

Science Curriculum Map: Anatomy

2023

updated 9/1/2023

<u>Unit</u>	<u>Topics</u>	<u>Time Frame</u>
Intro to Anatomy and Physiology	<ul style="list-style-type: none"> - Define Anatomy and Physiology - Anatomical Position - Directional Terminology - Body Cavities - Positive and Negative Feedbacks - Homeostasis - Levels of Organization - Organization of the Human Body 	10 periods
Histology	<ul style="list-style-type: none"> - Terminology - Structure and Function of the Epithelial Tissues - Types of Glandular Epithelium - Structure and Function of the various types of Connective Tissues, muscles, and nerves 	20 periods
Integumentary System	<ul style="list-style-type: none"> - Structure and Function of Layers of Integumentary System - Structure and Function of the accessory organs of the skin 	8 periods
Skeletal System	<ul style="list-style-type: none"> - Differentiate between different shapes of bones - Differentiate between endochondral and intramembranous bones - Anatomy of a long bone - Explain steps involved in bone formation - Differentiate types of fractures and bone repair - Identify key skeletal bones and structures - Differentiate between a male and female skeleton - Differentiate between different bone diseases and disorders - Differentiate between different types of joints - Identify possible joint movements - Explain joint disorders 	20 periods
Muscular System	<ul style="list-style-type: none"> - Differentiate between types of muscles and their functions. - Describe the structure and function of a skeletal muscle. - Describe the structure and function of a sarcomere. - Describe the neuromuscular junction and the process of muscle contraction using the sliding filament theory. - Differentiate between contractility, extensibility, and elasticity of a skeletal muscle. - Identify origin, insertion, and action of key muscles of the human body. 	20 periods

	<ul style="list-style-type: none"> - Identify key muscles of the human body. - Explain muscle disorders. 	
Nervous System	<ul style="list-style-type: none"> - List the divisions of the nervous system and distinguish them by describing the characteristics of each. - Describe structure and function of a neuron - Explain how an action potential fires. - Describe the process of brain formation. - Identify parts of the brain and describe their function. - Describe key brain disorders. 	20 periods
Cat Dissection	<ul style="list-style-type: none"> - Demonstrate how general dissection is done and what each instrument is used for. - Dissect, separate, and identify skeletal muscles. - Dissect, separate, and identify parts of the thoracic cage. - Dissect, separate, and identify parts of the digestive system. - Dissect, separate, and identify parts of the circulatory system. - Dissect, separate, and identify parts of the excretion system. 	35 periods

Unit 1 Summary: Introduction to Anatomy and Physiology

This unit is the first unit of the course. It will introduce the course and identify all major topics and concepts that will be outlined throughout the year. This unit investigates the history of the study of anatomy and physiology and major contributions made. It will highlight the characteristics and requirements of life. Students will be introduced to the important connection between structure and function which will continue to frame the course throughout the year. In addition, students will learn the terminology associated with body position which is necessary to understand and perform anatomical skills and techniques. Students will be introduced to body organization which will help students to transition to the following units on body tissues and systems. This unit will end with the concepts of homeostasis and feedback loops which help to set the stage for the understanding of proper bodily function and thus the importance of studying disease to develop strategies for remediation.

Students will be able to attend a field trip in the spring to observe a Live Surgery at Camden County College via streaming at a surgical center in North Jersey. Students will be able to ask the surgical team questions about the surgery they are watching. Students will also be given a tour of the various science rooms and lab rooms at Camden County College

Essential Questions:

These questions establish inquiry to unify the unit's assignments and assessments.

- How do we study anatomy and physiology?
- How was anatomy & physiology developed as a science?
- What is necessary for the survival and continuation of life?
- Why does the body need to be organized?
- How does structure relate to function in living things?
- Why is homeostasis important to living things?

Vocabulary/Key Terms

Tier 2: Anatomy, Physiology

Tier 3: Superior, Inferior, Anterior, Posterior, Medial, Lateral, Bilateral, Ipsilateral, Proximal, Distal, Superficial, Peripheral, Deep, Visceral

Evidence of Learning:

Major Assessments: Summative/Performance Assessments (Tests/Projects = 40%)

Chapter 1 Test

Minor Assessments: Quizzes (20%)

Intro to Anatomy and Physiology-Body Cavities

Terminology Quiz

Labs (30%)

Homeostasis Lab - various exercises to determine resting vs. active heart rate

Practice (Homework/Classwork =10 %)

Body Cavity labeling, Terminology WS, coloring, labeling body cavities and terminology

Formative Assessments:

Formative assessments will be in the form of warm ups, exit tickets, responder activities, objective checks and other teacher evaluations during class including concept reinforcement worksheets and reading comprehension checks, small group recitations, EdPuzzles, *ZOINK Review Game*

Resources

Textbook - Hole's Essentials of Human Anatomy & Physiology - 11th edition

Anatomy Coloring Book 4th edition

Anatomy and Physiology, 17th Edition

Various online resources such as:

- Kahoot
- Quizlet
- Gimkit
- Google Suites
- EdPuzzle

[Science Recommended Accommodations & Modifications for Curriculum Implementation](#)

- **Italicizing important parts of the statement for the true & false section, breaking matching sections into smaller parts with more specific word banks.**

The teacher will also accommodate any specific needs based on 504 and IEP plans such as preferential seating and providing copies of power-point presentations and notes. Advanced students could be provided with additional research opportunities to further knowledge.

Modifications for the exams could include limiting multiple choice answers to three instead of four, offer questions read aloud/rewording if necessary, and two class periods to complete instead of one if needed. In addition italicizing important parts of multiple choice questions and/or the statement for the true & false section. Also adding a word bank for completion of the fill in the blank statements may be beneficial to some students.

STANDARDS for Learning Targets

NJSLS Science	Literacy	Cross curricular	CTE(NJSLS 9) Technology(NJSLS)
HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of	RST.11-12.3 - Follow precisely a complex multistep procedure when carrying out experiments,	MP.4 Model with mathematics.	9.3.ST-ET.3 Apply processes and concepts for the use of

interacting systems that provide specific functions within multicellular organisms.	taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.	HSF-IF.C.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.	technological tools in STEM 9.3.ST-SM.2 Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.
9-12.HS-LS1-3 - Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.	RST.11-12.8 - Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.	HSF-BF.A.1 Write a function that describes a relationship between two quantities.	9.3.ST-SM.3: Analyze the impact that science and mathematics has on society.
HS-LS1-4 - Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organ	RST.11-12.9 - Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.	VA.K-2.1.5.2.Pr5 - Developing and refining techniques and models or steps needed to create products.	
	WHST.9-12.2 - Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.		
	WHST.9-12.9 - Draw evidence from informational texts to support analysis, reflection, and research.		
	SL.11-12.5 - Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.		

Sample Measurable Objectives for Lesson Planning

- 1. Differentiate between Anatomy and Physiology**
- 2. Differentiate between various body positions**
- 3. Analyze various forms of homeostasis of the body**

Unit 2 Summary: Histology

This unit investigates the properties of the different tissue types within the body. In this unit students will focus on the location, structure, and function of each tissue type. Students will examine the specific characteristics that classify each of the tissues and the implications of these characteristics for the overall organization of the organism. Students will develop connections between the cells that make up each tissue type and the organs that are composed of the various tissues. Students will discuss diseases associated with the different tissue types. Students will examine the relationship between disease, structure, and function. Knowledge of this information is important in studying possible treatments and preventions for such diseases. This information is necessary for the health and medical fields which some of these students may go into in the future. The concept of structure and function which was introduced in the previous unit will be reinforced in the histology unit and prepare the students for the study of the integumentary system. Since systems are composed of organs of various tissue types, an understanding of basic tissues is fundamental in the development of upcoming units.

Essential Questions:

These questions establish inquiry to unify the unit's assignments and assessments.

- Why is it important to study histology?
- What are the 4 major types of tissue?
- How can we classify tissues?
- What do the 4 major types of tissues look like?
- How is structure and functions related?
- What are the characteristics of epithelial tissue?
- What are different types of connective tissue?
- What are the three types of muscular tissue?
- What is a neuron and why is it important?
- What are some disorders associated with histology?
- How do tissues repair themselves?

Vocabulary/Key Terms

Tier 2: Histology

Tier 3: .Squamous, Cuboidal, Columnar, Stratified, Transitional, Epithelium Tissue, Pseudostratified Epithelium Tissue, Glandular Epithelium, Endocrine, Exocrine. Simple Gland, Compound Gland, Merocrine, Apocrine, Holocrine, Areolar, Adipose, Dense Connective Tissues, Bone, Cartilage, Fibroblast, Macrophage, Mast Cell, Regular Dense Connective Tissue, Irregular Dense Connective Tissue, Elastic Connective Tissue, Cartilage, Hyaline Cartilage, Elastic Cartilage, Fibrocartilage, Bone, Skeletal Muscle Tissue, Smooth Muscle Tissue ,Cardiac Muscle Tissue, Nerve tissue

Evidence of Learning:

Major Assessments: Summative/Performance Assessments (Tests/Projects = 40%)

Test Histology

Minor Assessments: Quizzes (20%)

Epithelial Tissue Quiz

Connective Tissue Quiz

Tissue Practical

Labs (30%)

Epithelial Tissue Lab

Connective Tissue Labs

Practice (Homework/Classwork =10 %)

Coloring book of various tissues, tissue review sheet, tissue case study

Formative Assessments:

Formative assessments will be in the form of warm ups, exit tickets, responder activities, objective checks and other teacher evaluations during class including concept reinforcement worksheets and reading comprehension checks, small group recitations,, EdPuzzles, *ZOINK Review Game*

Resources

Textbook - Hole's Essentials of Human Anatomy & Physiology - 11th edition

Anatomy Coloring Book 4th edition

Anatomy and Physiology, 17th Edition

Various online resources such as:

- *Kahoot*
- *Quizlet*
- *Gimkit*
- *Google Suites*
- *EdPuzzle*
- *YouTube Videos*

Science Recommended Accommodations & Modifications for Curriculum Implementation

- **Italicizing important parts of the statement for the true & false section,**
- **breaking matching sections into smaller parts with more specific word banks.**

The teacher will also accommodate any specific needs based on 504 and IEP plans such as preferential seating and providing copies of power-point presentations and notes. Advanced students could be provided with additional research opportunities to further knowledge.

Modifications for the exams could include limiting multiple choice answers to three instead of four, offer questions read aloud/rewording if necessary, and two class periods to complete instead of one if needed. In addition italicizing important parts of multiple choice questions and/or the statement for the true & false section. Also adding a word bank for completion of the fill in the blank statements may be beneficial to some students.

STANDARDS for Learning Targets

NJSLS Science	Literacy	Cross curricular	CTE(NJSLS 9) Technology(NJSLS)
<p>HS-LS1-1.LS1.A.1 Systems of specialized cells within organisms help them perform the essential functions of life.</p> <p>HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.</p> <p>HS-LS1-3 - Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.</p> <p>.HS-LS1-4 - Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organ</p>	<p>RST.11-12.3 - Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p> <p>RST.11-12.8 - Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.</p> <p>RST.11-12.9 - Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p> <p>WHST.9-12.2 - Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p> <p>WHST.9-12.9 - Draw evidence from informational texts to support analysis, reflection, and research.</p> <p>SL.11-12.5 - Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.</p>	<p>MP.4 Model with mathematics.</p> <p>VA.K-2.1.5.2.Pr5 - Developing and refining techniques and models or steps needed to create products.</p>	<p>9.3.ST-ET.3 Apply processes and concepts for the use of technological tools in STEM</p> <p>9.3.ST-SM.2 Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.</p> <p>9.3.ST-SM.3: Analyze the impact that science and mathematics has on society.</p>

Sample Measurable Objectives for Lesson Planning

1. Differentiate between various types of epithelial tissues
2. Differentiate between various types of connective tissues

Unit 3 Summary: Integumentary System

This unit investigates the properties of the different tissues types within the body. In this unit students will focus on the location, structure, and function of each tissue type. Students will examine the specific characteristics that classify each of the tissues and the implications of these characteristics for the overall organization of the organism. Students will develop connections between the cells that make up each tissue type and the organs that are composed of the various tissues. Students will discuss diseases associated with the different tissue types. Students will examine the relationship between disease, structure, and function. Knowledge of this information is important in studying possible treatments and preventions for such diseases. This information is necessary for the health and medical fields which some of these students may go into in the future.

The concept of structure and function which was introduced in the previous unit will be reinforced in the histology unit and prepare the students for the study of the integumentary system. Studying the integumentary system with histology allows students to apply what they learned about cell and tissue connection to a larger unit Grade Level(s): 11 th & 12th of the body. Since systems are composed of organs of various tissue types, an understanding of basic tissues is fundamental in the development of upcoming units

Essential Questions:

These questions establish inquiry to unify the unit's assignments and assessments.

- **List the basic structure of the integumentary system**
- **Differentiate the layers of the integumentary system based on location and function**
- **Identify the accessory structures present in the integumentary and their respective locations**

Vocabulary/Key Terms

Tier 2: Keratin, Epithelium, Connective Tissue, Collagen Fibers, Elastic Fibers, Adipose Tissue, Pigment, Nail

Tier 3: Organ, Integumentary System, Epidermis, Dermis, Subcutaneous Layer, Keratinization, Melanin, Hair Follicle, Sweat Glands, Eccrine Glands, Apocrine Glands, Basement Membrane, Hair Root, Hair Shaft

Evidence of Learning:

Major Assessments: Summative/Performance Assessments (Tests/Projects = 40%)

- TEST: Integumentary System

Minor Assessments: Quizzes (20%)

Labs (30%)

Practice (Homework/Classwork =10 %)

Formative Assessments: Formative assessments will be in the form of warm ups, exit tickets, responder activities, objective checks and other teacher evaluations during class including concept reinforcement worksheets and reading comprehension checks. ZOINK review game

Resources

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Various online resources such as:

- Kahoot

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- EdPuzzle

[Science Recommended Accommodations & Modifications for Curriculum Implementation](#)

The teacher will also accommodate any specific needs based on 504 and IEP plans such as preferential seating and providing copies of power-point presentations and notes. Advanced students could be provided with additional research opportunities to further knowledge.

- **Specific instructions and a guided timeline for completion of the activity**
- **A student copy of the grading rubric which the instructor can review with students**
- **Research materials to assist the students with the clinical application section**

STANDARDS for Learning Targets

NJSLS Science	Literacy	Cross curricular	CTE(NJSLS 9) Technology(NJSLS)
<p>HS-LS1-1 - Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.</p> <p>HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.</p> <p>HS-LS1-4 - Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organ</p>	<p>RST.11-12.3 - Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p> <p>RST.11-12.8 - Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.</p> <p>RST.11-12.9 - Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p> <p>WHST.9-12.2 - Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p> <p>WHST.9-12.9 - Draw evidence from informational texts to support analysis, reflection, and research.</p> <p>SL.11-12.5 - Make strategic use of digital media (e.g., textual, graphical, audio,</p>	<p>MP.4 Model with mathematics.</p> <p>HSF-IF.C.7 Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.</p> <p>HSF-BF.A.1 Write a function that describes a relationship between two quantities.</p> <p>VA.K-2.1.5.2.Pr5 - Developing and refining techniques and models or steps needed to create products.</p>	<p>9.3.ST-ET.3 Apply processes and concepts for the use of technological tools in STEM</p> <p>9.3.ST-SM.2 Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.</p> <p>9.3.ST-SM.3: Analyze the impact that science and mathematics has on society.</p>

visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

Sample Measurable Objectives for Lesson Planning

1. Describe the structure and functions of the skin
2. Describe the structure and function of the accessory organs of the skin

Unit 4 Summary: Skeletal System

In this unit, Skeletal System & Joints, students will become familiar with the formation and development of bone. Students will be able to explain the two types of bone development (Intramembranous and Endochondral) from fetus to adult and draw comparisons between compact and spongy (cancellous) bone. By familiarizing themselves with the microscopy of bone, students will be able to demonstrate great understanding of bone formation, development, repair and function.

From a gross anatomy perspective of the skeletal system, students will be able to identify axial and appendicular bones as well as their significant landmarks to develop their understanding of joint movements and articulations. This will lead into further investigations of pathology as it pertains to the skeletal system.

Prior to this unit, students learned the language of Anatomy and Physiology in order to describe and locate the anatomical features of the human body in the same manner as an allied health or medical professional. Students also gained experience in microscopy while studying human histology. The histology unit reviewed the cell types of functions of epithelial, connective, muscle, and nervous tissue. In particular, the section on connective tissue will be the most helpful when studying the skeletal system for bone falls into this category.

Succeeding this unit, the curriculum brings the students to the Muscular system. A transition from joint articulation and movement will be seamless as the students will draw a connection between the interdependence of the skeletal system and the muscular system, in particularly the skeletal muscles.

Supplement understanding with collaborative discussions with schools athletic trainer.

Essential Questions:

These questions establish inquiry to unify the unit's assignments and assessments.

- **List and describe the bones of the axial and Appendicular skeleton.**
- **List and describe the various types of joints.**
- **Describe the major types of joint movement.**
- **Describe the effects of the Endocrine system on homeostatic functions and bone growth**

Vocabulary/Key Terms

Tier 2: Extracellular Bone Matrix, Collagen, Bone Tissue, Cartilage, Connective Tissue, Process, Nerves

Tier 3: Epiphysis, Articular Cartilage, Diaphysis, Periosteum, Compact Bone, Spongy Bone, Trabeculae, Medullary Cavity, Endosteum, Marrow, Osteocytes, Lacunae, Haversian Canals, Canaliculi, Volkmann's Canal, Osteoblasts, Ossification, Epiphyseal Plate, Osteoclasts, Endochondral Bones, Vertebral Canal, Thoracic Cage, Cranium

Evidence of Learning:

Major Assessments: Summative/Performance Assessments (Tests/Projects = 40%)

- TEST #1: Skeletal Structure
- TEST #2: Joints
- PRACTICAL TEST: Naming Skeletal Bones
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Minor Assessments: Quizzes (20%)

Labs (30%)

- Long Bone Dissection
- Foam Bone Dissection
- Knee Joint Dissection
- Joint Poster
- Skeleton Puzzle

Practice (Homework/Classwork =10 %)

Formative Assessments: Formative assessments will be in the form of warm ups, exit tickets, responder activities, objective checks and other teacher evaluations during class including concept reinforcement worksheets and reading comprehension checks. EdPuzzle, ZOINK review game

Resources

Textbook - Hole's Essentials of Human Anatomy & Physiology - 11th edition

Various online resources such as:

Anatomy Coloring Book 4th edition

Anatomy and Physiology, 17th Edition

- Kahoot
- Quizlet
- Gimkit
- Google Suites
- EdPuzzle

Science Recommended Accommodations & Modifications for Curriculum Implementation

The teacher will also accommodate any specific needs based on 504 and IEP plans such as preferential seating and providing copies of power-point presentations and notes. Advanced students could be provided with additional research opportunities to further knowledge.

- **Specific instructions and a guided timeline for completion of the activity**
- **A student copy of the grading rubric which the instructor can review with students**
- **Research materials to assist the students with the clinical application section**

STANDARDS for Learning Targets

NJSLS Science	Literacy	Cross curricular	CTE(NJSLS 9) Technology(NJSLS)
HS-LS1-1 - Construct an explanation based on evidence for how the structure of DNA determines the structure of	RST.11-12.3 - Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical	VA.K-2.1.5.2.Pr5 - Developing and refining techniques and models or	9.3.ST-ET.3 Apply processes and concepts for the use of

<p>proteins which carry out the essential functions of life through systems of specialized cells.</p> <p>HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.</p> <p>HS-LS1-4 - Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organ</p> <p>HS-LS3-1 - 1. - Ask questions to clarify relationships about the role of DNA and chromosomes in coding the instructions for characteristic traits passed from parents to offspring.</p> <p>HS-LS3-2 - 2. - Make and defend a claim based on evidence that inheritable genetic variations may result from (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.</p>	<p>tasks; analyze the specific results based on explanations in the text.</p> <p>RST.11-12.8 - Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.</p> <p>RST.11-12.9 - Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p> <p>SL.11-12.5 - Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.</p> <p>RST.11-12.1 - Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account</p> <p>WHST.9-12.1.a-e: Write arguments focused on discipline-specific content.</p>	<p>steps needed to create products.</p>	<p>technological tools in STEM</p> <p>9.3.ST-SM.2 Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.</p> <p>9.3.ST-SM.3: Analyze the impact that science and mathematics has on society.</p>
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Sample Measurable Objectives for Lesson Planning

1. Discuss the functions of the skeletal system
2. Classify bones on the basis of shape and location
3. Describe the histological features of bone tissue
4. Explain the steps involved in bone formation
5. Describe the factors involved in bone growth and maintenance
6. Identify the bones of the human skeleton
7. Explain how structure and function work together in the skeletal system
8. Describe how the structure of an articulation determines function
9. Describe the structure and function of all types of joints

Unit 5 Summary: Muscular System

In this unit, Muscular System, students will become familiar with the histology of the various types of muscles, be able to explain the significance of those differences, identify the functions of muscles and be able to locate the origins and insertions of specific muscles.

Prior to this unit, students learned about the structural frame-work of the skeletal system which serves as sites of attachment for skeletal muscles and aids in gross body movement. Students will have the opportunity to expand their knowledge of the previous units: language of Anatomy and Physiology, Histology, and the Skeletal System, because they will be required to use this information to communicate observations, locate structures, and describe the physiology of the muscular system.

Succeeding this unit, the curriculum brings the students to the Nervous system where students will study how the nervous system will coordinate the body's activities. In this unit they will study how the nervous system generated muscular movement through neuromuscular junctions, and this will serve as a springboard into physiological workings of the nervous system.

Supplement understanding with collaborative discussions with schools athletic trainer.

Essential Questions:

These questions establish inquiry to unify the unit's assignments and assessments.

- Describe the microscopic structure of a muscle and produce diagrams that illustrate the arrangement of myofilaments, myofibrils and sarcomeres.
- Distinguish among skeletal, smooth and cardiac muscle.
- Define and give an example of: origin, insertion, synergist, antagonist, and prime mover.
- Identify select muscles of the human body.
- Describe the effects of the Endocrine system on homeostatic function

Vocabulary/Key Terms

Tier 2: Skeletal Muscle, Smooth Muscle, Cardiac Muscle, Striations, Filaments, Sarcolemma, Sarcoplasm, Connective Tissue, Sarcoplasmic Reticulum, ATP, ADP

Tier 3: Fascia, Myofibrils, Myosin, Actin, Epimysium, Perimysium, Sarcomere, Transverse Tubules, Neuromuscular Junction, Motor Neurons, Synapse, Neurotransmitters, Motor End Plate, Troponin, Tropomyosin, Sliding Filament Theory, Acetylcholine, Creatine Phosphate, Origin, Insertion, Action

Evidence of Learning:

Major Assessments: Summative/Performance Assessments (Tests/Projects = 40%)

- TEST: Muscle Structure and Function
- PRACTICAL TEST: Naming Muscles

Minor Assessments: Quizzes (20%)

Labs (30%)

- POGIL Lab "Muscle Contraction Lab"

Practice (Homework/Classwork =10 %)

Formative Assessments: Formative assessments will be in the form of warm ups, exit tickets, responder activities, objective checks and other teacher evaluations during class including concept reinforcement worksheets and reading comprehension checks. , ZOINK review game

Resources

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Anatomy and Physiology, 17th Edition

Various online resources such as:

- Kahoot
- Quizlet
- Gimkit
- Google Suites
- EdPuzzle

[Poke-a-Muscle](#)

Science Recommended Accommodations & Modifications for Curriculum Implementation

The teacher will also accommodate any specific needs based on 504 and IEP plans such as preferential seating and providing copies of power-point presentations and notes. Advanced students could be provided with additional research opportunities to further knowledge.

The special education teacher will include examples of ways to accommodate the special needs of students and to modify assessments to provide means of accurately assessing these students

Modifications that could be made for the laboratory practical:

- Reducing the number of origins/insertions/ or muscles needed to remember at one time by breaking up the material into smaller chunks.
- Students unable to perform certain tasks because of a physical disability may record observation as of other student response to activities.

STANDARDS for Learning Targets

NJSLS Science	Literacy	Cross curricular	CTE(NJSLS 9) Technology(NJSLS)
<p>HS-LS1-1 - Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.</p>	<p>RST.11-12.1 - Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account</p>	<p>VA.K-2.1.5.2.Pr5 - Developing and refining techniques and models or steps needed to create products.</p>	<p>9.3.ST-ET.3 Apply processes and concepts for the use of technological tools in STEM</p>
<p>HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.</p>	<p>RST.11-12.3 - Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p>		<p>9.3.ST-SM.2 Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.</p>
<p>HS-LS1-3 - Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.</p>	<p>RST.11-12.8 - Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.</p>		<p>9.3.ST-SM.3: Analyze the impact that science and mathematics has on society.</p>
<p>HS-LS1-4 - Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organ</p>	<p>RST.11-12.9 - Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p>		
<p>HS-LS1-6 - Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.</p>	<p>WHST.9-12.2 - Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p>		
<p>HS-LS1-7 - Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed, resulting in a net transfer of energy.</p>	<p>WHST.9-12.5 - Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.</p>		
	<p>WHST.9-12.7 - Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (</p>		
	<p>WHST.9-12.8 - Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms</p>		

of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation

WHST.9-12.9 - Draw evidence from informational texts to support analysis, reflection, and research.

SL.11-12.5 - SL.11-12.5 - Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

Sample Measurable Objectives for Lesson Planning

1. Describe the structure and function of each of the three types of muscle
2. Explain the factors involved in the contraction and relaxation of skeletal muscle
3. Discuss the metabolism of skeletal muscle tissue
4. Define muscle tone
5. List and describe several ways that skeletal muscles are named
6. Identify selected skeletal muscles and identify their origins, insertions, and actions

Unit 6 Summary: Nervous System

This unit will introduce the student(s) to the nervous system. At the conclusion of this unit, the student(s) will be able to list the divisions of the nervous system as well as describe the structures and functions of neurons. Students will also be able to explain the resting potential and how an action potential is generated. Students will use prior knowledge from previous units, such as the muscle unit to show how the nervous system is used to contract muscles and how this system provides the reflexes for the skeletal muscles. Students will also describe the formation of the brain and the 3 meningeal layers surrounding the brain and the spinal cord. Students will be able to explain the dangers of meningitis. Students will also be able to differentiate between the sympathetic and parasympathetic nervous systems as well as the autonomic and somatic nervous system and see the correlation between them. This unit will also be used as an introductory and preview for the human senses.

Essential Questions:

These questions establish inquiry to unify the unit's assignments and assessments.

- **List the divisions of the nervous system and distinguish them by describing the characteristics of each.**
- **Explain what a resting potential is and trace how an action potential is generated and propagated**
- **List the parts of the brain and distinguish among them by describing their major functions.**
- **Describe the effects of the Endocrine system on Neurological function**

Vocabulary/Key Terms

Tier 2: Cytoplasm, Presynaptic Neuron, Postsynaptic Neuron, Synaptic Transmission, Ions, Polarization, Concentration, Diffusion

Tier 3: Neuron, Nerve Impulse, Cell Body, Soma, Dendrites, Axon, Neuroglia, Central Nervous System, Peripheral Nervous System, Sensory Receptors, Somatic Nervous System, Autonomic Nervous System, Myelin, Schwann Cells, Sensory Neurons, Interneurons, Motor Neurons, Synapse, Neurotransmitters, Resting Potential, Threshold Potential, Action Potential, Excitatory, Inhibitory, Afferent, Efferent

Evidence of Learning:

Major Assessments: Summative/Performance Assessments (Tests/Projects = 40%)

- TEST: Structure and Function of Nervous System

Minor Assessments: Quizzes (20%)

Labs (30%)

- Sense of Smell Lab
- Nerve Endings Toothpick
- Brain Dissection

Practice (Homework/Classwork =10 %)

Formative Assessments: Formative assessments will be in the form of warm ups, exit tickets, responder activities, objective checks and other teacher evaluations during class including concept reinforcement worksheets and reading comprehension checks. ZOINK review game

Resources

Textbook - Hole's Essentials of Human Anatomy & Physiology - 11th edition

Anatomy Coloring Book 4th edition
 Anatomy and Physiology, 17th Edition
 Various online resources such as:

- Kahoot
- Quizlet
- Gimkit
- Google Suites

Science Recommended Accommodations & Modifications for Curriculum Implementation

The teacher will also accommodate any specific needs based on 504 and IEP plans such as preferential seating and providing copies of power-point presentations and notes. Advanced students could be provided with additional research opportunities to further knowledge.

Modifications for the Senses test could include limit multiple choice answers to three instead of four, offer questions read aloud/rewording if necessary, and two class periods to complete instead of one if needed. In\ addition italicizing important parts of multiple choice questions and/or the statement for the true & false section. Also adding a word bank for completion of the fill in the blank statements may be beneficial to some students

STANDARDS for Learning Targets

NJSLs Science	Literacy	Cross curricular	CTE(NJSLs 9) Technology(NJSLs)
HS-LS1-1 - Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.	RST.11-12.1 - Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account	VA.K-2.1.5.2.Pr5 - Developing and refining techniques and models or steps needed to create products.	9.3.ST-ET.3 Apply processes and concepts for the use of technological tools in STEM
HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	RST.11-12.3 - Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.		9.3.ST-SM.2 Apply science and mathematics concepts to the development of plans, processes and projects that address real world problems.
HS-LS1-3 - Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.	RST.11-12.8 - Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.		9.3.ST-SM.3: Analyze the impact that science and mathematics has on society.
HS-LS3-2 - Make and defend a claim based on evidence that inheritable genetic variations may result from (1) new genetic combinations through	RST.11-12.9 - Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a		

meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.

process, phenomenon, or concept, resolving conflicting information when possible.

WHST.9-12.2 - Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.

WHST.9-12.5 - Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.

WHST.9-12.7 - Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (

WHST.9-12.8 - Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation

WHST.9-12.9 - Draw evidence from informational texts to support analysis, reflection, and research.

SL.11-12.5 - SL.11-12.5 - Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

Sample Measurable Objectives for Lesson Planning

1. Describe the organization of the nervous system
2. Compare the structure and functions of neuroglia and neurons
3. Describe how a nerve impulse is generated and conducted
4. Describe how a nerve impulse is generated and conducted

5. Describe how a chemical synapse functions
6. Describe the structure of a nerve
7. Describe the protection and coverings of the brain and spinal cord
8. Describe the structure and functions of the spinal cord
9. Name the major parts of the brain and explain the function of each part
10. Identify the 12 pairs of cranial nerves by name, number, type, location, and function
11. Outline the main structural and functional differences between the somatic and autonomic nervous systems
12. Identify the structural features of the autonomic nervous system
13. Discuss the functions of the sympathetic and parasympathetic divisions of the autonomic nervous system
14. Define a sensation and describe the conditions necessary for a sensation to occur
15. List and describe the somatic sensations
16. Define proprioceptors and describe the structure of proprioceptive receptors
17. Describe the receptors and mechanism for olfaction, gustation, vision, hearing, and equilibrium

Unit 7 Summary: Cat Dissection

This unit will cover basic structures and functions of the muscular, digestive, respiratory, cardiovascular, and the nervous system of the cat. It will highlight the separation and identification of differences between superficial muscles of the cat. Students will be introduced to structures of the digestive tract and respiratory system and their functions. Major blood vessels and the chambers of the heart will also be studied and this information will allow students to compare these structures with the cardiovascular system of the human that will be covered in later units. Dissection of major nerves and an optional dissection of the brain will support examination of how these structures may be similar in humans and other mammals. Students will use anatomical terminology from the first chapter as they perform their dissections. This unit will help students understand how structure is related to function. According to NJ state statute, P.L. 2005, CHAPTER 266, students may choose not to participate in certain dissection activities but will remain responsible for all concepts and assessment related to the study of the organism through use of dissection alternatives such as CatScan, virtual imagery, and models.

Students will also do a research project independently on an organ system that they select. The organ system project will include the organs that make up the system and their functions, disease and ways to treat the disease of the system, how the system relates to other organ systems of the body.

Essential Questions:

These questions establish inquiry to unify the unit's assignments and assessments.

1. Why is the cat used to study human anatomy?
2. What are the major superficial muscles of the cat?
3. What are the structures and functions of the digestive tract of the cat?
4. What is the pathway for digestion, both chemical and mechanical ?
5. What are the stages of mechanical digestion and where do they occur along the GI tract?
6. What are the stages of nutrient absorption during digestion?
7. What are the structures and functions of the lymphatic system of the cat?
8. What are the roles of each major lymphatic structure in immunity?
9. What are the structures and functions of the respiratory system of the cat?
10. What are the stages of gas exchange in the lungs?
11. What is the role of the diaphragm in respiration?
12. What are the structures and functions of the cardiovascular system of the cat?
13. What are the structures and functions of the urinary system of the cat?
14. What are the major structures of the nervous system of the cat?
15. How does structure relate to function in living things?
16. Why can animals such as cats be used as test subjects for medicines or surgical procedures that will be used on people?
17. Why are dissections important?

Vocabulary/Key Terms

Tier 2: Scalpel, Forceps, Probe

Tier 3: Latissimus Dorsi, External Oblique, Clavobrachialis, Pectoantibrachialis, Epitrochlearis, Pectoralis Major, Pectoralis Minor, Xiphohumeralis, Palmaris Longus, Flexor Carpi Radialis, Flexor Carpi Ulnaris, Sartorius, Gracilis Gastrocnemius, Clavotrapezius, Acromiodeltoid, Spinodeltoid, Triceps Brachii Lateral head, Triceps Brachii Long Head, Acromiotrapezius, Latissimus Dorsi, Spinotrapezius, Clavobrachialis, Gluteus Medius, Gluteus Maximus, Sartorius,

Caudofemoralis, Biceps Femoris, Semitendinosus, Oral Cavity, Vestibule, Tongue, Hard Palate, Soft Palate. Epiglottis, Trachea, Esophagus, Abdominal Cavity, Diaphragm, Liver, Gallbladder, Stomach, Small Intestine, Large intestine, Pancreas, Spleen Kidney, Urinary Bladder, Pericardium, Anterior and Posterior Vena Cava, Atria, Ventricles, Carotid Artery, Jugular Veins, Renal Vein and Artery, Femoral Vein and Artery, Greater Saphenous Vein, Peritoneum, Omentum Tissue, Mesentery Tissue

Evidence of Learning:

Major Assessments: Summative/Performance Assessments (Tests/Projects = 40%)

Final Cat Practical
Organ system Project

Minor Assessments: Quizzes (20%)

Cat practicals based on specific structure of the cat

Organ System project- individual assignments to chunk for the overall project. Students complete research for each topic below with due dates to help break up the large task into smaller chunks. At the end, students will create a slideshow presentation that explains everything about their system. Optional presentations.

- Organ System Purpose
- Organs that Make up the system
- Functions of the organ system
- Diagrams of the organ system
- Organ system relationships to other systems
- Diseases and/or medical problems associated with organ system

Labs (30%)

Introduction to the cat worksheet
Cat data sheet based on dissection

Practice (Homework/Classwork =10 %)

Weekly dissection techniques

Formative Assessments:

Formative assessments will be in the form of teacher assisting with the dissection groups to make sure that the groups are performing the dissections techniques properly and that the groups clean up their tools and put away the materials properly.

Resources

Photo Manual & Dissection Guide of the Cat by Bohensky

- EdPuzzle

[Science Recommended Accommodations & Modifications for Curriculum Implementation](#)

Modifications that could be made for the Cat Dissection include more specific guidelines for completion of the

activity. In addition, smaller lab group sizes may also be used. Accommodations could include extra time to complete lab. Modifications that could be made to the quizzes would be reducing the number of structures to identify or give a word bank. Accommodations could be allow extra time and retake failures

STANDARDS for Learning Targets

NJSLS Science	Literacy	Cross curricular	CTE(NJSLS 9) Technology(NJSLS)
<p>HS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.</p>	<p>RST.11-12.1 - Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and to any gaps or inconsistencies in the account</p>		<p>9.3.ST-ET.3 Apply processes and concepts for the use of technological tools in STEM</p>
<p>.HS-LS1-3 - Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.</p>	<p>RST.11-12.3 - Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</p>		
<p>HS-LS1-4 - Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organ</p>	<p>RST.11-12.9 - Synthesize information from a range of sources (e.g., texts, experiments, simulations) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.</p> <p>WHST.9-12.2 - Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p> <p>WHST.9-12.5 - Develop and strengthen writing as needed by planning, revising, editing, rewriting, or trying a new approach, focusing on addressing what is most significant for a specific purpose and audience.</p>		

WHST.9-12.7 - Conduct short as well as more sustained research projects to answer a question (including a self-generated question) or solve a problem; narrow or broaden the inquiry when appropriate; synthesize multiple sources on the subject, demonstrating understanding of the subject under investigation. (

WHST.9-12.8 - Gather relevant information from multiple authoritative print and digital sources, using advanced searches effectively; assess the strengths and limitations of each source in terms of the specific task, purpose, and audience; integrate information into the text selectively to maintain the flow of ideas, avoiding plagiarism and overreliance on any one source and following a standard format for citation

WHST.9-12.9 - Draw evidence from informational texts to support analysis, reflection, and research.

SL.11-12.5 - SL.11-12.5 - Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.

Sample Measurable Objectives for Lesson Planning

1. Compare features between the male and female cat
2. Differentiate between various skeletal muscles
3. Differentiate between various internal organs for identification
4. Differentiate between a vein and an artery.