Engaging Experience 2</u> <u>Unit 5, Topic 4, Engaging Experience 1</u>

Timeframe	Unit	Instructional Topics
		Unit 6, Topic 1, Engaging Experience 2

Curriculum Revision Tracking

Fall, 2025

All Units:

- Removed ISTE Standards
- Added Learning Targets

Unit 5:

- Changed title from Skeletal System to Musculoskeletal System
- Added Topic 4: Muscle Identification

Unit 7:

- Deleted Sexual Development of a Fetus from Topic 1
- Separated Male and Female Reproductive Anatomy from Topic 2 into Topic 1 and 2

Unit 1: Language of Anatomy

Subject: Human Anatomy and Physiology

Grade: 10, 11, 12

Name of Unit: Language of Anatomy

Length of Unit: 13-15 blocks

Overview of Unit: Students learn the jargon of anatomy in order to identify the regions of the body, the directional terms, and the cavities of the body. Students also are introduced to similarities and differences between anatomy and physiology, how they are related, and what differentiates the two.

Priority Standards for unit:

- NCHSE 1.1.1 Describe the organization of the human body and directional terms.

Supporting Standards for unit:

- NCHSE 1.2.1 Describe etiology, pathology, diagnosis, treatment, and prevention of common diseases and disorders
- NCHSE 1.1.2 Identify basic structures and describe functions of human body systems

Learning Targets:

Priority Standard: NCHSE 1.1.1 Describe the organization of the human body and directional terms.

Learning Targets	Webb's DOK Level
	Bloom's Level
Students will identify and apply body planes (coronal/frontal, midsagittal, sagittal, transverse/horizontal)	2
	Applying
Students will evaluate the use of directional terms for accuracy of anatomical movements (anterior/posterior, cephalic/caudal, medial/lateral, proximal/distal, superficial/deep, superior/inferior, ventral/dorsal)	4
	Evaluating
Students will identify body cavities and describe their contents (abdominal, cranial, dorsal, nasal, oral, orbital, pelvic, spinal, thoracic)	1
	Understanding

Essential Questions:

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

Enduring Understanding/Big Ideas:

1. Anatomy is the knowledge of the different structures in the body and physiology is the understanding of how those different parts work together in harmony to maintain homeostasis.
2. The body is divided into cavities, regions, and directions. Cavities are spaces in the body in which organs, tissues, and other structures reside. Regions are subdivisions of those cavities that further separate the organs of the body into systems and locations. Common language terms (distal/proximal, anterior/posterior, etc.) are used so that *all* professionals are speaking about the same regions of the body.
3. All of the organ systems work together to maintain homeostasis. For example, the nervous system is responsible for detecting changes to the body's status quo and sending signals to the different organ systems in order to correct the unwanted changes. When we consume food, our blood sugar is raised after the digestive process begins. The nervous system detects this change and signals the endocrine system to release insulin.
4. Negative feedback is how the body maintains homeostasis. Our body has a 'normal' range for a wide variety of measurements and when the reading is off, the nervous system sends signals for the body to correct the change. For example, when we consume food, our blood sugar is raised after the digestive process begins. The nervous system detects this change and signals the endocrine system to release insulin.

Unit Vocabulary:

- Abdominal
- Acromial
- Antecubital
- Anterior
- Axillary
- Brachial
- Buccal
- Calcaneal
- Carpal
- Cephalic
- Cervical
- Control center
- Coxal
- Crural
- Digital
- Distal
- Effector
- Endocrine System
- Femoral
- Fibular
- Frontal
- Gluteal
- Groin
- Hallux
- Homeostasis
- Hypogastric
- Inferior
- Inguinal
- Integumentary System
- Lateral
- Left upper quadrant
- Lumbar
- Lymphatic System
- Mammary
- Manus
- Medial
- Mental
- Metatarsal
- Nasal
- Negative feedback
- Occipital
- Olecranal
- Oral
- Orbital
- Otic
- Palmar
- Patellar
- Pelvic
- Perineal
- Plantar
- Pollex
- Popliteal
- Posterior
- Proximal
- Pubic
- Positive feedback
- Sacral
- Sagittal
- Scapular
- Sternal
- Superior
- Tarsal
- Thoracic
- Transverse
- Umbilical
- Vertebral

Topic 1: Anatomy and Physiology

Engaging Experience 1

Title: Anatomy and Physiology Case Studies

Suggested Length of Time: ½ Block

Standards Addressed

Priority:

- NCHSE 1.1.1 Describe the organization of the human body and directional terms.

Detailed Description/Instructions: Students are provided with case study scenarios, and they determine if the scientist is conducting an anatomical or physiological study.

Bloom's Levels: Applying

Webb's DOK: 2

Topic 2: Body Systems

Engaging Experience 1

Title: Body System Chart

Suggested Length of Time: 1 Block

Standards Addressed

Priority:

- NCHSE 1.1.1 Describe the organization of the human body and directional terms.

Supporting:

- NCHSE 1.1.2 Identify basic structures and describe functions of human body systems

Detailed Description/Instructions: Students are tasked to identify the function, location, and organs involved in each body system, then to re-enforce knowledge, they are asked to draw a picture.

Bloom's Levels: Understanding

Webb's DOK: 1

Topic 3: Language of Anatomy

Engaging Experience 1

Title: Simon Says

Suggested Length of Time: ½ Block

Standards Addressed

Priority:

- NCHSE 1.1.1 Describe the organization of the human body and directional terms.

Detailed Description/Instructions: The classic childhood game of Simon Says, however instead of ‘Simon says touch your nose’, Simon might say ‘touch your Nasal Cavity’. Or ‘Simon says touch a body part inferior to your cervical region’. Play the game 3-4 times awarding prizes to whoever wins.

Bloom’s Levels: Applying

Webb’s DOK: 2

Topic 4: Homeostasis & Feedback

Engaging Experience 1

Title: Textbook Illustration

Suggested Length of Time: ½ Block

Standards Addressed

Priority:

- NCHSE 1.1.1 Describe the organization of the human body and directional terms.

Supporting:

- NCHSE 1.2.1 Describe etiology, pathology, diagnosis, treatment, and prevention of common diseases and disorders

Detailed Description/Instructions: Students will create an original textbook illustration describing the parts of a negative feedback model.

Bloom's Levels: Creating

Webb's DOK: 4

Engaging Experience 2

Title: Graphical Analysis of Homeostasis

Suggested Length of Time: ½ Block

Standards Addressed

Priority:

- NCHSE 1.1.1 Describe the organization of the human body and directional terms.

Supporting:

- NCHSE 1.2.1 Describe etiology, pathology, diagnosis, treatment, and prevention of common diseases and disorders

Detailed Description/Instructions: Students are given data sets measuring different readings from a body, for example, blood glucose level over time. Students then analyze the graphs and try to determine if the data is demonstrative of a positive or negative feedback loop.

Bloom's Levels: Analyzing

Webb's DOK: 3

Engaging Scenario

Engaging Scenario (An Engaging Scenario is a culminating activity that includes the following components: situation, challenge, specific roles, audience, product or performance.)

Veggisection

Students will bring in a potato or apple and will give it anatomical direction by using craft materials to create arms, legs, and face. Students will create flags with various body regions (provided on paper) glued to toothpicks. They will place each flag in the correct location on their veggie. They will then complete a set of four surgical incisions in the correct region using the correct dissection planes. Each incision will be marked with a colored toothpick. The toothpick must also be projected in the correct anatomical direction.

Summary of Engaging Learning Experiences for Topics

Topic	Engaging Experience Title	Description	Suggested Length of Time
Anatomy and Physiology	Anatomy and Physiology Case Studies	Students are provided with case study scenarios, and they determine if the scientist is conducting an anatomical or physiological study.	½ Block
Body Systems	Body System Chart	Students are tasked to identify the function, location, and organs involved in each body system, then to re-enforce knowledge, they are asked to draw a picture.	1 Block
Language of Anatomy	Simon Says	The classic childhood game of Simon Says, however instead of ‘Simon says touch your nose’, Simon might say ‘touch your Nasal Cavity’. Or ‘Simon says touch a body part inferior to your cervical region’. Play the game 3-4 times awarding prizes to whoever wins.	½ Block
Homeostasis and Feedback	Textbook Illustration	Students will create an original textbook illustration describing the parts of a negative feedback model.	½ Block
Homeostasis and Feedback	Graphical Analysis of Homeostasis	Students are given data sets measuring different readings from a body, for example, blood glucose level over time. Students then analyze the graphs and try and determine if the data is demonstrative of a positive or negative feedback loop.	½ Block

Unit 2: Histology

Subject: Human Anatomy and Physiology

Grade: 10, 11, 12

Name of Unit: Histology

Length of Unit: 15-17 Blocks

Overview of Unit: Students learn about anatomy at a microscopic level as the different types of tissues found in the body are explored. Students learn about the four major classifications of tissues and their many subsequent divisions. Finally, they will learn how the structure of each of these different classifications allows each cell and tissue type to perform the tasks required by the body and how those unique structural components allow that to occur.

Priority Standards for unit:

- NCHSE 1.1.1 Describe the organization of the human body and directional terms

Supporting Standards for unit:

- NCHSE 1.2.1 Describe etiology, pathology, diagnosis, treatment, and prevention of common diseases and disorders
- NCHSE 1.1.2 Identify basic structures and describe functions of human body systems
- 9-12.LS1.A.2 Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
[Clarification Statement: Emphasis is on functions at the organism system level such as nutrient uptake, water delivery, and organism movement in response to stimuli.]

Learning Targets:

Priority Standard: NCHSE 1.1.1 Describe the organization of the human body and directional terms.

Learning Targets	Webb's DOK Level
	Bloom's Level
Students will apply subclassifications of epithelium based off their form, function, or location to understand and identify	2
	Applying
Students will apply subclassifications of connective tissue based off of their form, function, or location to understand and identify	2
	Applying

Students will apply their understanding of subclassifications of based off muscles and nerves of their form, function, or location in order to identify them	2
	Applying

Essential Questions:

1. How does the structure of an epithelium fit its function?
2. How is connective tissue categorized and what is the function of each category of CT?
3. How does muscle tissue vary by location and function?
4. How does nervous tissue serve as the fast-acting control center of the body?

Enduring Understanding/Big Ideas:

1. Epithelial tissue lines surfaces in or on the body. If the surface is an area that needs protection from chemicals or abrasion, the tissue must be stratified. If the epithelium is designed for filtration or permeability, it will be simple
2. Connective tissue is divided into proper, supportive, and fluid. CT Proper can be loose or dense, and dense CT proper can be regular or irregular. The function of CT proper is to connect structures together and fill spaces between structures. Supportive CT is bone and cartilage and functions to hold the body upright and protect internal organs. Fluid CT includes blood and lymph which serve as a highway to transport substances in the body.
3. Skeletal muscle is used to move the body and is attached to bones or other muscles. It is voluntarily controlled. Smooth muscle lines tubes and hollow organs and is not under our voluntary control. Cardiac muscle makes up the bulk of the heart. It is not voluntary and serves to pump blood into vessels.
4. Neural tissue sends signals with an electrochemical impulse. This impulse is used to cause immediate change in an organ or tissue.

Unit Vocabulary:

- Adipocytes
- Adipose
Connective Tissue
- Anucleate
- Apical Surface
- Areolar Connective
Tissue
- Avascular
- Basal Surface
- Basement
Membrane
- Cardiac Muscle
- Cells (general
concept term for
vocabulary use)
- Chondrocytes
- Collagen Fibers
- Dense Irregular
Connective Tissue
- Dense Regular
- Connective Tissue
- Desmosome
- Elastic Cartilage
- Elastic Fibers
- Epithelium /
Epithelial
- Extracellular
Matrix
- Fibrocartilage
- Ground Substance
- Hemocytoblasts
- Hyaline Cartilage
- Innervated
- Intercalated Discs
- Lateral Contact
- Macrophages
- Mesenchyme
- Multinucleate
- Osseous Tissue
- Osteoblasts
- Osteocytes
- Polarity
- Pseudostratified
Connective Tissue
- Reticular
Connective Tissue
- Reticular Fibers
- Secretion
- Simple Columnar
- Simple Cuboidal
- Simple Squamous
- Skeletal Muscle
- Smooth Muscle
- Stratified Columnar
- Stratified Cuboidal
- Stratified
Squamous
- Tight Junction
- Transitional
Epithelium
- Vascular Tissue

Topic 1: Epithelial Tissue

Engaging Experience 1

Title: Epithelial Tissue Card Sort

Suggested Length of Time: ½ Block

Standards Addressed

Priority:

- NCHSE 1.1.1 Describe the organization of the human body and directional terms.

Supporting:

- NCHSE 1.1.2 Identify basic structures and describe functions of human body systems

Detailed Description/Instructions: Students will be given a stack of cards with function, location, and description of each type of epithelial tissue. As a team, they will place each card on its corresponding tissue picture.

Bloom's Levels: Remembering

Webb's DOK: 1

Topic 2: Connective Tissue

Engaging Experience 1

Title: Connective Tissue Concept Mapping

Suggested Length of Time: 1½ Blocks

Standards Addressed

Priority:

- NCHSE 1.1.1 Describe the organization of the human body and directional terms.

Detailed Description/Instructions: Students will be asked to collaborate with their group to create a graphic organizer to help them keep track of which types of tissues belong in which categories. Their graphic organizer will include illustrations, locations, and descriptions of the variety of connective tissues.

Bloom's Levels: Applying

Webb's DOK: 2

Topic 3: Muscle & Nerve Tissue

Engaging Experience 1

Title: Muscle & Nerve Tissue Cell Structure

Suggested Length of Time: ½ Block

Standards Addressed

Priority:

- NCHSE 1.1.1 Describe the organization of the human body and directional terms.

Detailed Description/Instructions: Students will compare and contrast the cellular structure of the 3 types of muscle tissue based on whether or not those cells are voluntary or involuntary, striated or smooth, and uni- or multinucleate.

Bloom's Levels: Applying

Webb's DOK: 2

Engaging Scenario

Engaging Scenario (An Engaging Scenario is a culminating activity that includes the following components: situation, challenge, specific roles, audience, product or performance.)

Engaging Scenario 1

Histology Microscopy

Students will spend 1-2 days looking at prepared microscope slides that cover all of the variety of tissues learned in the units. Students will have 5-6 slides of different classifications of epithelial tissue, 6-7 slides of different connective tissues, 3-4 slides for muscle tissues, 2 slides for osseous tissue, and a slide for nervous tissues. They will be required, with their partner, to draw and label the major structural characteristics for each type of tissue. On the 3rd day, a lab practical will be set up where students will go to different microscopes and be asked to identify what type of tissue they are looking at.

Engaging Scenario 2

Dissection

Students will participate in a dissection with an analogous specimen with emphasis on finding and identifying the tissues of the body. Focus will be on introduction to the dissection process, tools & identifying the various tissue types (Epithelial, Connective, Muscle & Nerve).

Summary of Engaging Learning Experiences for Topics

Topic	Engaging Experience Title	Description	Suggested Length of Time
Epithelial Tissue	Epithelial Tissue Card Sort	Students will be given a stack of cards with function, location, and description of each type of epithelial tissue. As a team, they will place each card on its corresponding tissue picture.	½ Block
Connective Tissue	Connective Tissue Concept Mapping	Students will be asked to collaborate with their group to create a graphic organizer to help them keep track of which types of tissues belong in which categories. Their graphic organizer will include illustrations, locations, and descriptions of the variety of connective tissues.	1½ Blocks
Muscle & Nervous Tissue	Muscle & Nerve Tissue Cell Structure	Students will compare and contrast the cellular structure of the 3 types of muscle tissue based on whether or not those cells are voluntary or involuntary, striated or smooth, and uni- or multinucleate.	½ Block

Unit 3: Blood

Subject: Human Anatomy and Physiology

Grade: 10, 11, 12

Name of Unit: Blood

Length of Unit: 10 Blocks

Overview of Unit: Students learn the general composition and functionality of blood and then explore a much more detailed look at the major components of blood: erythrocytes, leukocytes, and thrombocytes. They will learn how these ‘formed elements are created, function in the body, and the variety of structural differences between these cells. They will also learn practical, applicable knowledge as different blood disorders are learned and the medical science behind blood typing and transfusions are examined.

Priority Standards for unit:

- NCHSE 1.1.2 Identify basic structures and describe functions of human body systems.

Supporting Standards for unit:

- NCHSE 1.2.1 Describe etiology, pathology, diagnosis, treatment, and prevention of common diseases and disorders
- 9-12.LS1.A.2 Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. [Clarification Statement: Emphasis is on functions at the organism system level such as nutrient uptake, water delivery, and organism movement in response to stimuli.]
- 9-12.LS1.A.3 Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. [Clarification Statement: Examples of investigations could include heart rate response to exercise, stomata response to moisture and temperature, and root development in response to water levels.]

Learning Targets:

Priority Standard: NCHSE 1.1.2 Identify basic structures and describe functions of human body systems	
Learning Targets	Webb’s DOK Level
	Bloom’s Level
Students will identify structures of vascular tissue and its components with an emphasis on evaluating the composition of blood	4
	Evaluating

Students can apply blood typing procedures and determine appropriate blood transfusions for each representative blood type.	2
	Applying
Students will evaluate when and why the body might make new red blood cells (erythrocytes) and how it will go about doing so	4
	Evaluating
Students will remember the steps of blood clotting (hemostasis)	1
	Remembering

Essential Questions:

1. 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?
2. How do those components of blood provide functionality?
3. How are blood disorders caused and what is happening on a cellular level to initiate those disorders?
4. How are new blood cells created and how does the body know when it is appropriate to create more blood cells and/or destroy old ones?
5. What are the different blood types and why is it critical to understand how those blood types of function in regard to organ transplants and/or giving or receiving blood donations?

Enduring Understanding/Big Ideas:

1. Blood is composed of plasma and formed elements. Those formed elements are red blood cells, white blood cells, and platelets. Each different cell type plays a role in the variety of functions that blood is responsible for. For example, our blood is necessary to move oxygen and carbon dioxide into and out of the body. Developmental natural selection has shaped red blood cells to be a hyper-efficient vesicle for this purpose.
2. Blood has three main functions: 1) Regulatory - blood helps to regulate body temperature, liquid content, and other factors of the body; 2) Protective - our blood has self-defense against losing blood (by forming clots) and against foreign entities (by developing an immune system, and 3) Distributive - blood is one of the only organs in the body that is mobile, and as such, it has the role of distributing nutrients, gases, waste, and hormones throughout the body.
3. Blood disorders are caused because one of the formed elements is not functioning properly as a result of a genetic mutation, a genetic condition, or environmental factors. Anemia is the most common of these and is caused when our red blood cells have been altered to the point where they cannot distribute oxygen properly.

4. New blood cells are created when a hormone called erythropoietin (EPO) is released by the kidney. EPO stimulates the red bone marrow to release blood stem cells, which undergo a specific pathway to differentiate into immature red blood cells.
5. The 4 major blood types are A, B, AB, and O. They are inherited in Codominant Fashion - A and B are dominant to type O, but codominant with each other. These blood types are caused by different membrane proteins on the red blood cells that help to identify the cells to the immune systems of the body. Blood type can also be due to the presence of the Rh member protein. People with this antigen are considered positive, and people lacking it are considered negative.

Unit Vocabulary:

- | | | |
|------------------------|------------------------------------|---------------------------|
| ● Agglutinate | ● Erythrocytes | ● Iron-Deficiency Anemia |
| ● Agranulocytes | ● Erythropoiesis | ● Leukemia |
| ● Anemia | ● Fibrin | ● Leukocytes |
| ● Anaerobic | ● Folic Acid | ● Lymphocyte |
| ● Antibodies | ● Formed Elements | ● Megakaryocyte |
| ● Antigens | ● Globin | ● Monocytes |
| ● Aplastic Anemia | ● Granulocytes | ● Neutrophil |
| ● Basophil | ● Hematocrit | ● Oxyhemoglobin |
| ● Biconcave | ● Hematopoiesis | ● Pernicious Anemia |
| ● Bilirubin | ● Hemoglobin | ● Phagocytic |
| ● Blood Types | ● Hemolytic Anemia | ● Platelet Plug Formation |
| ● Buffy Coat | ● Hemolytic Disease of the Newborn | ● Regulation |
| ● Carbaminohemoglobin | ● Hemorrhage | ● Sickie Cell Anemia |
| ● Clotting Factors | ● Hemorrhagic Anemia | ● Spectrin |
| ● Coagulation | ● Hemostasis | ● Thrombocytes |
| ● Delivery | ● Heme | ● Transfusion |
| ● Deoxyhemoglobin | ● Histamine | ● Vascular Spasm |
| ● Eosinophil | ● Hypoxia | ● Vitamin B12 |
| ● EPO (Erythropoietin) | ● Inflammation | |

Topic 1: Composition & Function of Blood

Engaging Experience 1

Title: Composition of Blood Virtual Lab

Suggested Length of Time: 1 Block

Standards Addressed

Priority:

- NCHSE 1.1.2 Identify basic structures and describe functions of human body systems

Detailed Description/Instructions: Students will access a virtual lab of the components of blood. They will interact with the program so that they ‘draw’ virtual blood, spin it in a centrifuge, analyze the components and look at them at a microscopic level to prepare them for the rest of the unit.

Bloom’s Levels: Understanding

Webb’s DOK: 1

Topic 2: Blood Typing & Transfusions

Engaging Experience 1

Title: Blood Typing (Virtual) Lab

Suggested Length of Time: 1 Block

Standards Addressed

Priority:

- NCHSE 1.1.2 Identify basic structures and describe functions of human body systems

Detailed Description/Instructions: In this lab, students will explore the principles of human blood typing and transfusion compatibility by performing a simulated blood typing experiment. Using safe synthetic blood samples and anti-sera (Anti-A, Anti-B, and Anti-Rh), students will test for the presence of specific antigens on red blood cells. Students will observe agglutination reactions to determine whether each sample is type A, B, AB, or O, and whether it is Rh-positive or Rh-negative.

Through this activity, students will:

- Understand the role of antigens and antibodies in the immune response.
- Identify how blood types are classified and why compatibility matters in transfusions.
- Practice analyzing experimental results and drawing conclusions from observed reactions.
- Connect laboratory observations to real-world applications in medicine, such as transfusion safety, organ transplantation, and forensic science

By the end of the lab, students will be able to explain why accurate blood typing is essential for patient health and how mismatched blood transfusions can trigger dangerous immune responses.

Bloom's Levels: Evaluating

Webb's DOK: 4

Topic 3: Erythropoiesis

Engaging Experience 1

Title: Blood Doping Articles

Suggested Length of Time: ½ Block

Standards Addressed

Priority:

- NCHSE 1.1.2 Identify basic structures and describe functions of human body systems

Supporting:

- NCHSE 1.2.1 Describe etiology, pathology, diagnosis, treatment, and prevention of common diseases and disorders
- 9-12.LS1.A.3 Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. [Clarification Statement: Examples of investigations could include heart rate response to exercise, stomata response to moisture and temperature, and root development in response to water levels.]

Detailed Description/Instructions: Students will be presented with two articles about a blood doping scandal in the Tour de France from 2010. This event saw over 50 riders get caught abusing the homeostasis controlling hormone erythropoietin. Students will learn about what physiological advantages these athletes sought, why it was dangerous, and how they got caught and write a paper about what they learned.

Bloom's Levels: Analyzing

Webb's DOK: 3

Topic 4: Homeostasis of Blood via Hemostasis

Engaging Experience 1

Title: Hemostasis Dance

Suggested Length of Time: ½ Block

Standards Addressed

Priority:

- NCHSE 1.1.2 Identify basic structures and describe functions of human body systems

Detailed Description/Instructions: After learning the very intricate and detailed process of hemostasis, students will be taught a ‘dance’ that choreographs movement that roughly mimics each of the 7 steps of the process.

Bloom’s Levels: Remembering

Webb’s DOK: 1

Engaging Scenario

Engaging Scenario (An Engaging Scenario is a culminating activity that includes the following components: situation, challenge, specific roles, audience, product or performance.)

Blood Disorder Speed Dating

This activity has students research and educates their classmates about assigned blood disorder. Students will create a *dating profile* for an assigned blood disorder, using the theme of a fake online dating site. The goal is to creatively present accurate medical information in a fun, engaging format. Students will ‘speed date’ each other in order to educate each other about their blood disorder traits.

Task:

- Research a specific blood disorder using class and outside resources.
- Create a one-slide “dating profile” (PowerPoint, infographic, or equivalent) that highlights the disorder’s key traits while following the dating theme.

Summary of Engaging Learning Experiences for Topics

Topic	Engaging Experience Title	Description	Suggested Length of Time
Composition of Blood	Composition of Blood Virtual Lab	Students will access a virtual lab of the components of blood. They will interact with the program so that they ‘draw’ virtual blood, spin it in a centrifuge, analyze the components and look at them at a microscopic level to prepare them for the rest of the unit.	1 Block
Blood Typing	Blood Typing (Virtual) Lab	In this lab, students will explore the principles of human blood typing and transfusion compatibility by performing a simulated blood typing experiment. Using safe synthetic blood samples and anti-sera (Anti-A, Anti-B, and Anti-Rh), students will test for the presence of specific antigens on red blood cells. Students will observe agglutination reactions to determine whether each sample is type A, B, AB, or O, and whether it is Rh-positive or Rh-negative.	1 Block
Blood Disorders	Blood Doping Articles	Students will be presented with two articles about a blood doping scandal in the Tour de France from 2010. This event saw over 50 riders get caught abusing the homeostasis controlling hormone erythropoietin. Students will learn about what physiological advantages these athletes sought, why it was dangerous, and how they got caught and write a paper about what they learned.	½ Block
Homeostasis of Blood	Hemostasis Dance	After learning the very intricate and detailed process of hemostasis, students will be taught a ‘dance’ that choreographs movement that roughly mimics each of the 7 steps of the process.	½ Block

Unit 4: Cardiovascular System

Subject: Human Anatomy and Physiology

Grade: 10,11,12

Name of Unit: Cardiovascular System

Length of Unit: 8-10 Blocks

Overview of Unit: Students begin this unit by learning about the anatomy of the heart and learning the names of all of the major chambers, valves, and vessels. They will then take that knowledge and apply it to learning how those components help blood cycle through the body and how that cycle is controlled by an electrical impulse generated inside of the heart. Finally, they will learn about the variety of disorders and diseases that a person with an unhealthy heart might be exposed to.

Priority Standards for unit:

- NCHSE 1.1.2 Identify basic structures and describe functions of human body systems.

Supporting Standards for unit:

- NCHSE 1.2.1 Describe etiology, pathology, diagnosis, treatment, and prevention of common diseases and disorders
- 9-12.LS1.A.2 Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. [Clarification Statement: Emphasis is on functions at the organism system level such as nutrient uptake, water delivery, and organism movement in response to stimuli.]
- 9-12.LS1.A.3 Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. [Clarification Statement: Examples of investigations could include heart rate response to exercise, stomata response to moisture and temperature, and root development in response to water levels.]

Learning Targets:

Priority Standard: NCHSE 1.1.2 Identify basic structures and describe functions of human body systems	
Learning Targets	Webb's DOK Level
	Bloom's Level
Students will identify structures of the cardiovascular system (label parts of the heart)	1
	Remembering
Students will identify functions of the cardiovascular system (blood flow through the heart and body)	1
	Remembering
Students will analyze and apply the knowledge about the conduction pathway in the heart.	3
	Analyzing
Students will connect modifiable and nonmodifiable risk factors to various heart conditions.	2
	Applying

Essential Questions:

1. How do atria and ventricles differ in function and what are the major chambers and valves in the heart?
2. Why are there two pathways of blood flow out of the heart and to where do they travel?
3. How does the electric impulse generate at the sinoatrial node travel through the rest of the heart?
4. How does atherosclerosis lead to heart attacks?

Enduring Understanding/Big Ideas:

1. Atria are the receiving chambers of the heart and ventricles expel blood from the heart. They are named right or left depending on their location in the heart. The tricuspid valve separates the right atrium from the right ventricle to prevent the backflow of blood. The bicuspid valve separates the left atrium from the left ventricle and also prevents backflow. Semilunar valves are at the bottom of the aorta and pulmonary artery and prevent blood from flowing back into the ventricles.
2. The systemic pathway sends oxygen rich blood to the entire body and back to the heart. The pulmonary pathway is necessary to take oxygen depleted blood to the lungs and back.
3. After the sinoatrial node fires, there is a pause in the impulse at the atrioventricular node to allow the atria to finish contracting. From there the impulse travels through the AV

bundle and its branches, terminating in purkinje fibers which innervate and allow the ventricles to contract.

4. Buildup of fatty plaques on artery walls can cause the delicate endothelium to rupture. This condition is exacerbated by high blood pressure. When the endothelium ruptures it causes an unwanted clot to form, blocking the blood supply to the heart muscle, resulting in a myocardial infarction.

Unit Vocabulary:

- | | | |
|----------------------------|---------------------------|-----------------------------|
| ● Aorta | ● Fibrillation | ● Repolarization |
| ● Aortic valve | ● Foramen ovale | ● SA node (Sinoatrial node) |
| ● Apex | ● Heart rate | ● Semilunar valves |
| ● Atria | ● Inferior vena cava | ● Sinoatrial node |
| ● Artery | ● Interatrial septum | ● Systole |
| ● AV node | ● Interventricular septum | ● Stroke volume |
| ● AV valves | ● Incompetent valve | ● Superior vena cava |
| ● Bicuspid valve | ● Myocardial infarction | ● Systemic circuit |
| ● Bradycardia | ● Myocardium | ● Stenosis |
| ● Bundle of His | ● Murmur | ● Tachycardia |
| ● Blood pressure | ● Oxygenated blood | ● Tricuspid valve |
| ● Cardiac output | ● Pacemaker | ● T wave |
| ● Chordae tendineae | ● Papillary muscles | ● Valve |
| ● Coronary arteries | ● Pericardium | ● Ventricle |
| ● Conduction system | ● Pulmonary artery | ● Ventricular fibrillation |
| ● Congestive heart failure | ● Pulmonary circuit | ● Vein |
| ● Diastole | ● Pulmonary valve | |
| ● Depolarization | ● P wave | |
| ● ECG (Electrocardiogram) | ● QRS complex | |

Topic 1: Structure and Function of the Heart

Engaging Experience 1

Title: Heart Shaped Box

Suggested Length of Time: 1 Block

Standards Addressed

Priority:

- NCHSE 1.1.2 Identify basic structures and describe functions of human body systems.

Supporting:

- 9-12.LS1.A.2 Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

[Clarification Statement: Emphasis is on functions at the organism system level such as nutrient uptake, water delivery, and organism movement in response to stimuli.]

Detailed Description/Instructions: Students will create a paper ‘heart’ with four boxes simulating the 4 chambers of the heart. As we progress through the unit, students will include red arrows for the pathway of blood and yellow arrows for tracking the electrical current.

Bloom’s Levels: Analyzing

Webb’s DOK: 3

****Engaging Experience 2**

Title: Dissection of analogous heart in a mammal (cat)

Suggested Length of Time: 2 Blocks

Standards Addressed

Priority:

- NCHSE 1.1.2 Identify basic structures and describe functions of human body systems.

Detailed Description/Instructions: Students will participate in a dissection with an emphasis on the heart of the mammal (cat) and how they compare to the anatomy of humans. Students will be able to identify the names of the heart components in mammals (cats) and the related components in humans. Students will also be able to locate the origin and insertion of each muscle and describe the movement generated by the muscle.

Bloom’s Levels: Applying

Webb’s DOK: 2

Topic 2: Pathway of Blood

Engaging Experience 1

Title: Hand puppets of the Heart

Suggested Length of Time: ½ Block

Standards Addressed

Priority:

- NCHSE 1.1.2 Identify basic structures and describe functions of human body systems.

Supporting:

- 9-12.LS1.A.2 Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

[Clarification Statement: Emphasis is on functions at the organism system level such as nutrient uptake, water delivery, and organism movement in response to stimuli.]

Detailed Description/Instructions: Students will be shown how they can keep track of the pathway of blood as it flows through the heart using only their hands. After they are shown, students will be asked to partner with somebody and rehearse their hand puppet performance until they are comfortable presenting to the class.

Bloom's Levels: Remembering

Webb's DOK: 1

Topic 3: Conduction System

Engaging Experience 1

Title: Conduction Review Games

Suggested Length of Time: 1 Block

Standards Addressed

Priority:

- NCHSE 1.1.2 Identify basic structures and describe functions of human body systems.

Detailed Description/Instructions: Students will break up into groups of 3-5 and be tasked with creating a review game about the conduction system of the heart. Only 1 group will be allowed to use each platform (for example, only 1 group would be allowed to use 'Kahoot'). Students will spend the first half of class researching and creating their game, and then the second half of class playing each other's games.

Bloom's Levels: Creating

Webb's DOK: 4

Topic 4: Heart Disease

Engaging Experience 1

Title: Heart Disease Presentation

Suggested Length of Time: 2 Blocks

Standards Addressed

Priority:

- NCHSE 1.1.2 Identify basic structures and describe functions of human body systems.

Supporting:

- NCHSE 1.2.1 Describe etiology, pathology, diagnosis, treatment, and prevention of common diseases and disorders
- 9-12.LS1.A.3 Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. [Clarification Statement: Examples of investigations could include heart rate response to exercise, stomata response to moisture and temperature, and root development in response to water levels.]

Detailed Description/Instructions: Students will be given 1 day to pick one of the numerous heart conditions that exist and research them. The next day they will give a 2-3-minute audio-visual presentation about their disease making sure to place an emphasis on how the disease is caused at a cellular / tissue level, and what can be done to treat/prevent it as well as whether or not the disease is caused by environmental factors or genetic conditions.

Bloom's Levels: Analyzing

Webb's DOK: 3

Engaging Scenario

Engaging Scenario (An Engaging Scenario is a culminating activity that includes the following components: situation, challenge, specific roles, audience, product or performance.)

Blood Pressure / Heart Rate Lab

Students will be given 1 day to complete this lab exploration into the physiological changes that occur to the cardiovascular system before, during, and after exercise. Students will take their heart rate and blood pressure readings using the appropriate instruments before the lab begins, after completing a 5-minute exercise, and 10 minutes after they have finished their exercise.

Using their knowledge of blood from the last unit, and their knowledge of the parts of the heart, pathway of blood, and heart disease, they will try and analyze patterns in their data and compare that to what a stereotypical data set for a ‘healthy’ heart would look like. They will finally be tasked with writing up what happens on a physiological level before, during, and after exercise.

Summary of Engaging Learning Experiences for Topics

Topic	Engaging Experience Title	Description	Suggested Length of Time
Parts of the Heart	Heart Shaped Box	Students will create a paper 'heart' with four boxes simulating the 4 chambers of the heart. As we progress through the unit, students will include red arrows for the pathway of blood and yellow arrows for tracking the electrical current.	1 Block
Parts of the Heart	Mammal Dissection	Students will dissect their mammalian heart and compare the anatomy of that heart to their knowledge of the human heart	1 Block
Pathway of Blood	Hand puppets of the Heart	Students will be shown how they can keep track of the pathway of blood as it flows through the heart using only their hands. After they are shown, students will be asked to partner with somebody and rehearse their hand puppet performance until they are comfortable presenting to the class.	½ Block
Electrical Currents of the Heart	Conduction Review Games	Students will break up into groups of 3-5 and be tasked with creating a review game about the conduction system of the heart. Only 1 group will be allowed to use each platform (for example, only 1 group would be allowed to use 'Kahoot'). Students will spend the first half of class researching and creating their games, and then the second half of class playing each other's games.	1 Block
Heart Disease	Heart Disease Presentation	Students will be given 1 day to pick one of the numerous heart conditions that exist and research them. The next day they will give a 2-3-minute audio-visual presentation about their disease making sure to place an emphasis on how the disease is caused at a cellular / tissue level, and what can be done to treat/prevent it as well as	2 Blocks

		whether or not the disease is caused by environmental factors or genetic conditions.	
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Unit 5: Musculoskeletal System

Subject: Human Anatomy and Physiology

Grade: 10,11,12

Name of Unit: Musculoskeletal System

Length of Unit: 18-20 Blocks

Overview of Unit: Students begin this unit by learning about the structure, classification, and functionality of the different types of bones found in the body. The unit continues on with an in-depth study of all of the major bones of the body. Students will learn to identify these different bones based upon the variety of markings and shapes of the bones. The unit culminates when the skeletal muscles that generate familiar body movements (adduction, flexion, abduction, extension) of the appendages are identified along with their origin, and insertions on the bones.

Priority Standards for unit:

- NCHSE 1.1.2 Identify basic structures and describe functions of human body systems.

Supporting Standards for unit:

- NCHSE 1.2.1 Describe etiology, pathology, diagnosis, treatment, and prevention of common diseases and disorders
- 9-12.LS1.A.3 Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. [Clarification Statement: Examples of investigations could include heart rate response to exercise, stomata response to moisture and temperature, and root development in response to water levels.]

Learning Targets:

Priority Standard: NCHSE 1.1.2 Identify basic structures and describe functions of human body systems	
Learning Targets	Webb's DOK Level
	Bloom's Level
Students will identify structures of the skeletal system (distinguish between axial and appendicular skeletons, describe long bone anatomy, name and classify all bones)	1
	Remembering
Students will identify functions of the skeletal system (hematopoiesis, mineral storage, muscle attachment and movement, structure and support)	1
	Remembering

Students will identify larger muscles and where they originate and insert on the skeleton.

1

Remembering

Essential Questions:

1. How do the axial and appendicular skeletons have similarities and differences? How do these similarities and differences allow them to perform the functions required of the skeletal system?
2. How are bones classified and how are the structures of these bones similar and different?
3. How are the bones in our body named, oriented, and located?
4. Why are there so many different ways that someone can fracture a bone?
5. How does the contraction of skeletal muscle generate a specific movement at the articulation of two bones?

Enduring Understanding/Big Ideas:

1. The axial skeleton is the trunk of our body, the main purpose for this skeleton system is to protect the underlying organs of the head, abdomen, and thorax. The appendicular skeleton's purpose is to allow our body a range of motion so that movement is possible.
2. Bones are classified either as long, short, irregular, or flat. The structure of these bones is dependent on the function required of them. For example, the bones in the skull are mostly flat bones to provide a nearly solid layer of protection for the brain from the outside environment.
3. Bones in our body are named based upon the location of the bone and usually originate from a Greek or Latin word origin. There are 206 bones in the body with 83 unique names.
4. Bones can fracture in any number of ways based upon what type of bone is being fractured, the age and health of the person whose bone it is, and the type and strength of the force being placed upon these bones. These different factors can cause a variety of different fractures that medical professionals (and anatomy students) are trained to recognize and diagnose.
5. Skeletal muscle is found attached to the bones of the skeletal system. A muscle's origin is the stationary bone, and the insertion is on the bone that moves. The muscle will cross the articulation of the two bones, and contract to generate the motion at the joints.

Unit Vocabulary:

- Acetabulum
- Acromial end
- Acromion process
- Anatomical neck
- Atlas
- Axis
- Calcaneus
- Capitulum
- Carpals
- Cervical Vertebrae
- Clavicle
- Coccyx (1)
- Coracoid process
- Coronal suture
- Coronoid fossa
- Coronoid process
- Crista galli
- Deltoid tuberosity
- Dens
- Ethmoid
- External auditory meatus
- Femur
- Fibula
- Foramen magnum
- Frontal
- Glenoid cavity
- Greater trochanter
- Greater tubercle
- Greater sciatic notch
- Humerus
- Inferior nasal concha
- Infraorbital foramen
- Intercondylar Eminence
- Ischial Ramus
- Ischial spine
- Lacrimal
- Lambdoidal suture
- Lateral condyles
- Lateral epicondyles
- Lateral malleolus
- Lesser sciatic notch
- Lesser trochanter
- Lesser tubercle
- Lumbar Vertebrae
- Mandible
- Mandibular fossa
- Mandibular notch
- Mastoid process
- Maxilla
- Medial condyles
- Medial epicondyles
- Medial malleolus
- Mental foramen
- Metacarpals
- Middle nasal conchae
- Nasal bone (2)
- Obturator foramen
- Occipital bone (1)
- Occipital condyles
- Olecranon fossa
- Olecranon process
- Palatine
- Parietal
- Patella (2)
- Patellar surface
- Perpendicular plate
- Phalanges
- Pubic Ramus
- Pubis symphysis
- Radial notch
- Radial tuberosity
- Radius
- Sacrum
- Sagittal suture
- Scapula
- Sphenoid bone
- Spine
- Sternal end
- Sternum
- Styloid process
- Superior nasal conchae
- Talus
- Tarsals
- Temporal
- Temporal process
- Thoracic Vertebrae
- Tibia
- Tibial tuberosity
- Transverse foramen
- Trochlea
- Trochlear notch
- Ulna
- Vertebral
- Vertebral sternal ribs
- Vertebrochondral ribs
- Vomer
- Xiphoid process
- Zygomatic process

Topic 1: Appendicular and Axial Skeleton

Engaging Experience 1

Title: Compare and contrast graphic organizer

Suggested Length of Time: ½ Block

Standards Addressed

Priority:

- NCHSE 1.1.2 Identify basic structures and describe functions of human body systems.

Detailed Description/Instructions: Students will use a Venn Diagram (or similar organizer of choice) to compare and contrast the functions, bone categories and structures of the bones of the axial vs appendicular skeleton

Bloom's Levels: Analyzing

Webb's DOK: 3

Topic 2: Classification and Structure of Bone

Engaging Experience 1

Title: Bone sort race

Suggested Length of Time: ½ Block

Standards Addressed

Priority:

- NCHSE 1.1.2 Identify basic structures and describe functions of human body systems.

Detailed Description/Instructions: Students are divided into lab groups. Each group is given a set of bones and a set of four notecards. They are not allowed to open their bone box until the teacher says “go”. At this point students will open their bone set and place all of the bones under the corresponding notecard category. The first group to finish and be completely correct wins.

Optional Version: Use this as an ‘opening’ activity before teaching the official lesson. Give students the bones and have them create and sort into 4 categories of their choosing. Students must provide justification for their categories and reasoning.

Bloom’s Levels: Applying

Webb’s DOK: 2

Topic 3: Bone Identification

Engaging Experience 1

Title: Bone Practical Practice

Suggested Length of Time: 1 Block

Standards Addressed

Priority:

- NCHSE 1.1.2 Identify basic structures and describe functions of human body systems.

Detailed Description/Instructions: Students will pair up and practice identifying and classifying bones from the bone set. They will do a practice practical to check for understanding and grade their own mock test. This score gets recorded in the virtual notebook. They will re-sort the bone set to include only the bones they missed and make a second attempt. They may take the entire practical again and track their learning in their virtual notebooks.

Bloom's Levels: Applying

Webb's DOK: 2

Topic 4: Muscle Identification

****Engaging Experience 1**

Title: Dissection of analogous muscles in a mammal (cat)

Suggested Length of Time: 2 Blocks

Standards Addressed

Priority:

- NCHSE 1.1.2 Identify basic structures and describe functions of human body systems.

Detailed Description/Instructions: Students will participate in a dissection with an emphasis on the muscles of the mammal (cat) and how they compare them to the anatomy of humans.

Students will be able to identify the names of the muscles on the mammals (cats) and the related muscles in humans. Students will also be able to locate the origin and insertion of each muscle and describe the movement generated by the muscle.

Bloom's Levels: Applying

Webb's DOK: 2

Engaging Scenario

Engaging Scenario (An Engaging Scenario is a culminating activity that includes the following components: situation, challenge, specific roles, audience, product or performance.)

Life-Sized Skeleton

Throughout the unit students will illustrate a full-sized human skeleton on butcher paper. The part of the skeleton illustrated will be the portion covered in lecture each day. Students need to draw and outline each bone, as well as label the bone name and any important bone markings mentioned in notes. At the end of the unit, the skeleton should be complete. After test day students will post their skeletons for peer grading (accuracy). There is an extra credit contest gallery walk for extra credit. Two or three classes come to vote on their top two favorites. First, Second and Third places are awarded.

Summary of Engaging Learning Experiences for Topics

Topic	Engaging Experience Title	Description	Suggested Length of Time
Appendicular and Axial Skeleton	Compare and contrast graphic organizer	Students will use a Venn Diagram (or similar organizer of choice) to compare and contrast the functions, bone categories and structures of the bones of the axial vs appendicular skeleton	½ Block
Classification and Structure of Bone	Bone sort race	Students are divided into lab groups. Each group is given a set of bones and a set of four notecards. They are not allowed to open their bone box until the teacher says “go”. At this point students will open their bone set and place all of the bones under the corresponding notecard category. The first group to finish and be completely correct wins.	½ Block
Bone Identification	Bone Practical Practice	Students will pair up and practice identifying and classifying bones from the bone set. They will do a practice practical to check for understanding and grade their own mock test. This score gets recorded in the virtual notebook. They will re-sort the bone set to include only the bones they missed and make a second attempt. They may take the entire practical again and track their learning in their virtual notebooks.	1 Block
Muscle Identification	Dissection of analogous muscles in a mammal (cat)	Students will participate in a dissection with an emphasis on the muscles of the cat and how they compare to the anatomy of humans. Students will be able to identify the names of the muscles on the cats and the related muscles in humans. Students will also be able to locate the origin and insertion of each muscle and describe the movement generated by the muscle.	2 Blocks

Unit 6: Digestive System

Subject: Human Anatomy and Physiology

Grade: 10, 11, 12

Name of Unit: Digestive System

Length of Unit: 10-12 Blocks

Overview of Unit: The digestive unit has the students track what happens to food as they eat it by exploring the alimentary canal of the digestive system. As they learn about the organs directly involved with the extraction of nutrients from food, they will also learn the anatomy and physiology of the accessory digestive organs, which do not play a major role in food digestion, but play a crucial role at various times of the process.

Priority Standards for unit:

- NCHSE 1.1.2 Identify basic structures and describe functions of human body systems.

Supporting Standards for unit:

- NCHSE 1.2.1 Describe etiology, pathology, diagnosis, treatment, and prevention of common diseases and disorders
- 9-12.LS1.A.3 Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. [Clarification Statement: Examples of investigations could include heart rate response to exercise, stomata response to moisture and temperature, and root development in response to water levels.]

Learning Targets:

Priority Standard: NCHSE 1.1.2 Identify basic structures and describe functions of human body systems	
Learning Targets	Webb's DOK Level
	Bloom's Level
Students will differentiate between alimentary and accessory organs.	2
	Applying
Students will identify digestive organs in sequence.	1
	Remembering
Students will identify the functions of the digestive system (Absorption of nutrients, chemical and mechanical digestion, excretion of waste)	3
	Analyzing

Essential Questions:

1. How do accessory organs differ from organs making up the alimentary canal?
2. How does each organ contribute to the digestion of the 4 major categories of biological macromolecules (carbohydrates, proteins, lipids, and nucleic acids)?
3. How is the digestive system specialized at the microscopic level to aid in breaking down and absorbing food?

Enduring Understanding/Big Ideas:

1. Accessory organs (salivary glands, liver, gallbladder, and pancreas) secrete substances that aid in digestion. The organs of the alimentary canal (mouth, esophagus, stomach, small intestine, large intestine) form a continuous pathway for food to travel through the body.
2. Carbohydrates begin digestion in the mouth when the salivary glands secrete the enzyme amylase. In the stomach, enzymes and HCl begin the digestion of protein. The pancreas secretes all categories of enzymes necessary to break down the four macromolecules. Bile from the liver is required to emulsify fat.
3. Gastric pits in the stomach contain cells that secrete HCl, pepsinogen, mucus, and hormones that control digestion. Villi in the small intestine are lined with columnar cells that contain microvilli at their surface to maximize surface area for absorption.

Unit Vocabulary:

- Acute diarrhea
- Alimentary canal
- Ankyloglossia
- Appendicitis
- Appendix
- Autoimmune
- Bicarbonate
- Bilirubin
- Bile
- Bile salts
- Bolus
- Cardia
- Cardiac orifice
- Cecum
- Celiac Disease
- Chyme
- Colon
- Constipation
- Crohn's Disease
- Deglutition
- Diaphragm
- Emulsify
- Esophageal hiatus
- Esophagus
- Feces
- Fiber
- Gallbladder
- Gallstones
- Gastroesophageal sphincter
- Gluten
- Greater omentum
- Helicobacter pylori
- Hepatitis
- Hiatal Hernia
- Ileocecal valve
- Ileum
- Inflammation
- Intrinsic factor
- Jaundice
- Laryngopharynx
- Lesser omentum
- Lipase
- Liver
- Lingual frenulum
- Mesenteries
- Microbiome
- Nasopharynx
- Nuclease
- Nucleotides
- Oropharynx
- Pancreas
- Pancreatic enzymes
- Perforating ulcers
- Peristalsis
- Peritonitis
- Pharynx
- Protease
- Pyloric valve
- Pylorus
- Rectum
- Saliva
- Salivary glands
- Stomach
- Stomach acid
- Ulcerative colitis
- Vitamin B12
- Vestigial

Topic 1: Accessory Structures vs. the Alimentary Canal

Engaging Experience 1

Title: Trash Bag Illustration

Suggested Length of Time: ½ Block

Standards Addressed

Priority:

- NCHSE 1.1.2 Identify basic structures and describe functions of human body systems.

Detailed Description/Instructions: Students will *become* the digestive system by physically mapping the alimentary canal onto themselves and showing where accessory organs contribute enzymes and secretions to aid digestion. By turning their own bodies into interactive models, students gain a deeper spatial and functional understanding of how the digestive system works as a coordinated whole.

Bloom's Levels: Analyzing

Webb's DOK: 3

****Engaging Experience 2**

Title: Dissection of digestive system in a mammal (cat)

Suggested Length of Time: 2 Blocks

Standards Addressed

Priority:

- NCHSE 1.1.2 Identify basic structures and describe functions of human body systems.

Detailed Description/Instructions: Students will participate in a dissection with an emphasis on the digestive system of the mammal (cat) and how they compare to the anatomy of humans. Students will be able to identify the names of the digestive organs on the mammals (cats) and the analogous organs in humans.

Bloom's Levels: Applying

Webb's DOK: 2

Topic 2: Digestion of Macromolecules

Engaging Experience 1

Title: Food Day Essay

Suggested Length of Time: ½ Block

Standards Addressed

Priority:

- NCHSE 1.1.2 Identify basic structures and describe functions of human body systems.

Detailed Description/Instructions: Students bring in and consume a variety of foods. They then trace the pathway of the food, describing what macromolecules from a specific food is digested in each part of the system and how this occurs.

Bloom's Levels: Analyzing

Webb's DOK: 3

Topic 3: Microscopic Anatomy

Engaging Experience 1

Title: Textbook Illustration

Suggested Length of Time: ½ Block

Standards Addressed

Priority:

- NCHSE 1.1.2 Identify basic structures and describe functions of human body systems.

Detailed Description/Instructions: Students are asked to create their own illustration of a villus with columnar cells that have microvilli. This is done after watching a clip from Crashcourse on the surface area of the digestive system.

Bloom's Levels: Analyzing

Webb's DOK: 3

Engaging Scenario

Engaging Scenario (An Engaging Scenario is a culminating activity that includes the following components: situation, challenge, specific roles, audience, product or performance.)

One Page Poster Project

Students will be assigned a particular organ of the digestive system. The front of the poster will contain a picture, major functions, how the organ contributes to both chemical and mechanical digestion, and any substances produced by this organ. The back of the poster covers a disease of choice associated with the organ. During presentations, the rest of the class may take notes. There will be an open-note quiz using the presentation notes. The teacher will write two questions from each presentation to put on the quiz.

Summary of Engaging Learning Experiences for Topics

Topic	Engaging Experience Title	Description	Suggested Length of Time
Accessory Structures vs. Alimentary	Trash Bag Illustration	Students will <i>become</i> the digestive system by physically mapping the alimentary canal onto themselves and showing where accessory organs contribute enzymes and secretions to aid digestion. By turning their own bodies into interactive models, students gain a deeper spatial and functional understanding of how the digestive system works as a coordinated whole.	½ Block
Accessory Structures vs. Alimentary	Cat Dissection	Students will participate in a dissection with an emphasis on the digestive system of the mammal (cat) and how they compare to the anatomy of humans. Students will be able to identify the names of the digestive organs on the mammals (cats) and the analogous organs in humans.	2 Blocks
Digestion of Macro-molecules	Food Day Essay	Students bring in and consume a variety of foods. They then trace the pathway of the food, describing what macromolecule from a specific food is digested in each part of the system and how this occurs.	½ Block
Microscopic Anatomy	Textbook Illustration	Students are asked to create their own illustration of a villus with columnar cells that have microvilli. This is done after watching a clip from Crashcourse on the surface area of the digestive system.	½ Block

Unit 7: Reproductive System

Subject: Human Anatomy and Physiology

Grade: 10, 11, 12

Name of Unit: Reproductive System

Length of Unit: 6 Blocks

Overview of Unit: In this unit, students will learn how the differences in the purpose of male and female reproductive systems shape the anatomy of those corresponding organs. There will be an emphasis on the pathway of sperm and pathway and development of the egg. Additionally, students will learn the incredible amount of changes that occur to a woman's body as she is pregnant, and why those changes occur in order to assure the healthy development and delivery of a baby.

Priority Standards for unit:

- NCHSE 1.1.2 Identify basic structures and describe functions of human body systems.

Supporting Standards for unit:

- NCHSE 1.2.1 Describe etiology, pathology, diagnosis, treatment, and prevention of common diseases and disorders
- 9-12.LS1.A.3 Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. [Clarification Statement: Examples of investigations could include heart rate response to exercise, stomata response to moisture and temperature, and root development in response to water levels.]

Learning Targets:

Priority Standard: NCHSE 1.1.2 Identify basic structures and describe functions of human body systems	
Learning Targets	Webb's DOK Level
	Bloom's Level
Students will identify structures and function of the male reproductive system	1
	Remembering
Students will identify the structures and functions of the female reproductive system	1
	Remembering
Students will analyze and compare the changes to a woman's body during pregnancy as opposed to the 'normal' anatomical and physiological condition.	3
	Analyzing

Essential Questions:

1. How is the male reproductive anatomy structured and allow for maximum storage and passage of the sperm?
2. How is the female reproductive anatomy different from the male reproductive anatomy?
3. How does a pregnancy impact the overall anatomy and physiology of the female body?

Enduring Understanding/Big Ideas:

1. The male reproductive anatomy is essentially one large tunnel designed to maximize the amount of sperm that can be created and stored through the testes, epididymis, vas deferens and urethra.
2. Female reproductive anatomy differs from the males in regard to functionality. The purpose of the male reproductive anatomy is to be able to deliver sperm - female anatomy must be able to not only receive the sperm, but also to be able to house, nurture, and ultimately deliver a baby during the 9 months of pregnancy. These extremely functional differences result in distinct anatomical features that allow for this to occur.
3. A female's body changes in a multitude of ways during a pregnancy, including (but certainly not limited to): organs compressed in the abdomen, hormonal changes, increased appetite, etc.

Unit Vocabulary:

- Androgens
- Bladder sphincter
- Ductus deferens
(vas deferens)
- Ejaculation
- Ejaculatory duct
- Ejaculatory event
- Epididymis
- Glans penis
- Penis
- Prepuce (foreskin)
- Prostate gland
- Rete testis
- Root of penis
- Scrotum
- Semen
- Seminiferous
tubules
- Seminal vesicles
(seminal glands)
- Septum
(scrotum/testis)
- Sperm
- Straight tubule
- Testes
- Testosterone
- Urethra
- Vasectomy
- Cervix
- Clitoris
- Corpus luteum
- Endometrium
- Estrogen
- External urethral
orifice
- Fallopian tubes
(uterine tubes,
oviducts)
- Follicle
- Fundus (of uterus)
- Gamete
- Glans of clitoris
- Greater vestibular
gland
- Hymen
- Labia majora
- Labia minora
- Libido
- Mammary glands
- Menopause
- Menstrual cycle
- Mons pubis
- Ovaries
- Ovulation
- Prepuce (of clitoris)
- Progesterone
- Suspensory
ligament (of ovary)
- Umbilical cord
- Urethra
- Uterine tubes
- Uterus
- Vagina
- Vestibule
- Vulva
- Zygote

Topic 1: Male Reproductive Anatomy

Engaging Experience 1:

Title: Pathway of Sperm Interactive

Suggested Length of Time: 1 Block

Standards Addressed

Priority:

- NCHSE 1.1.2 Identify basic structures and describe functions of human body systems.

Supporting:

- NCHSE 1.2.1 Describe etiology, pathology, diagnosis, treatment, and prevention of common diseases and disorders

Detailed Description/Instructions: Students will *trace the pathway of sperm* through the male reproductive system, using interactive stations and models, to reinforce both anatomical structure and function.

Setup:

- Place labeled 3D models, plastinated specimens, or detailed diagrams of the male reproductive organs around the classroom.
- At each station, provide short prompts, scenarios, or mini-challenges.
 - Example: At the epididymis station, students might answer: “*What is happening to sperm at this point, and why is it important?*”
 - At the vas deferens station, they could follow a rope/tube model across the room to show the transport process.

Bloom’s Levels: Applying

Webb’s DOK: 2

Topic 2: Female Reproductive Anatomy

Engaging Experience 1

Title: MapQuest Mating

Suggested Length of Time: 1 Block

Standards Addressed

Priority:

- NCHSE 1.1.2 Identify basic structures and describe functions of human body systems.

Detailed Description/Instructions: Students will create a step-by-step map with instructions on the path that the sperm takes from the creation of the sperm to fertilization of the egg. Students will share their maps with classmates. With an emphasis on reviewing male reproductive steps and female reproductive anatomy creating and developing the egg.

Bloom's Levels: Analyzing

Webb's DOK: 3

Topic 3: Changes During Pregnancy

Engaging Experience 1

Title: Interview with a Mom

Suggested Length of Time: 1 Block

Standards Addressed

Priority:

- NCHSE 1.1.2 Identify basic structures and describe functions of human body systems.

Supporting:

- 9-12.LS1.A.3 Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. [Clarification Statement: Examples of investigations could include heart rate response to exercise, stomata response to moisture and temperature, and root development in response to water levels.]

Detailed Description/Instructions: Students will be tasked with finding someone who is either pregnant or has been pregnant and ask them questions about changes that they noticed. They will summarize their interview in a paper and present it to the class.

Bloom's Levels: Applying

Webb's DOK: 2

Engaging Scenario

Engaging Scenario (An Engaging Scenario is a culminating activity that includes the following components: situation, challenge, specific roles, audience, product or performance.)

Aging and the Reproductive System

A medical professional will come into the class and discuss the wide variety of preventative screenings available to them as they progress through their lives. Topics include things such as prostate and cervical cancer, menopause, hormone replacement therapy, and others.

Students will be assigned to research these, and any other disorders relating to the reproductive system to determine frequency of the disease and treatment options and additional screening measures. Each student will be asked to come up with at least 1 question to ask the medical professional to be examined in class. Finally, each student will be asked to submit a summary of what they expected to hear and did, as well as something they did not know.

Summary of Engaging Learning Experiences for Topics

Topic	Engaging Experience Title	Description	Suggested Length of Time
Male Reproductive Anatomy	Pathway of Sperm Interactive	Students will <i>trace the pathway of sperm</i> through the male reproductive system, using interactive stations and models, to reinforce both anatomical structure and function.	1 Block
Female Reproductive Anatomy	MapQuest Mating	Students will create a step-by-step map with instructions on the path that the sperm takes from the creation of the sperm to fertilization of the egg. Students will share their maps with classmates. With an emphasis on reviewing male reproductive steps and female reproductive anatomy creating and developing the egg.	1 Block
Changes During Pregnancy	Interview with a Mom	Students will be tasked with finding someone who is either pregnant or has been pregnant and ask them questions about changes that they noticed. They will summarize their interview in a paper and present it to the class.	1 Block

Course Engaging Scenario

Engaging Scenario (An Engaging Scenario is a culminating activity that includes the following components: situation, challenge, specific roles, audience, product or performance.)

Students will spend approximately a month at the end of the course dissecting a mammal (cat). The course has been designed so that by the time students dissect the mammal (cat), they know enough about anatomy and physiology to have an understanding of the variety of different structures, organs, and connective tissues they find inside of the mammal (cat).

Just like the course was broken up into different body systems, the mammal (cat) itself will be dissected by body systems. We will begin by exploring the skeletal and muscular systems of the mammal (cat) by analyzing the origin and insertion points of the muscles. Students will then open up the abdominal cavity and explore the digestive system and organs. The students will end the dissection by opening the thoracic cavity and looking at the heart and cardiovascular system as well as briefly looking at the respiratory system.

Unit of Study Terminology

Appendices: All Appendices and supporting material can be found in this course's shell course in the District's Learning Management System.

Assessment Leveling Guide: A tool to use when writing assessments in order to maintain the appropriate level of rigor that matches the standard.

Big Ideas/Enduring Understandings: Foundational understandings teachers want students to be able to discover and state in their own words by the end of the unit of study. These are answers to the essential questions.

Engaging Experience: Each topic is broken into a list of engaging experiences for students. These experiences are aligned to priority and supporting standards, thus stating what students should be able to do. An example of an engaging experience is provided in the description, but a teacher has the autonomy to substitute one of their own that aligns to the level of rigor stated in the standards.

Engaging Scenario: This is a culminating activity in which students are given a role, situation, challenge, audience, and a product or performance is specified. Each unit contains an example of an engaging scenario, but a teacher has the ability to substitute with the same intent in mind.

Essential Questions: Engaging, open-ended questions that teachers can use to engage students in learning.

Priority Standards: What every student should know and be able to do. These were chosen because of their necessity for success in the next course, the state assessment, and life.

Supporting Standards: Additional standards that support the learning within the unit.

Topic: These are the main teaching points for the unit. Units can have anywhere from one topic to many, depending on the depth of the unit.

Unit of Study: Series of learning experiences/related assessments based on designated priority standards and related supporting standards.

Unit Vocabulary: Words students will encounter within the unit that are essential to understanding. Academic Cross-Curricular words (also called Tier 2 words) are those that can be found in multiple content areas, not just this one. Content/Domain Specific vocabulary words are those found specifically within the content.