

**FREEHOLD REGIONAL HIGH SCHOOL DISTRICT**

**OFFICE OF CURRICULUM AND INSTRUCTION**

**MEDICAL SCIENCES**

**HONORS HUMAN ANATOMY/PHYSIOLOGY  
WITH SENIOR EXTERNSHIP**

Grade Level: 12

Credits: 5

**BOARD OF EDUCATION ADOPTION DATE:**

**AUGUST 22, 2011**

[SUPPORTING RESOURCES AVAILABLE IN DISTRICT RESOURCE SHARING](#)

APPENDIX A: ACCOMMODATIONS AND MODIFICATIONS

APPENDIX B: ASSESSMENT EVIDENCE

APPENDIX C: INTERDISCIPLINARY CONNECTIONS

# **FREEHOLD REGIONAL HIGH SCHOOL DISTRICT**

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# Introduction- Honors Human Anatomy & Physiology with Senior Externship

## Introduction

## Course Philosophy

The Human Anatomy and Physiology curriculum will engage students in the learning and understanding the structures and functions of the human body. The understanding how the body is able to maintain a constant internal environment and the components of the internal environment will be studied investigated and analyzed. Students will participate in authentic clinical and laboratory experiences through the senior externship at CentraState Medical Center. The CentraState Medical Center experience promotes and exposes the students to the multiple roles of the medical community.

## Course Description

Anatomy and Physiology students study the structure and function of the human body. The focus of Human Anatomy & Physiology is to develop an understanding of cells and organs and their relationship to the whole organism. The human body systems, including skeletal, muscular, circulatory, respiratory, nervous, digestive, integumentary, excretory, and endocrine are studied. A variety of instructional modalities will be available, which include laboratory activities such as the dissection of preserved specimens, virtual labs, the study of anatomical models, and microscopy. The CentraState Medical Center Externship includes multiple lecture series and clinical rotations providing the evaluation of current research, technology, and issues related to a variety of health fields.

## Course Map and Proficiencies/Pacing

### Course Map

Relevant Standards	Enduring Understandings	Essential Questions	Assessments		
			Diagnostic	Formative	Summative
5.1.12.A.a 5.1.12.A.3 5.1.12.B.1 5.1.12.B.3 5.1.12.B.4 5.1.12.C.c 5.1.12.C.3 5.1.12.D.a 5.1.12.D.1 5.1.12.D.2 5.1.12.D.c 5.1.12.D.3 5.3.12.A.b 5.3.12.A.c 5.3.12.A.3 5.3.12.A.f 5.3.12.A.6 8.1.12.A.1 8.1.12.A.5 8.1.12.A.6	Structure relates to function.	How understanding the structure of cell, tissue, and organs are a prerequisite to the comprehension of function?  How function highlights events at the cellular or molecular level?  How cell tissue and organs function in conjunction in determining if the body is functioning within normal limits?	Pre-test	Quizzes/tests on concepts and relevant terminology  Student generated graphic organizers  Written and oral responses to academic prompts  Lab reports and /or analysis  Student self peer assessment  CentraState externship reflective journal	Unit test  Laboratory practical  Unit project
5.1.12.A.a 5.1.12.A.3 5.1.12.B.1 5.1.12.B.3 5.1.12.B.4 5.1.12.C.c 5.1.12.C.3 5.1.12.D.a 5.1.12.D.1 5.1.12.D.2 5.1.12.D.c 5.1.12.D.3 5.3.12.A.b 5.3.12.A.c 5.3.12.A.3 5.3.12.A.f 5.3.12.A.6 8.1.12.A.1 8.1.12.A.5 8.1.12.A.6	Human organ systems interrelate with other organ systems.	How the regulatory mechanisms of one organ system lead to the required interaction of several organ systems?  How each organ system contributes to maintaining homeostasis in the complete organism?	Pre-test	Quizzes/tests on concepts and relevant terminology  Student generated graphic organizers  Written and oral responses to academic prompts  Lab reports and /or analysis  Student self peer assessment  CentraState externship reflective journal	Unit test  Laboratory practical  Unit project

<p>5.1.12.A.a 5.1.12.A.3 5.1.12.B.1 5.1.12.B.3 5.1.12.B.4 5.1.12.C.c 5.1.12.C.3 5.1.12.D.a 5.1.12.D.1 5.1.12.D.2 5.1.12.D.c 5.1.12.D.3 5.3.12.A.b 5.3.12.A.c 5.3.12.A.3 5.3.12.A.f 5.3.12.A.6 8.1.12.A.1 8.1.12.A.5 8.1.12.A.6</p>	<p>Homeostasis maintains normal operation of the human organism.</p>	<p>How is communication within the body essential for maintaining homeostasis?</p> <p>How might the body's inability to maintain homeostasis cause disease?</p> <p>How might age affect how the organs and organ systems maintain homeostasis?</p> <p>How might the medical community treat and maintain individual organs/systems in order to maintain homeostasis when the body can no longer maintain internal balance.</p>	<p>Pre-test</p>	<p>Quizzes/tests on concepts and relevant terminology</p> <p>Student generated graphic organizers</p> <p>Written and oral responses to academic prompts</p> <p>Lab reports and /or analysis</p> <p>Student self peer assessment</p> <p>CentraState externship reflective journal</p>	<p>Unit test</p> <p>Laboratory practical</p> <p>Unit project</p>
<p>5.1.12.A.a 5.1.12.A.3 5.1.12.B.1 5.1.12.B.3 5.1.12.B.4 5.1.12.C.c 5.1.12.C.3 5.1.12.D.a 5.1.12.D.1 5.1.12.D.2 5.1.12.D.c 5.1.12.D.3 5.3.12.A.b 5.3.12.A.c 5.3.12.A.3 5.3.12.A.f 5.3.12.A.6 8.1.12.A.1 8.1.12.A.5 8.1.12.A.6</p>	<p>Age has a variety of effects on the structure and function of the human organism</p>	<p>How can age affect overall anatomical structures?</p> <p>How can age affect body function?</p>	<p>Pre-test</p>	<p>Quizzes/tests on concepts and relevant terminology</p> <p>Student generated graphic organizers</p> <p>Written and oral responses to academic prompts</p> <p>Lab reports and /or analysis</p> <p>Student self peer assessment</p> <p>CentraState externship reflective journal</p>	<p>Unit test</p> <p>Laboratory practical</p> <p>Unit project</p>

<p>5.1.12.A.a 5.1.12.A.3 5.1.12.B.1 5.1.12.B.3 5.1.12.B.4 5.1.12.C.c 5.1.12.C.3 5.1.12.D.a 5.1.12.D.1 5.1.12.D.2 5.1.12.D.c 5.1.12.D.3 5.3.12.A.b 5.3.12.A.c 5.3.12.A.3 5.3.12.A.f 5.3.12.A.6 8.1.12.A.1 8.1.12.A.5 8.1.12.A.6</p>	<p>Collaboration and understanding of the interdisciplinary nature of science will allow for more informed decisions and assessing the risk and benefits of alternative solutions</p>	<p>How does the collaboration of the medical community bring about emerging discoveries in detecting and treating disease?  How does the overall interaction of the medical community provide cost effective and quality health care for all of the members of the community?</p>	<p>Pre-test</p>	<p>Quizzes/tests on concepts and relevant terminology  Student generated graphic organizers  Written and oral responses to academic prompts  Lab reports and /or analysis  Student self peer assessment  CentraState externship reflective journal</p>	<p>Unit test  Laboratory Practical  Unit Project</p>
<p>5.1.12.A.a 5.1.12.A.3 5.1.12.B.1 5.1.12.B.3 5.1.12.B.4 5.1.12.C.c 5.1.12.C.3 5.1.12.D.a 5.1.12.D.1 5.1.12.D.2 5.1.12.D.c 5.1.12.D.3 5.3.12.A.b 5.3.12.A.c 5.3.12.A.3 5.3.12.A.f 5.3.12.A.6 8.1.12.A.1 8.1.12.A.5 8.1.12.A.6</p>	<p>The medical community is made of many interrelated parts that work together in providing effective and quality health care for all people.</p>	<p>How does the collaboration of the medical community bring about emerging discoveries in detecting and treating disease?  How does technology contribute to the understanding and well-being of each system as it relates to the complete organism?  How do lifestyle choices effect the proper functioning of human body systems?</p>	<p>Pre-test</p>	<p>Quizzes/tests on concepts and relevant terminology  Student generated graphic organizers  Written and oral responses to academic prompts  Lab reports and /or analysis  Student self peer assessment  CentraState externship reflective journal</p>	<p>Unit test  Laboratory practical  Unit project</p>

## Proficiencies and Pacing

Unit Title	Unit Understanding(s) and Goal(s)	Recommended Duration
Unit 1: Levels of Organization	<p>Structure relates to function.            Human organ systems interrelate with other organ systems.            Homeostasis maintains normal operation of the human organism.</p> <p>Age has a variety of effects on the structure and function of the human organism.            Collaboration and understanding of the interdisciplinary nature of science will allow for more informed decisions and assessing the risk and benefits of alternative solutions.</p> <p>The medical community is made of many interrelated parts that work together in providing effective and quality health care for all people.</p> <p>At the conclusion of this unit, students will be able to:</p> <ol style="list-style-type: none"> <li>1. Understand the organization of the human body.</li> <li>2. Explain the process of homeostasis.</li> <li>3. Identify the structure and function of body tissues.</li> </ol>	5 weeks
Unit 2: Covering and Support	<p>Structure relates to function.            Human organ systems interrelate with other organ systems.            Homeostasis maintains normal operation of the human organism.</p> <p>Age has a variety of effects on the structure and function of the human organism.            Collaboration and understanding of the interdisciplinary nature of science will allow for more informed decisions and assessing the risk and benefits of alternative solutions.</p> <p>The medical community is made of many interrelated parts that work together in providing effective and quality health care for all people.</p> <p>At the conclusion of this unit, students will be able to:</p> <ol style="list-style-type: none"> <li>1. Identify the parts of the integument system and explain their functions.</li> <li>2. Identify the histology of bone.</li> <li>3. Explain bone growth and development.</li> <li>4. Explain the dynamic nature in which bone responds to hormones exercise. Calcium balance and fracture repair.</li> <li>5. Identify axial and appendicular skeleton and their bone markings.</li> </ol>	5 weeks

Unit 3: Movement	<p>Structure relates to function. Human organ systems interrelate with other organ systems. Homeostasis maintains normal operation of the human organism.</p> <p>Age has a variety of effects on the structure and function of the human organism. Collaboration and understanding of the interdisciplinary nature of science will allow for more informed decisions and assessing the risk and benefits of alternative solutions.</p> <p>The medical community is made of many interrelated parts that work together in providing effective and quality health care for all people.</p> <p>At the conclusion of this unit, students will be able to:</p> <ol style="list-style-type: none"> <li>1. Identify the classification of joints and their functions.</li> <li>2. Identify the types of joint movements and their structural classification.</li> <li>3. Identify representative articulations, their structures and movements.</li> <li>4. Identify the microscopic anatomy of muscle and their functions.</li> <li>5. Identify the excitation and coupling of muscular tissue.</li> <li>6. Identify how muscular tension is produced.</li> <li>7. Explain how muscle uses energy.</li> <li>8. Identify various muscles with their origin, insertions and actions.</li> </ol>	6 weeks
Unit 4: Integration, Regulation and Control	<p>Structure relates to function. Human organ systems interrelate with other organ systems. Homeostasis maintains normal operation of the human organism.</p> <p>Age has a variety of effects on the structure and function of the human organism. Collaboration and understanding of the interdisciplinary nature of science will allow for more informed decisions and assessing the risk and benefits of alternative solutions.</p> <p>The medical community is made of many interrelated parts that work together in providing effective and quality health care for all people.</p> <p>At the conclusion of this unit, students will be able to:</p> <ol style="list-style-type: none"> <li>1. Identify the general organization of the nervous system with the differentiation between the CNS and PNS.</li> <li>2. Identify the structure and classification of neurons and their functions.</li> <li>3. Explain how changes in the transmembrane potential results in an action potential.</li> <li>4. Identify the properties of the synapse and how neurotransmitters conducts signal between neurons.</li> <li>5. Identify the major parts of the brain and their functions.</li> <li>6. Identify the higher order functions of the brain and how they work.</li> <li>7. Identify the divisions of the ANS (sympathetic and parasympathetic) and their interactions.</li> <li>8. Identify hormone structure, secretion and distribution.</li> <li>9. Identify the major endocrine glands and their functions.</li> <li>10. Identify and explain the process of aging and the loss of control of hormonal production.</li> </ol>	6 weeks

<p>Unit 5: Fluids and Transport</p>	<p>Structure relates to function.  Human organ systems interrelate with other organ systems.  Homeostasis maintains normal operation of the human organism.  Age has a variety of effects on the structure and function of the human organism.  Collaboration and understanding of the interdisciplinary nature of science will allow for more informed decisions and assessing the risk and benefits of alternative solutions.  The medical community is made of many interrelated parts that work together in providing effective and quality health care for all people.  At the conclusion of this unit, students will be able to:</p> <ol style="list-style-type: none"> <li>1. Identify the function of blood.</li> <li>2. Identify the composition of blood and their functions.</li> <li>3. Summarize the process of homeostasis and identify the phases.</li> <li>4. Identify organization of the cardiovascular system.</li> <li>5. Identify the structures and functions of the heart.</li> <li>6. Trace the conduction system of the heart.</li> <li>7. Summarize the cardiac cycle and relate how EKG, chamber volume and heart sounds are in relation to the cycle.</li> <li>8. Identify the factors that affect heart rate cardiac output and stroke volume.</li> <li>9. Identify the effects of aging on the heart.</li> </ol>	<p>6 weeks</p>
<p>Unit 6: Environmental Exchange</p>	<p>Structure relates to function.  Human organ systems interrelate with other organ systems.  Homeostasis maintains normal operation of the human organism.  Age has a variety of effects on the structure and function of the human organism.  Collaboration and understanding of the interdisciplinary nature of science will allow for more informed decisions and assessing the risk and benefits of alternative solutions.  The medical community is made of many interrelated parts that work together in providing effective and quality health care for all people.  At the conclusion of this unit, students will be able to:</p> <ol style="list-style-type: none"> <li>1. Identify the structure and function of the digestive system from the histological and the gross anatomy.</li> <li>2. Identify the movement of digestive materials and the neural and hormonal control over it.</li> <li>3. Identify the organs of the digestive system and their functions.</li> <li>4. Identify the processing and absorption of the micro and macronutrients.</li> <li>5. Explain the effects of aging on the digestive system.</li> <li>6. Identify the organs of the respiratory system and their functions.</li> <li>7. Explain the process of air movement in and out of the lungs.</li> <li>8. Explain the mechanics of breathing and respiratory rates and volumes.</li> <li>9. Explain how oxygen and carbon dioxide is exchanged and transported.</li> <li>10. Identify and explain local regulation of gas transport and alveolar function.</li> <li>11. Explain how the respiratory centers in the brain and reflexes work.</li> <li>12. Explain how age affects the respiratory system.</li> <li>13. Identify the functions of the kidneys that help maintain homeostasis.</li> <li>14. Identify the structures and functions of the kidneys.</li> <li>15. Explain the role of aldosterone and natriuretic peptide in water balance.</li> <li>16. Describe the mechanism of osmotic gradient.</li> <li>17. Describe the normal physical and chemical properties of urine and describe conditions from abnormal urine component.</li> <li>18. Describe and identify the general locations and functions of ureters, bladder urethra.</li> <li>19. List several changes in the urinary system that occurs with age.</li> </ol>	<p>6 weeks</p>

# Unit 01 - Honors Human Anatomy/Physiology with Senior Externship

## Organization of the Body

### Enduring Understandings:

1. Structure relates to function.
2. Organ systems interrelate with other organ systems.
3. Homeostasis maintains normal operation of the human organism.
4. Age has a variety of effects on the structure and function of the human organism.
5. Collaboration and understanding of the interdisciplinary nature of science will allow for more informed decisions and assessing the risk and benefits of alternative solutions.
6. The medical community is made of many interrelated parts that work together in providing effective and quality health care for all people.

### Essential Questions:

1. How does complementarity of structure and function unite the disciplines of anatomy and physiology?
2. Why is anatomical position important to the study of anatomy?
3. How do the body plans relate to sectioning terms and techniques?
4. How does the body maintain a constant internal environment?
5. How does the structure of various tissues relate to its function?
6. Explain how age affects the different types of tissue?

### Unit Goals:

1. Students will become familiar with the organization of the human body plan and terminology.
2. Students will become familiar with the process of homeostasis.
3. Summarize how cells, organs and systems interact to counteract the many environmental factors that can lead to the loss of the internal environment.
3. Students will become familiar with the structural and functional characteristics of tissue.

**Recommended Duration: 5 week**

Guiding/Topical Questions	Content/Themes/Skills	Resources and Materials	Suggested Strategies	Suggested Assessments
How does complementarity of structure and function unite the disciplines of anatomy and physiology?	Define anatomy and physiology. Explain the principle of complementarity. List the 11 organ systems, identify their components, and briefly explain the major functions	Text Lab manual Study guide	Teacher-guided multimedia presentations Student-generated research multimedia presentations	Quizzes/tests on concepts and relevant terminology Student generated research & graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student self-peer assessment
How does the body plans relate to the sectioning terms and techniques?	Describe anatomical position. Use the correct anatomical terms to describe body directions, regions, and body planes or sections Locate and name the major body cavities and their subdivisions, and list the major organs contained within them. Name the serous membranes and indicate their common functions Name the nine regions of the four quadrants of the abdominal pelvic cavity and list the organs they contain	Text Lab manual Study guide CDROM diagrams	Teacher-guided multimedia presentations Student-directed lab activity Graphic organizer Student Demonstrations labeling diagram	Quizzes/tests on concepts and relevant terminology Student generated graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student self-peer assessment
How does the body maintain a constant internal environment?	Define homeostasis and explain its significance Distinguish between negative feedback loop & positive feedback loop and describe how both maintain homeostasis Describe the relationship between homeostatic imbalance and disease	Text Lab manual Study guide CD-ROM Diagram	Teacher-guided multimedia presentations Student research & generated application of feedback loops Comparison of feedback loops	Quizzes/tests on concepts and relevant terminology Student generated feedback loops Written and oral responses to academic prompts Lab reports and /or analysis Student self-peer assessment
How does the structure of various tissues relate to its functions?	List structural and functional characteristics of epithelial tissue Name, classify, and describe the various types of epithelia; also indicate their chief function(s) and location(s) Differentiate between exocrine and endocrine gland and multicellular and	Text Multimedia presentations Lab manual Study guide Histological slides Microscope camera Virtual online labs	Teacher-guided multimedia presentations Student traditional and virtual lab activity histology graphical organization of histological samples CentraState lecture	Quizzes/tests on concepts and relevant terminology Student generated graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis

	<p>unicellular glands</p> <p>Indicate common characteristics of connective tissue</p> <p>List and describe connective tissue structural elements</p> <p>Describe the types of connective tissue found in the body, and indicate their characteristic functions</p> <p>Indicate the general characteristics of nervous tissue</p> <p>Compare and contrast the structures and body locations of the three types of muscle tissue</p> <p>Describe the structure and function of coetaneous, mucus and serous membrane</p>		<p>pathology CentraState Externship</p>	<p>Student self and peer assessment</p> <p>Histology Laboratory Practical</p> <p>CentraState externship reflective Journal pathology lab</p>
<p>How does injuries and aging affect the tissues of the body?</p>	<p>Indicate the embryonic origin of the fetal tissue class.</p> <p>Briefly describe the changes that occur with age</p>	<p>Multimedia presentations</p> <p>Text</p> <p>Study guide</p> <p>Online animation &amp; diagrams</p>	<p>Teacher multimedia presentations</p> <p>student compare contrast</p>	<p>Quizzes/tests on concepts and relevant terminology</p> <p>Student research &amp; generated graphic organizers</p> <p>tissue repair</p> <p>Written and oral responses to academic prompts</p>
<p>How does the body restore homeostasis after tissue injury?</p>	<p>Outline the process of tissue repair involved in normal healing of a superficial wound</p>	<p>Multimedia presentations</p> <p>Text</p> <p>Study guide</p> <p>Online animation</p>	<p>Teacher multimedia presentations</p> <p>Online animation</p> <p>Student application of homeostasis and tissue repair</p> <p>student generated feedback loop</p> <p>CentraState Lecture pathology</p>	<p>Quizzes/tests on concepts and relevant terminology</p> <p>Student research &amp; generated graphic organizers</p> <p>tissue repair</p> <p>Written and oral responses to academic prompts</p>

SCI.9-12.5.1.12.A.3  
 SCI.9-12.5.1.12.B.1  
 SCI.9-12.5.1.12.B.3  
 SCI.9-12.5.1.12.B.4

Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.  
 Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.  
 Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.  
 Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.

SCI.9-12.5.1.12.C.c	Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.
SCI.9-12.5.1.12.C.3	Consider alternative theories to interpret and evaluate evidence-based arguments.
SCI.9-12.5.1.12.D.a	Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.
SCI.9-12.5.1.12.D.1	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
SCI.9-12.5.1.12.D.2	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
SCI.9-12.5.1.12.D.c	Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.
SCI.9-12.5.1.12.D.3	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.
SCI.9-12.5.3.12.A.c	Cellular function is maintained through the regulation of cellular processes in response to internal and external environmental conditions.
SCI.9-12.5.3.12.A.3	Predict a cell's response in a given set of environmental conditions.
SCI.9-12.5.3.12.A.f	There is a relationship between the organization of cells into tissues and the organization of tissues into organs. The structures and functions of organs determine their relationships within body systems of an organism.
SCI.9-12.5.3.12.A.6	Describe how a disease is the result of a malfunctioning system, organ, and cell, and relate this to possible treatment interventions (e.g., diabetes, cystic fibrosis, lactose intolerance).

## Differentiation

Students in the Medical Sciences Learning Center Program are a homogeneous student group. Students will experience a variety of modalities to accommodate all learning styles. Each unit will have visual representations through multimedia presentations and animations, kinesthetic and interpersonal interactions through laboratory activities and manipulation of models; project based assignments and their senior externship at CentraState Medical Center

## Technology

Technology is utilized throughout the units. Multimedia presentations, animations, virtual labs are used to support the content. Students are required to use variety of media including multimedia presentations and desktop publishing software to present research and organize information to better their understanding of the content.

## College and Workplace Readiness

Students will engage in activities that will require higher order thinking skills where analysis, interpretation and evaluation of data in lab and clinical settings are essential for success. Students must be able to collaborate and communicate with others to effectively and efficiently complete research, organize information and manage time effectively to meet deadlines.

# Unit 02 - Honors Human Anatomy/Physiology with Senior Externship

## Covering and Support

### Enduring Understandings:

1. Structure relates to function
2. Organ systems interrelate with other organ systems
3. Homeostasis maintains normal operation of the human organism.
4. Age has a variety of effects on the structure and function of the human organism
5. Collaboration and understanding of the interdisciplinary nature of science will allow for more informed decisions and assessing the risk and benefits of alternative solutions.
6. The medical community is made of many interrelated parts that work together in providing effective and quality health care for all people.

### Essential Questions:

1. How do skin and its components make up a complex set of organs that protects and interacts with other body systems?
2. How does the structure of each layers of skin relate to its function?
3. How does age affect the structures of the skin?
4. How age and the environment affect the homeostasis of the skin and all the accessory structures?
5. How does the integumentary system interrelate with other organ systems?
6. How does the structure of bone relate to its functions?
7. How does various hormones and physical stress affect bone structure?
8. How does the skeletal system interrelate with other organ systems?
9. How might age affect the structural integrity/ homeostasis of bone?

### Unit Goals:

1. Students will become familiar with the organization and functions of the integumentary system.
2. Students will become familiar with how the integumentary system maintains homeostasis.
3. Students will become familiar with the effects of age on the integument.
4. Students will become familiar with the organization and function of osseous tissue and explain how it maintains homeostasis.
5. Students will become familiar with how bone develops and how age and other environmental stressors affect the maintenance of bone.
5. Students will become familiar with the division of the axial and appendicular skeleton

**Recommended Duration:** 5 weeks

Guiding/Topical Questions	Content/Themes/Skills	Resources and Materials	Suggested Strategies	Suggested Assessments
How are the coetaneous membranes organized?	<p>Name the tissue types composing the epidermis and dermis</p> <p>List the major layers of each and describe the function of each</p> <p>Describe the factors that normally contribute to skin color may be used as clinical signs of certain disease states</p>	<p>Text</p> <p>Lab manual</p> <p>Multimedia presentations/figures</p>	<p>Teacher-guided Multimedia presentations</p> <p>Lab Reports</p> <p>Mind map</p> <p>Graphic organizers</p> <p>Study guide worksheets</p>	<p>Quizzes/tests on concepts and relevant terminology</p> <p>Student generated research &amp; graphic organizers</p> <p>Written and oral responses to academic prompts</p> <p>Lab reports and /or analysis</p> <p>Student self-peer assessment</p>
How are the coetaneous membranes organized?	<p>Name the tissue types composed within the epidermis and dermis</p> <p>List the major layers of each and describe the function of each</p>	<p>Text</p> <p>Lab manual</p> <p>Multimedia presentations/figures</p>	<p>Teacher-guided Multimedia presentations</p> <p>Lab report Virtual and traditional Mind map</p> <p>Study guide worksheets</p>	
What are the accessory structures and what role do they play in the integumentary system?	<p>Compare the structure and location of sweat glands. Compare the composition and functions of their secretions</p> <p>Compare and contrast eccrine and apocrine glands</p> <p>Lists the parts of the hair follicle and explain the function of each part. Describe the functional relationship of arrector pili muscles to the hair follicle</p> <p>Name the regions of a hair and explain the basis of hair color</p> <p>Describe the distribution growth replacement and changing nature of hair during the life span</p> <p>Describe the structure of nails</p>	<p>Text</p> <p>Lab manual</p> <p>Multimedia presentations/figures</p>	<p>Teacher-guided Multimedia presentations</p> <p>Lab virtual and traditional Labeling diagram</p>	<p>Quizzes/tests on concepts and relevant terminology</p> <p>Student generated research &amp; graphic organizers</p> <p>Written and oral responses to academic prompts</p> <p>Lab reports and /or analysis</p> <p>Student self-peer assessment</p>

<p>How does the skin respond to injury and how does the skin maintain homeostasis?</p>	<p>Explain how skin responds to injury and repairs itself</p> <p>Summarize the characteristics of the three major types of skin cancer. Explain why serious burns are life threatening</p> <p>Describe how to determine the extent of a burn and differentiate</p>	<p>Text Lab manual Multimedia presentations/figures</p>	<p>Teacher-guided Multimedia presentations Compare contrast Summarize skin repair</p>	<p>Quizzes/tests on concepts and relevant terminology Student generated research &amp; graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student self-peer assessment</p>
<p>What effects does aging have on the integumentary system?</p>	<p>Summarize the effects of the aging process on the skin</p>	<p>Text Lab manual Multimedia presentations/figures</p>	<p>Student-generated Multimedia presentations &amp; pamphlet (Project Beauty)</p>	<p>Quizzes/tests on concepts and relevant terminology Student generated research &amp; graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student self-peer assessment</p>
<p>How does the structure of bone relate to the functions of bone?</p>	<p>Name the major regions of the skeleton and describe their relative functions</p> <p>Compare and contrast the structure of the four bone classes and provide examples of each class</p> <p>List and describe five important functions of bone</p> <p>Describe the gross anatomy of a typical long bone and flat bone</p> <p>Indicate the locations and functions of red and yellow marrow, articular cartilage, periosteum, and endosteum</p>	<p>Text Lab manual Multimedia presentations/figures</p>	<p>Teacher-directed Multimedia presentations Lab Chicken Bone dissection Lab histology &amp; effects of heat &amp; acid</p>	<p>Quizzes/tests on concepts and relevant terminology Student generated research &amp; graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student self-peer assessment</p>

<p>How bone is formed and what is the dynamic nature in which bone is maintained?</p>	<p>Compare and contrast intramembranous ossification and endochondral ossification</p> <p>Describe the process of long bone growth that occurs at the epiphyseal plates</p> <p>Compare the locations and remodeling functions of the osteoblast, osteocytes, and osteoclasts</p> <p>Explain how hormones, nutrition and physical stress regulate bone remodeling</p> <p>Describe the steps of fracture repair</p>	<p>Text</p> <p>Lab manual</p> <p>Multimedia presentations/figures</p> <p>Histological slides</p>	<p>Teacher-guided Multimedia presentations</p> <p>Animations</p> <p>Compare contrast bone formation</p> <p>Summarize fracture and bone formation</p> <p>Graphical organizer</p> <p>Homeostasis of bone</p>	<p>Quizzes/tests on concepts and relevant terminology</p> <p>Student generated research &amp; graphic organizers</p> <p>Written and oral responses to academic prompts</p> <p>Lab reports and /or analysis</p> <p>Student self-peer assessment</p>
<p>What is the importance of bone markings?</p>	<p>Identify the bones of the axial skeleton</p> <p>Name, describe and identify the bones of the axial skeleton and their bone markings</p> <p>Identify the bones of the appendicular skeleton</p> <p>Name, describe and identify the bones of the appendicular skeleton and their bone markings</p>	<p>Text</p> <p>Lab manual</p> <p>Multimedia presentations/figures</p> <p>Disarticulated &amp; Articulate skeleton</p>	<p>Teacher-guided Multimedia presentations</p> <p>Lab bone marking identification virtual and traditional lab</p> <p>graphical organizer</p>	<p>Quizzes/tests on concepts and relevant terminology</p> <p>Student generated research &amp; graphic organizers</p> <p>Written and oral responses to academic prompts</p> <p>Lab reports and /or analysis</p> <p>Student self-peer assessment</p>

SCI.9-12.5.1.12.A.a	Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.
SCI.9-12.5.1.12.A.3	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
SCI.9-12.5.1.12.B.1	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
SCI.9-12.5.1.12.B.3	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
SCI.9-12.5.1.12.B.4	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
SCI.9-12.5.1.12.C.c	Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.
SCI.9-12.5.1.12.C.3	Consider alternative theories to interpret and evaluate evidence-based arguments.
SCI.9-12.5.1.12.D.a	Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.
SCI.9-12.5.1.12.D.1	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
SCI.9-12.5.1.12.D.2	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
SCI.9-12.5.1.12.D.c	Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.
SCI.9-12.5.3.12.A.b	Cellular processes are carried out by many different types of molecules, mostly by the group of proteins known as enzymes.
SCI.9-12.5.3.12.A.c	Cellular function is maintained through the regulation of cellular processes in response to internal and external environmental conditions.
SCI.9-12.5.3.12.A.3	Predict a cell's response in a given set of environmental conditions.
SCI.9-12.5.3.12.A.f	There is a relationship between the organization of cells into tissues and the organization of tissues into organs. The structures and functions of organs determine their relationships within body systems of an organism.
SCI.9-12.5.3.12.A.6	Describe how a disease is the result of a malfunctioning system, organ, and cell, and relate this to possible treatment interventions (e.g., diabetes, cystic fibrosis, lactose intolerance).

## Differentiation

Students in the Medical Sciences Learning Center are a homogeneous group. Students will experience a variety of modalities to accommodate all learning styles. Each unit will have visual representations through multimedia presentations and animations, kinesthetic and interpersonal interactions through laboratory activities and manipulation of models; project based assignments and senior externship at CentraState Medical Center.

## Technology

Technology is utilized throughout the units. Multimedia presentations, animations, virtual labs are used to support the content. Students are required to use variety of media including multimedia presentations and desktop publishing software to present research and organize information to better their understanding of the content.

## College and Workplace Readiness

Students will engage in activities that will require higher order thinking skills where analysis, interpretation and evaluation of data in lab and clinical settings are essential for success. Students must be able to collaborate and communicate with others to effectively and efficiently complete research, organize information and manage time effectively to meet deadlines.

# Unit 03 - Honors Human Anatomy/Physiology with Senior Externship

## Movement

### Enduring Understandings:

1. Structure relates to function.
2. Human organ systems interrelate with other organ systems.
3. Homeostasis maintains normal operation of the human organism.
4. Age has a variety of effects on the structure and function of the human organism.
5. Collaboration and understanding of the interdisciplinary nature of science will allow for more informed decisions and assessing the risk and benefits of alternative solutions.
6. The medical community is made of many interrelated parts that work together in providing effective and quality health care for all people.

### Essential Questions:

1. How does the structure of fibrous, cartilaginous and synovial joints relate to their functions?
2. How age affects the structural and functional integrity of joints?
3. How homeostasis is affected by mechanical stress and injury to the three types of joints?
4. How does the structure of smooth, skeletal and cardiac muscle relate to its functions?
5. How does age affect the structural and functional integrity muscle?
6. How does muscle interrelate with other organ systems?
7. How does age affect the structure and function of muscle?

### Unit Goals:

1. Students will become familiar with the structural and functional characteristics of joints.
2. Students will become familiar with synovial joints their anatomical characteristics, movement and joint stability.
3. Students will become familiar how age and disease affects the homeostasis of joints.
4. Students will become familiar with the gross and microscopic organization of muscle tissue.
5. Students will become familiar with the irritability and contractibility of muscle tissue and the metabolism of muscular function.
6. Students will become familiar with the criteria for muscular identification identifying origins, insertions, and functions.
7. Students will become familiar with the affects of age and on the function and homeostasis of muscular tissue.

**Recommended Duration:** 6 weeks

<b>Guiding/Topical Questions</b>	<b>Content/Themes/Skills</b>	<b>Resources and Materials</b>	<b>Suggested Strategies</b>	<b>Suggested Assessments</b>
How might the structure of a joint relate to its functions?	<p>Explain how joints are classified structurally and functionally.</p> <p>Identify the three types of fibrous joints and give an example of each</p> <p>Indicate the three types of cartilaginous joints and give examples of each</p> <p>Describe the general features of a synovial joint</p> <p>Define bursae and tendon sheaths.</p>	<p>Text book</p> <p>Laboratory manuals</p> <p>Models</p> <p>Virtual online lab</p>	<p>Teacher multimedia presentations</p> <p>Virtual and traditional Laboratory</p> <p>Student-generated multimedia presentations/informative pamphlet</p> <p>Student role play</p> <p>student-generated graphical organizers</p> <p>CentraState Lecture Series</p> <p>CentraState Externship</p>	<p>Pre-assessments</p> <p>Quizzes/tests on concepts and relevant terminology</p> <p>Student generated graphic organizers</p> <p>Written and oral responses to academic prompts</p> <p>Lab reports and /or analysis</p> <p>Student self and peer assessment</p> <p>Laboratory practical</p> <p>CentraState externship reflective journal</p>
What happens to a joints structural integrity as more movement is permitted?	<p>Explain the three factors that influence the stability of synovial joints</p> <p>Describe the movements allowed at synovial joints</p> <p>Examine the types of synovial joints.</p>	<p>Text book</p> <p>Laboratory manuals</p> <p>Models</p> <p>Virtual online lab</p>	<p>Teacher multimedia presentations</p> <p>Virtual and traditional Laboratory</p> <p>Student generated multimedia presentations/informative pamphlet</p> <p>Student role play</p> <p>student-generated graphical organizers</p> <p>CentraState Lecture Series</p> <p>CentraState Externship</p>	<p>Pre-assessments</p> <p>Quizzes/tests on concepts and relevant terminology</p> <p>Student generated graphic organizers</p> <p>Written and oral responses to academic prompts</p> <p>Lab reports and /or analysis</p> <p>Student self and peer assessment</p> <p>Laboratory practical</p> <p>CentraState externship reflective journal</p>
What structural & functional differences exist between different representative joints?	<p>Describe the articulations between vertebrae of the vertebral column.</p> <p>Describe the structure and function of the shoulder, elbow, hip and knee joint</p> <p>Explain the relationship between joint strength and mobility, using specific examples</p>	<p>Text book</p> <p>Laboratory manuals</p> <p>Models</p> <p>Virtual online lab</p>	<p>Teacher multimedia presentations</p> <p>Virtual and traditional Laboratory</p> <p>Student-generated multimedia presentations/informative pamphlet</p> <p>Student role play</p> <p>student-generated graphical organizers</p> <p>CentraState Lecture Series</p> <p>CentraState Externship</p>	<p>Pre-assessments</p> <p>Quizzes/tests on concepts and relevant terminology</p> <p>Student generated graphic organizers</p> <p>Written and oral responses to academic prompts</p> <p>Lab reports and /or analysis</p> <p>Student self and peer assessment</p> <p>Laboratory practical</p> <p>CentraState externship reflective journal</p>

<p>What structural and functional changes occur as we age?</p>	<p>Explore the changes that occur to joints as one ages. Identify the inflammatory and degenerative conditions that target joints. Describe the fetal development of joints.</p>	<p>Text book Laboratory manuals Models Virtual online lab</p>	<p>Teacher multimedia presentations Virtual and traditional Laboratory Student-generated multimedia presentations/informative pamphlet Student role play student-generated graphical organizers CentraState Lecture Series CentraState Externship</p>	<p>Pre-assessments Quizzes/tests on concepts and relevant terminology Student generated graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student self and peer assessment Laboratory practical CentraState externship reflective journal</p>
<p>What structural and functional differences exist between skeletal cardiac and smooth muscle?</p>	<p>Describe the properties of the three types of muscle tissue. Identify the functional characteristics of muscle tissue. Explain the function of muscles. Examine the gross anatomical features of skeletal muscle. Describe the types of muscle attachments. Explore the microscopic anatomy of skeletal muscle, and the specific arrangement of each element in relation to the others.</p>	<p>Text book Laboratory manuals Models Virtual online PhysioEx CD Online animations</p>	<p>Teacher multimedia presentations Virtual and traditional Laboratory Student role play Student-generated multimedia presentations student-generated graphical organizers CentraState Lecture Series CentraState Externship</p>	<p>Pre-assessments Quizzes/tests on concepts and relevant terminology Student generated graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student self and peer assessment Laboratory practical CentraState externship reflective journal</p>
<p>What is the sequence of events that lead to a person thinking and physically lifting an object?</p>	<p>Describe the structural arrangement of neuromuscular junction. Explain the mechanism of generation of an action potential across the sarcolemma. Explain the sliding filament mechanism of muscle fiber contraction.</p>	<p>Text book Laboratory manuals Models Virtual online PhysioEx CD Online animations</p>	<p>Teacher multimedia presentations Virtual and traditional Laboratory Student role play Student-generated multimedia presentations student-generated graphical organizers CentraState Lecture Series CentraState Externship</p>	<p>Pre-assessments Quizzes/tests on concepts and relevant terminology Student generated graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student self and peer assessment Laboratory practical CentraState externship reflective journal</p>

<p>What determines the amount of tension a muscle can generate?</p>	<p>Define motor unit, and explain the events of a muscle twitch Identify graded muscle response, and explain how factors affect graded responses. Compare the different types of muscular contractions. Define muscle tone, and discuss in the context of isometric and isotonic contraction.</p>	<p>Text book Laboratory manuals Models Virtual online PhysioEx CD Online animations</p>	<p>Teacher multimedia presentations Virtual and traditional Laboratory Student role play Student-generated multimedia presentations student-generated graphical organizers CentraState Lecture Series CentraState Externship</p>	<p>Pre-assessments Quizzes/tests on concepts and relevant terminology Student generated graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student self and peer assessment Laboratory practical CentraState externship reflective journal</p>
<p>How much energy is consumed when a muscle contracts?</p>	<p>Describe the mechanism through which muscles are supplied with ATP. Discuss the factors that affect the force, velocity, and duration of muscle contraction. Describe the factors that contribute to muscle fatigue and discuss the stages and mechanisms involved in the muscle's subsequent recovery. Distinguish between aerobic and anaerobic endurance and explain their implications for muscular performance.</p>	<p>Text book Laboratory manuals Models Virtual online PhysioEx CD Online animations</p>	<p>Teacher multimedia presentations Virtual and traditional Laboratory Student role play Student-generated multimedia presentations student-generated graphical organizers CentraState Lecture Series CentraState Externship</p>	<p>Pre-assessments Quizzes/tests on concepts and relevant terminology Student generated graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student self and peer assessment Laboratory practical CentraState externship reflective journal</p>
<p>What structural and functional differences occur as one ages?</p>	<p>Identify the embryonic development of muscle tissue and the changes in muscle with age.</p>	<p>Text book Laboratory manuals Models Virtual online PhysioEx CD Online animations</p>	<p>Teacher multimedia presentations Virtual and traditional Laboratory Student role play Student-generated multimedia presentations student-generated graphical organizers CentraState Lecture Series CentraState Externship</p>	<p>Pre-assessments Quizzes/tests on concepts and relevant terminology Student generated graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student self and peer assessment Laboratory practical CentraState externship reflective journal</p>

<p>How are the arrangements of fascicles result in their functional differences?</p>	<p>Describe prime movers, antagonists, synergists, and fixators.  Identify the criteria used to name skeletal muscles.  Indicate the most common patterns of fascicle arrangement found in skeletal muscles.  Define lever, fulcrum, and effort.  List three types of lever systems and give examples of each in the body.</p>	<p>Text book  Laboratory manuals  Models  Virtual online  PhysioEx CD  Online animations</p>	<p>Teacher multimedia presentations  Virtual and traditional  Laboratory  Student role play  Student-generated  multimedia presentations  student-generated  graphical organizers  CentraState Lecture Series  CentraState Externship</p>	<p>Pre-assessments  Quizzes/tests on concepts and relevant terminology  Student generated graphic organizers  Written and oral responses to academic prompts  Lab reports and /or analysis  Student self and peer assessment  Laboratory practical  CentraState externship reflective journal</p>
<p>How are the arrangements of the axial muscles and appendicular muscles related to their functions?</p>	<p>Identify the principle axial and appendicular muscles, together with their origins, insertions and actions.</p>	<p>Text book  Laboratory manuals  Models  Virtual online  PhysioEx x CD  Online animations</p>	<p>Teacher multimedia presentations  Virtual and traditional  Laboratory  Student role play  Student-generated  multimedia presentations  student-generated  graphical organizers  CentraState Lecture Series  CentraState Externship</p>	<p>Pre-assessments  Quizzes/tests on concepts and relevant terminology  Student generated graphic organizers  Written and oral responses to academic prompts  Lab reports and /or analysis  Student self and peer assessment  Laboratory practical  CentraState externship reflective journal</p>

SCI.9-12.5.1.12.A.a  
SCI.9-12.5.1.12.A.3  
SCI.9-12.5.1.12.B.1

Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.  
Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.  
Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.

SCI.9-12.5.1.12.B.3  
SCI.9-12.5.1.12.B.4  
SCI.9-12.5.1.12.C.c  
SCI.9-12.5.1.12.C.3  
SCI.9-12.5.1.12.D.a  
SCI.9-12.5.1.12.D.1  
SCI.9-12.5.1.12.D.2  
SCI.9-12.5.1.12.D.c  
SCI.9-12.5.1.12.D.3  
SCI.9-12.5.3.12.A.c  
SCI.9-12.5.3.12.A.3  
SCI.9-12.5.3.12.A.f

Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.  
Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.  
Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.  
Consider alternative theories to interpret and evaluate evidence-based arguments.  
Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.  
Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.  
Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.  
Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.  
Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.  
Cellular function is maintained through the regulation of cellular processes in response to internal and external environmental conditions.  
Predict a cell's response in a given set of environmental conditions.  
There is a relationship between the organization of cells into tissues and the organization of tissues into organs. The structures and functions of organs determine their relationships within body systems of an organism.  
Describe how a disease is the result of a malfunctioning system, organ, and cell, and relate this to possible treatment interventions (e.g., diabetes, cystic fibrosis, lactose intolerance).

SCI.9-12.5.3.12.A.6

## Differentiation

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## Technology

Technology is utilized throughout the units. Multimedia presentations, animations, virtual labs are used to support the content. Students are required to use variety of media including multimedia presentations and desktop publishing software to present research and organize information to better their understanding of the content.

## College and Workplace Readiness

Students will engage in activities that will require higher order thinking skills where analysis, interpretation and evaluation of data in lab and clinical settings are essential for success. Students must be able to collaborate and communicate with others to effectively and efficiently complete research, organize information and manage time effectively to meet deadlines.

# Unit 04 - Honors Human Anatomy/Physiology with Senior Externship

## Regulation and Integration

### Enduring Understandings:

1. Structure relates to function.
2. Human organ systems interrelate with other organ systems.
3. Maintains normal operation of the human organism.
4. Age has a variety of effects on the structure and function of the human organism.
5. Collaboration and understanding of the interdisciplinary nature of science will allow for more informed decisions and assessing the risk and benefits of alternative solutions.
6. The medical community is made of many interrelated parts that work together in providing effective and quality health care for all people.

### Essential Questions:

1. Explain the relationship between the structural and functional divisions of the nervous system?
2. How does the nervous system interrelate with other organ systems?
3. How might age affect the homeostatic integrity of the nervous system?
4. How does the CNS interrelate with other organ systems?
5. How does age affect the structure and function of the brain & CNS?
6. How might a loss of homeostasis affect the structure and regulatory parts of the brain & CNS?
7. How might diagnostic technology and therapies alleviate homeostatic imbalances of the brain?
8. How does the regulation of the human systems differ from the Nervous system and the endocrine system?
9. How does the endocrine system structures relate to its functions?
10. How does the endocrine system interrelate with other organ systems?
11. How might the loss of endocrine function relate with a homeostatic imbalance with other organs/ organ systems?
12. How might age affect how the endocrine system functions?

### Unit Goals:

1. Students will become familiar with the organization of the CNS and PNS.
2. Students will become familiar with the gross and microscopic organization and functioning of the nervous system.
3. Students will become familiar with the major structures and functions of the brain and spinal cord.
4. Students will become familiar with the higher mental functions of the brain.
5. Students will become familiar with the cranial nerves and their functions
6. Students will become familiar with the effects of age and disease on the homeostasis of the brain and the nervous system.
7. Students will become familiar with the glands of the endocrine system and the target cells, organs and systems.
8. Students will become familiar how the loss of endocrine homeostasis of many organs/ systems.

**Recommended Duration:** 6 weeks

Guiding/Topical Questions	Content/Themes/Skills	Resources and Materials	Suggested Strategies	Suggested Assessments
<p>What are the two major divisions of the nervous system?</p>	<p>List the structural and functional divisions of the nervous system, and describe their relationship to each other</p>	<p>Text books Lab manual CD-ROM figures &amp; animations</p>	<p>Teacher directed power points Student-generated multimedia presentations graphical organizer animations</p>	<p>Quizzes/tests on concepts and relevant terminology Student generated research &amp; graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student self-peer assessment</p>
<p>How are the classification of neurons based on their structure and function?</p>	<p>Describe the types of glial cell, their functions, and location in the nervous system Explain the physiological characteristics of mature neurons Discuss the anatomy of a neuron, and the function of each structure. Describe the anatomy and function of the myelin sheath, and differentiate between myelinated and unmyelinated neurons Define the structural and functional categories of neurons, and compare how the structural class of a neuron relates to its functional class</p>	<p>Text books Lab manual CD-ROM figures &amp; animations</p>	<p>Teacher directed power points Student-generated multimedia presentations compare/contrast graphical organizer animations</p>	<p>Quizzes/tests on concepts and relevant terminology Student generated research &amp; graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student self-peer assessment</p>

<p>How are intracellular and extracellular ions vital in changing the transmembrane potential of nervous tissue?</p>	<p>Define the terms voltage, potential difference, and current, and describe how electrical current travels in the body  Name the various types of membrane channels, and the signals that control each type  Explain the resting membrane potential and how it is generated  Identify how changes in membrane potentials act as signal, and relate each type of signal to the generation of action potentials  Discuss the mechanism of generation of an action potential, and the three phases of an action potential  Describe a threshold stimulus. Discuss how it relates to the grades potential generated on dendrites, and the all-or-nothing behavior of axon  Define the absolute and relative refractory periods, and describe the events that occur during each  Identify the effects of axon diameter and myelination on conduction velocity of axons</p>	<p>Text books  Lab manual  CD-ROM figures &amp; animations</p>	<p>Teacher directed multimedia presentations  Student-generated multimedia presentations  graphical organizer  animations</p>	<p>Quizzes/tests on concepts and relevant terminology  Student generated research &amp; graphic organizers  Written and oral responses to academic prompts  Lab reports and /or analysis  Student self-peer assessment</p>
<p>How are messages from one synapse transferred to other cells?</p>	<p>Define synapse, name the two types, and describe how synaptic transmission occurs at a chemical synapse  Define EPSP and IPSP. Describe what causes them and how they are summated by the postsynaptic cell  List the chemical and functional classes of neurotransmitters, members of each class, and the types of receptors for neurotransmitters  Describe neuronal pools and their function  Name the various types of circuits. Compare and contrast serial and parallel processing</p>	<p>Text books  Lab manual  CD-ROM figures &amp; animations</p>	<p>Teacher directed multimedia presentations  Student-generated multimedia presentations  graphical organizer  animations</p>	<p>Quizzes/tests on concepts and relevant terminology  Student generated research &amp; graphic organizers  Written and oral responses to academic prompts  Lab reports and /or analysis  Student self-peer assessment</p>

<p>How does the nervous system change as one ages?</p>	<p>Describe the major events of development, growth, and refinement of the nervous system</p>	<p>Text books Lab manual CD-ROM figures &amp; animations</p>	<p>Teacher directed multimedia presentations Student-generated multimedia presentations graphical organizer animations</p>	<p>Quizzes/tests on concepts and relevant terminology Student generated research &amp; graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student self-peer assessment</p>
<p>What are the functions of the major regions of the brain?</p>	<p>Name the regions of the adult brain Name and locate the ventricles of the brain List the major lobes, fissures and functional areas of the cerebral cortex Explain lateralization of hemisphere function Differentiate between commissures, association fibers, and projection fibers Describe the general function of the basal ganglia Describe the location of the diencephalon and name its subdivisions Identify the three major regions of the brain stem and their functions Describe the structure and function of the cerebellum Locate the limbic system and the reticular formation and explain the role of each functional system</p>	<p>Text books Lab manual PhysioEx CD-ROM figures &amp; animations Sheep Brain</p>	<p>Teacher directed multimedia presentations Student-generated multimedia presentations graphical organizer animations traditional and virtual lab</p>	<p>Quizzes/tests on concepts and relevant terminology Student generated research &amp; graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student self-peer assessment Practical assessment</p>

<p>What are the higher mental functions?</p>	<p>Define EEG and distinguish between alpha beta, theta, and delta brain waves  Compare and contrast the events and importance of slow-wave and REM sleep, and indicate how their patterns  Describe consciousness  Clinically compare and contrast the stages and categories of memory  Describe the relative roles of the major brain structures believed to be involved in declarative and procedural memories</p>	<p>Text books  Lab manual  CD-ROM figures &amp; animations</p>	<p>Teacher directed multimedia presentations  Student-generated multimedia presentations  graphical organizer  animations</p>	<p>Quizzes/tests on concepts and relevant terminology  Student generated research &amp; graphic organizers  Written and oral responses to academic prompts  Lab reports and /or analysis  Student self-peer assessment</p>
<p>How are the soft and vital parts of the brain protected?</p>	<p>Describe how the meninges, cerebrospinal fluid, and the blood-brain barrier protect the CNS  Describe the formation of the cerebrospinal fluid, and follow its circulatory pathway  Describe the cause (if known) and the major signs and symptoms of cerebrovascular accidents, Alzheimer's disease, Huntington's disease and Parkinson's disease</p>	<p>Text books  Lab manual  CD-ROM figures &amp; animations</p>	<p>Teacher directed multimedia presentations  Student-generated multimedia presentations  graphical organizer  animations</p>	<p>Quizzes/tests on concepts and relevant terminology  Student generated research &amp; graphic organizers  Written and oral responses to academic prompts  Lab reports and /or analysis  Student self-peer assessment</p>
<p>Where do the cranial nerves originate and what anatomical structures do they innervate?</p>	<p>Name the 12 pairs of cranial nerves; indicate the body region and structures innervated by each  Identify homeostatic imbalance for each and the clinical testing used</p>	<p>Text books  Lab manual  CD-ROM figures &amp; animations  Sheep brain</p>	<p>Teacher directed multimedia presentations  Student-generated multimedia presentations  graphical organizer  animations  sheep brain dissection  Traditional &amp; virtual lab</p>	<p>Quizzes/tests on concepts and relevant terminology  Student generated research &amp; graphic organizers  Written and oral responses to academic prompts  Lab reports and /or analysis  Student self-peer assessment  practical assessment</p>

<p>Why is it useful to compare the Autonomic Nervous system to the Somatic Nervous System?</p>	<p>Compare the organization of the autonomic nervous system with that of the somatic nervous system List the divisions of the autonomic system and give the functions of each Describe the structures and function of the sympathetic divisions of the autonomic system Describe the mechanisms of neurotransmitter release in the sympathetic division</p>	<p>Text books Lab manual CD-ROM figures &amp; animations</p>	<p>Teacher directed multimedia presentations Student-generated multimedia presentations graphical organizer animations</p>	<p>Quizzes/tests on concepts and relevant terminology Student generated research &amp; graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student self-peer assessment</p>
<p>What are the major types of endocrine glands?</p>	<p>List the major endocrine organs, and describe their body locations Describe the structural and functional relationships between the hypothalamus and the pituitary gland Describe the effects of the two groups of hormones produced by the thyroid gland Follow the process of thyroxine formation and release Indicate general functions of the parathyroid hormone List the hormones produced by the adrenal gland, and cite their physiological effects Compare and contrast the effects of the two major pancreatic hormones Describe the importance of thymic and pineal glands Describe the functional roles of hormones of the testes and ovaries.</p>	<p>Text books Lab manual PhysioEx CD-ROM figures &amp; animations</p>	<p>Teacher directed multimedia presentations Student-generated multimedia presentations and brochure compare contrast graphical organizer animations</p>	<p>Quizzes/tests on concepts and relevant terminology Student generated research &amp; graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student self-peer assessment</p>

<p>What changes are brought about by a hormonal stimulus?</p>	<p>Describe how hormones are classified Describe two major mechanisms by which hormones bring about their effects on their target tissue List three kinds of interaction of different hormones acting on the same target cell Explain how hormone release is regulated</p>	<p>Text books Lab manual PhysioEx CD-ROM figures &amp; animations</p>	<p>Teacher directed multimedia presentations Student-generated multimedia presentations and brochure graphical organizer animations analysis</p>	<p>Quizzes/tests on concepts and relevant terminology Student generated research &amp; graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student self-peer assessment Student multimedia presentation/ brochure</p>
<p>What are the effects of aging on the function of the endocrine system and what homeostatic imbalances occur?</p>	<p>Explain how age affects?</p>	<p>Text books Lab manual CD-ROM figures</p>	<p>Teacher-generated multimedia presentations Student-generated multimedia presentations and brochure compare contrast graphical organizer animations analysis Student generated brochure</p>	<p>Quizzes/tests on concepts and relevant terminology Student generated research &amp; graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student self-peer assessment Student multimedia presentation/ brochure</p>

SCI.9-12.5.1.12.A.a  
SCI.9-12.5.1.12.A.3  
SCI.9-12.5.1.12.B.1  
SCI.9-12.5.1.12.B.3  
SCI.9-12.5.1.12.B.4  
SCI.9-12.5.1.12.C.c  
SCI.9-12.5.1.12.C.3  
SCI.9-12.5.1.12.D.a  
SCI.9-12.5.1.12.D.1  
SCI.9-12.5.1.12.D.2  
SCI.9-12.5.1.12.D.c  
SCI.9-12.5.1.12.D.3  
SCI.9-12.5.3.12.A.c  
SCI.9-12.5.3.12.A.3  
SCI.9-12.5.3.12.A.f  
SCI.9-12.5.3.12.A.6

Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.  
Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.  
Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.  
Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.  
Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.  
Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.  
Consider alternative theories to interpret and evaluate evidence-based arguments.  
Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.  
Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.  
Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.  
Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.  
Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.  
Cellular function is maintained through the regulation of cellular processes in response to internal and external environmental conditions.  
Predict a cell's response in a given set of environmental conditions.  
There is a relationship between the organization of cells into tissues and the organization of tissues into organs. The structures and functions of organs determine their relationships within body systems of an organism.  
Describe how a disease is the result of a malfunctioning system, organ, and cell, and relate this to possible treatment interventions (e.g., diabetes, cystic fibrosis, lactose intolerance).

## Differentiation

Students in the Medical Sciences Learning Center are a homogeneous group. Students will experience a variety of modalities to accommodate all learning styles. Each unit will have visual representations through multimedia presentations and animations, kinesthetic and interpersonal interactions through laboratory activities and manipulation of models; project based assignments and senior externship at CentraState Medical Center.

## Technology

Technology is utilized throughout the units. Multimedia presentations, animations, virtual labs are used to support the content. Students are required to use variety of media including multimedia presentations and desktop publishing software to present research and organize information to better their understanding of the content.

## College and Workplace Readiness

Students will engage in activities that will require higher order thinking skills where analysis, interpretation and evaluation of data in lab and clinical settings are essential for success. Students must be able to collaborate and communicate with others to effectively and efficiently complete research, organize information and manage time effectively to meet deadlines.

# Unit 05 - Honors Human Anatomy/Physiology with Senior Externship

## Fluids & Transport

### Enduring Understandings:

1. Structure relates to function.
2. Human organ systems interrelate with other organ systems.
3. Homeostasis maintains normal operation of the human organism.
4. Age has a variety of effects on the structure and function of the human organism.
5. Collaboration and understanding of the interdisciplinary nature of science will allow for more informed decisions and assessing the risk and benefits of alternative solutions.
6. The medical community is made of many interrelated parts that work together in providing effective and quality health care for all people.

### Essential Questions:

1. How do the structures of the heart relate to its functions?
2. How do the heart and cardiovascular system interrelate with other organ systems?
3. How might a loss of homeostasis affect the structures and normal functioning of the heart and the cardiovascular system?
4. How does age affect the heart and cardiovascular system?
5. How do the structures of the blood cells relate to its functions?
6. How do the blood & cardiovascular system interrelate with other organ systems?
7. How might a loss of homeostasis affect the structures and normal functioning of the blood and the cardiovascular system?
8. How does aging process affect blood and cardiovascular system?

### Unit Goals:

1. Students will become familiar with the organization of the cardiovascular system.
2. Students will become familiar with the blood composition and their functions.
3. Students will become familiar the process of homeostasis and the consequences when homeostasis is lost.
4. Students will become familiar with blood disorders as aging occurs.
5. Students will become familiar with the gross and microscopic structures of the heart and their functions
6. Students will become familiar with describing the events of the cardiac cycle.
7. Students will become familiar with age related changes in the cardiovascular system and what happens when homeostasis is lost.

**Recommended Duration:** 6 weeks

Guiding/Topical Questions	Content/Themes/Skills	Resources and Materials	Suggested Strategies	Suggested Assessments
<p>What is the composition and function of blood?</p>	<p>Describe the important components and major functions of blood</p> <p>Specify the composition and function of plasma</p> <p>List the characteristics and functions of red blood cells</p> <p>Describe the structure of hemoglobin and indicate its functions</p> <p>Describe the recycling system for aged and damaged red blood cells</p> <p>Define erythropoietin, identify the stages involved in red blood cell maturation and describe the homeostatic regulation of RBC production</p> <p>Explain the importance of blood typing and the basis for ABO and Rh incompatibilities</p> <p>Categorize the various white blood cells on the basis of their structures and functions, and discuss the factors that regulate the production of each</p> <p>Describe the structure and function of platelets</p>	<p>Text book</p> <p>Lab manual</p> <p>Blood typing kit</p> <p>PhysioEx animations</p>	<p>Teacher multimedia presentations</p> <p>Blood typing graphical organizer</p> <p>CentraState Externship</p> <p>CentraState Lecture series</p> <p>Traditional and virtual interactive labs</p>	<p>Quizzes/tests on concepts and relevant terminology</p> <p>Student generated graphic organizers</p> <p>Written and oral responses to academic prompts</p> <p>Lab reports and /or analysis</p> <p>Student self and peer assessment</p> <p>Laboratory Practical</p> <p>CentraState externship reflective journal</p>
<p>What are the series of events (chain reaction) that controls the loss of blood after an injury?</p>	<p>Describe the process of homeostasis</p> <p>List the factors that limit clot formation and prevent undesirable clotting</p> <p>Give examples of homeostatic disorders</p> <p>Indicate the cause of each condition</p>	<p>Text book</p> <p>Lab manual</p> <p>Blood typing kit</p> <p>PhysioEx animations</p>	<p>Teacher multimedia presentations</p> <p>graphical organizer</p> <p>CentraState Externship</p> <p>CentraState Lecture series</p> <p>Traditional and virtual interactive labs</p>	<p>Quizzes/tests on concepts and relevant terminology</p> <p>Student generated graphic organizers</p> <p>Written and oral responses to academic prompts</p> <p>Lab reports and /or analysis</p> <p>Student self and peer assessment</p> <p>Laboratory Practical</p> <p>CentraState externship reflective journal</p>

<p>How does the continuous supply of oxygen nutrients and waste disposal reach every cell in the body?</p> <p>Explain why the heart is known as a pump and why is the blood flows one direction.</p>	<p>Describe the size, location, and orientation of the heart  Identify structures of the pericardium.  Define endocardium, myocardium, and epicardium  Compare the function of the atria and the ventricles, and describe the difference between the function of the right and left ventricles  Discuss the need for coronary circulation, and name the vessels that play a role in it  Indicate the function and location of the atrioventricular valves and semilunar valves  Describe the microscopic anatomy and control of cardiac muscle cell, and compare to skeletal muscle cells</p>	<p>Textbook  Lab manual  PhysioEx  Sphygmomometers  Stethoscope  Animations</p>	<p>Teacher multimedia presentations  CentraState Externship  CentraState Lecture series  Traditional pig heart and virtual interactive labs</p>	<p>Quizzes/tests on concepts and relevant terminology  Student generated graphic organizers  Written and oral responses to academic prompts  Lab reports and /or analysis  Student self and peer assessment  Laboratory Practical  CentraState externship reflective journal</p>
<p>What phases and events are necessary to complete one cardiac cycle?</p>	<p>Describe the structures and activities of the intrinsic conduction system  Draw a typical ECG  Label and define the three phases  Discuss the cardiac cycle in terms of relative pressure in each set of chambers  Explain the normal heart sounds and how the sounds relate to closure of specific valves and systole or diastole of the ventricles</p>	<p>Textbook  Lab manual  PhysioEx  Sphygmomometers  Stethoscope</p>	<p>Teacher multimedia presentations  Student directed Blood pressure &amp; Pulse  CentraState Externship  CentraState Lecture series  Traditional and virtual interactive lab</p>	<p>Quizzes/tests on concepts and relevant terminology  Student generated graphic organizers  Written and oral responses to academic prompts  Lab reports and /or analysis  Student self and peer assessment  Laboratory Practical  CentraState externship reflective journal</p>
<p>How is the heart regulation controlled?</p>	<p>Define cardiac output, stroke volume of the heart  List the factors that affect stroke volume of the heart  Describe the effects of the divisions if the autonomic nervous system on the heart</p>	<p>Textbook  Lab manual  PhysioEx animations  Sphygmomometers  Stethoscope</p>	<p>Teacher multimedia presentations  Student directed Blood pressure &amp; Pulse  CentraState Externship  CentraState Lecture series  Traditional and virtual interactive lab</p>	<p>Quizzes/tests on concepts and relevant terminology  Student generated graphic organizers  Written and oral responses to academic prompts  Lab reports and /or analysis  Student self and peer assessment  Laboratory Practical  CentraState externship reflective journal</p>

<p>What effects does age have on the normal functioning of the heart?</p>	<p>Describe the heart formation and indicate how the fetal heart differs from the adult heart Provide examples of age related changes in heart function</p>	<p>Textbook Lab manual</p>	<p>Teacher multimedia presentations Student research cardiovascular issues CentraState Externship CentraState Lecture series</p>	<p>Quizzes/tests on concepts and relevant terminology Student generated graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student self and peer assessment Laboratory Practical CentraState externship reflective journal</p>
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- SCI.9-12.5.1.12.A.a Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.
- SCI.9-12.5.1.12.A.3 Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
- SCI.9-12.5.1.12.B.1 Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
- SCI.9-12.5.1.12.B.3 Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
- SCI.9-12.5.1.12.B.4 Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
- SCI.9-12.5.1.12.C.c Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.
- SCI.9-12.5.1.12.C.3 Consider alternative theories to interpret and evaluate evidence-based arguments.
- SCI.9-12.5.1.12.D.a Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.
- SCI.9-12.5.1.12.D.1 Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
- SCI.9-12.5.1.12.D.2 Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
- SCI.9-12.5.1.12.D.c Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.
- SCI.9-12.5.1.12.D.3 Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.
- SCI.9-12.5.3.12.A.b Cellular processes are carried out by many different types of molecules, mostly by the group of proteins known as enzymes.
- SCI.9-12.5.3.12.A.c Cellular function is maintained through the regulation of cellular processes in response to internal and external environmental conditions.
- SCI.9-12.5.3.12.A.3 Predict a cell's response in a given set of environmental conditions.
- SCI.9-12.5.3.12.A.f There is a relationship between the organization of cells into tissues and the organization of tissues into organs. The structures and functions of organs determine their relationships within body systems of an organism.
- SCI.9-12.5.3.12.A.6 Describe how a disease is the result of a malfunctioning system, organ, and cell, and relate this to possible treatment interventions (e.g., diabetes, cystic fibrosis, lactose intolerance).

## Differentiation

Students in the Medical Sciences Learning Center are a homogeneous group. Students will experience a variety of modalities to accommodate all learning styles. Each unit will have visual representations through multimedia presentations and animations, kinesthetic and interpersonal interactions through laboratory activities and manipulation of models; project based assignments and senior externship at CentraState Medical Center.

## Technology

Technology is utilized throughout the units. Multimedia presentations, animations, virtual labs are used to support the content. Students are required to use variety of media including multimedia presentations and desktop publishing software to present research and organize information to better their understanding of the content.

## College and Workplace Readiness

Students will engage in activities that will require higher order thinking skills where analysis, interpretation and evaluation of data in lab and clinical settings are essential for success. Students must be able to collaborate and communicate with others to effectively and efficiently complete research, organize information and manage time effectively to meet deadlines.

# Unit 06 - Honors Human Anatomy/Physiology with Senior Externship

## Environmental Exchange

### Enduring Understandings:

1. Structure relates to function.
2. Human organ systems interrelate with other organ systems.
3. Homeostasis maintains normal operation of the human organism.
4. Age has a variety of effects on the structure and function of the human organism.
5. Collaboration and understanding of the interdisciplinary nature of science will allow for more informed decisions and assessing the risk and benefits of alternative solutions.
6. The medical community is made of many interrelated parts that work together in providing effective and quality health care for all people.

### Essential Questions:

1. How do the structures of the digestive system relate to its function?
2. How does the digestive system interrelate to other organ systems?
3. How does age affect the structure and the functioning of the digestive system?
4. How might losing the ability to regulate the digestive system cause a loss of homeostasis?
5. How do the structures of the respiratory system relate to its function?
6. How does the respiratory system interrelate to other organ systems?
7. How does age affect the structure and the functioning of the respiratory system?
7. How might losing the ability to regulate the respiratory system cause a loss of homeostasis?

### Unit Goals:

1. Students will become familiar with the gross and microscopic organization of the respiratory system.
2. Students will become familiar with the mechanics of breathing, gas exchange, transport of respiratory gases and control of respiration.
3. Students will become familiar with age related changes and the loss of homeostasis in the respiratory system.
4. Students will become familiar with the gross and microscopic organization and control of the digestive system.
5. Students will become familiar with the digestion and absorption of macro and micronutrient.
6. Students will become familiar with age related changes in the digestion system.
7. Students will become familiar with the gross and microscopic organization of the urinary system.
8. Students will become familiar with the functions that maintain body homeostasis.
9. Students will become familiar with the normal formation of urine and describe the characteristics of abnormal components of urine.

**Recommended Duration:** 6 weeks

Guiding/Topical Questions	Content/Themes/Skills	Resources and Materials	Suggested Strategies	Suggested Assessments
<p>What are the six steps in digestion?</p>	<p>Identify the anatomy of the digestive system and explain the physiology of how that structure functions</p> <p>Describe the function of the digestive system and differentiate between organs of the alimentary canal and accessory digestive organs</p> <p>List and define the major processes occurring during digestive system activity</p> <p>Describe the location and function of the peritoneum</p> <p>Define retroperitoneal and name the retroperitoneal organs</p>	<p>Textbook</p> <p>Lab manual</p> <p>Student study guide</p> <p>PhysioEx</p> <p>Multimedia presentations</p>	<p>Teacher-directed multimedia presentations</p> <p>Animation analysis</p> <p>Graphical organizer</p>	<p>Quizzes/tests on concepts and relevant terminology</p> <p>Student generated research &amp; graphic organizers</p> <p>Written and oral responses to academic prompts</p> <p>Lab reports and /or analysis</p> <p>Student/self peer assessment</p>
<p>What are the layers of the digestive tract from most deep to superficial layer?</p>	<p>Describe the tissue composition and the general function of each of the four layers of the alimentary canal</p> <p>Describe the tissue composition and the general function of each of the four layers of the alimentary canal</p>	<p>Textbook</p> <p>Lab manual</p> <p>Student study guide</p> <p>PhysioEx</p> <p>Multimedia presentations</p> <p>Preserved slides</p>	<p>Teacher-directed multimedia presentations</p> <p>Graphical organizer</p> <p>Observe preserved slides</p> <p>Compare contrast layers</p>	<p>Quizzes/tests on concepts and relevant terminology</p> <p>Student generated research &amp; graphic organizers</p> <p>Written and oral responses to academic prompts</p> <p>Lab reports and /or analysis</p> <p>Student/self peer assessment</p>

<p>What role does each of the organs of the digestive system have in the process of digestion?</p>	<p>Describe the anatomy and basic function of each organ and accessory organ of the alimentary canal</p> <p>Explain the dental formula and differentiate clearly between deciduous and permanent teeth</p> <p>Describe the composition and functions of saliva, and explain how salivation is regulated</p> <p>Describe the mechanism of chewing and swallowing</p> <p>Identify structural modifications of the wall of the stomach and small intestine that enhance the digestive process in these regions</p> <p>Describe the composition of gastric juice, name the cell types responsible for secreting its components, and indicate the importance of each component in stomach activity</p> <p>Describe the function of local intestinal hormones</p> <p>List the major functions of the large intestine, and describe the regulation of defecation</p>	<p>Textbook</p> <p>Lab manual</p> <p>Student study guide</p> <p>PhysioEx</p> <p>Multimedia presentations</p> <p>Preserved rabbit</p>	<p>Teacher-directed multimedia presentations</p> <p>Graphical organizers</p> <p>Labs traditional and virtual</p> <p>Rabbit dissection</p>	<p>Quizzes/tests on concepts and relevant terminology</p> <p>Student generated research &amp; graphic organizers</p> <p>Written and oral responses to academic prompts</p> <p>Lab reports and /or analysis</p> <p>Student/self peer assessment</p>
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<p>What regulatory mechanism controls digestion?</p>	<p>Explain the regulation of gastric secretion and stomach motility</p> <p>Describe how entry of pancreatic juice and bile into the small intestine is regulated</p>	<p>Textbook Lab manual Student study guide PhysioEx Multimedia presentations</p>	<p>Teacher-directed multimedia presentations Animation analysis Graphical organization</p>	<p>Quizzes/tests on concepts and relevant terminology Student generated research &amp; graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student/self peer assessment</p>
<p>What role does the accessory organs have in the digestion of the macro &amp; micro nutrient?</p>	<p>State the role of bile and of pancreatic juice in digestion</p>	<p>Textbook Lab manual student study guide PhysioEx Multimedia presentations Preserved rabbit</p>	<p>Teacher-directed multimedia presentations PhysioEx lab Graphical organization Compare contrast</p>	<p>Quizzes/tests on concepts and relevant terminology Student generated research &amp; graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student/self peer assessment</p>
<p>How does the digestive system handle each type of macro and micronutrient?</p>	<p>Define chemical digestion and explain the process as it relates to the breakdown of carbohydrates, proteins, lipids, and nucleic acids</p> <p>Describe the absorption of carbohydrates, proteins, lipids, nucleic acids, vitamins, electrolytes, and water</p>	<p>Text book Lab manual Student study guide Multimedia presentations</p>	<p>Teacher-directed multimedia presentations PhysioEx lab Graphical organization Compare contrast</p>	<p>Quizzes/tests on concepts and relevant terminology Student generated research &amp; graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student/self peer assessment</p>
<p>What effects does age have on the digestive system?</p>	<p>Explain the processes that occur during fetal development of the digestive tract. Underscore the changes in the digestive system that occur with age</p>	<p>Textbook Student study guide PhysioEx Multimedia presentations</p>	<p>Teacher-directed multimedia presentations Student research</p>	<p>Quizzes/tests on concepts and relevant terminology Student generated research &amp; graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student/self peer assessment</p>

<p>What is the organization of the respiratory system &amp; their functions?</p>	<p>Describe the primary functions of the respiratory system. Explain how the delicate respiratory exchange surfaces are protected from pathogens, debris and other hazards</p>	<p>Textbook Lab manual Student study guide PhysioEx Multimedia presentations Preserved rabbit</p>	<p>Teacher-directed multimedia presentations Graphical organizers Histological slides</p>	<p>Quizzes/tests on concepts and relevant terminology Student generated research &amp; graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student/self peer assessment</p>
<p>What are the roles of each respiratory organ in the respiratory system?</p>	<p>Identify the organs of the upper respiratory system and describe their functions Describe how the larynx functions in breathing and production of sound Discuss the structures of the extra pulmonary airway Describe the superficial anatomy of the lungs, the structure of the pulmonary lobule, and the functional anatomy of the alveoli</p>	<p>Textbook Lab manual Student study guide PhysioEx Multimedia presentations Preserved rabbit</p>	<p>Teacher-directed multimedia presentations Graphical representation Rabbit dissection Virtual lab Animation analysis</p>	<p>Quizzes/tests on concepts and relevant terminology Student generated research &amp; graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student/self peer assessment</p>
<p>How is air moved in the respiratory system and how does pressure changes affect air flow?</p>	<p>Define and compare the process of external respiration and internal respiration Describe the major steps involved in external respiration Summarize the physical principles governing the movement of air into the lungs Describe the origins and actions of the respiratory muscles responsible for respiratory movements</p>	<p>Textbook Lab manual Student study guide PhysioEx Multimedia presentations</p>	<p>Teacher-directed multimedia presentations Animation analysis Graphical organization Student analysis partial pressure</p>	<p>Quizzes/tests on concepts and relevant terminology Student generated research &amp; graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student/self peer assessment</p>
<p>How does gas exchange occur How are carbon dioxide and oxygen carried?</p>	<p>Summarize the physical principles governing the diffusion of gases into and out of the blood Explain the important structural features of the respiratory membrane Describe partial pressure of oxygen and carbon dioxide in the alveolar air, blood and systemic circuits</p>	<p>Textbook Lab manual Student study guide PhysioEx Multimedia presentations</p>	<p>Teacher-directed multimedia presentations Animation analysis Graphical organization</p>	<p>Quizzes/tests on concepts and relevant terminology Student generated research &amp; graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student/self peer assessment</p>

<p>What regulatory mechanism controls respiration?</p>	<p>Describe the factors that influence the respiration rate Identify and discuss reflex respiratory activity and the brain involved in the control of respiration</p>	<p>Textbook Lab manual Student study guide PhysioEx Multimedia presentations</p>	<p>Teacher-directed multimedia presentations Graphical organization Lab activity</p>	<p>Quizzes/tests on concepts and relevant terminology Student generated research &amp; graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student/self peer assessment</p>
<p>What changes occur to the respiratory system as one ages?</p>	<p>Identify the changes that occur as one ages</p>	<p>Textbook Lab manual Student study guide PhysioEx Multimedia presentations</p>	<p>Teacher-directed multimedia presentations Student directed research Compare and contrast</p>	<p>Quizzes/tests on concepts and relevant terminology Student generated research &amp; graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student/self peer assessment</p>
<p>What is the structural organization of the kidneys?</p>	<p>Describe the gross anatomy of the kidney and its covering Trace the blood supply through the kidney. Describe the anatomy of the nephron</p>	<p>Textbook Lab manual Student study guide PhysioEx Multimedia presentations Preserved Kidney</p>	<p>Teacher-directed multimedia presentation Graphical organization Lab activity kidney dissection Virtual and traditional Histological preserved samples</p>	<p>Quizzes/tests on concepts and relevant terminology Student generated research &amp; graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student/self peer assessment</p>
<p>How does the kidney function as a filter?</p>	<p>List several kidney functions that help maintain body homeostasis Identify the nephron parts responsible for filtration, reabsorption and secretion, and describe mechanisms underlying each of these functional processes Explain the role of aldosterone and of atrial natriuretic peptide in sodium and water balance Describe the mechanisms responsible for the medullary osmotic gradient Explain formation of dilute versus concentrated urine</p>	<p>Textbook Lab manual Student study guide PhysioEx Multimedia presentations Preserved kidney</p>	<p>Teacher-directed multimedia presentations Graphical organization Lab activity kidney dissection Virtual and traditional Animation analysis</p>	<p>Quizzes/tests on concepts and relevant terminology Student generated research &amp; graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student/self peer assessment</p>

<p>How is urine formed and what can one assess about the components of urine?</p>	<p>Describe the normal physical and chemical properties of urine List several abnormal urine components, and name the condition characterized by the presence of detectable amounts of each</p>	<p>Textbook Lab manual Student study guide PhysioEx Multimedia presentations</p>	<p>Teacher-directed multimedia presentations Student graphical organization Student research urine tests Animation analysis</p>	<p>Quizzes/tests on concepts and relevant terminology Student generated research &amp; graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student/self peer assessment</p>
<p>What is the organization of the urinary system?</p>	<p>Describe the general location, structure and function of the urinary bladder, urethra and ureters</p>	<p>Textbook Lab manual Student study guide PhysioEx Multimedia presentations</p>	<p>Teacher-directed multimedia presentations Student generated graphical organizers Diagram analysis Graphical organizer</p>	<p>Quizzes/tests on concepts and relevant terminology Student generated research &amp; graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student/self peer assessment</p>
<p>What changes occur to the urinary system as one ages?</p>	<p>Trace the embryonic development of the urinary organs List several changes in urinary system anatomy and physiology that occur with age</p>	<p>Textbook Lab manual Student study guide Multimedia presentations</p>	<p>Teacher-directed multimedia presentations Student generated graphical organizers Compare contrast</p>	<p>Quizzes/tests on concepts and relevant terminology Student generated research &amp; graphic organizers Written and oral responses to academic prompts Lab reports and /or analysis Student/self peer assessment</p>

SCI.9-12.5.1.12.A.a	Mathematical, physical, and computational tools are used to search for and explain core scientific concepts and principles.
SCI.9-12.5.1.12.A.1	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
SCI.9-12.5.1.12.A.3	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
SCI.9-12.5.1.12.B.1	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.
SCI.9-12.5.1.12.B.3	Revise predictions and explanations using evidence, and connect explanations/arguments to established scientific knowledge, models, and theories.
SCI.9-12.5.1.12.B.4	Develop quality controls to examine data sets and to examine evidence as a means of generating and reviewing explanations.
SCI.9-12.5.1.12.C.c	Science is a practice in which an established body of knowledge is continually revised, refined, and extended as new evidence emerges.
SCI.9-12.5.1.12.C.3	Consider alternative theories to interpret and evaluate evidence-based arguments.
SCI.9-12.5.1.12.D.a	Science involves practicing productive social interactions with peers, such as partner talk, whole-group discussions, and small-group work.
SCI.9-12.5.1.12.D.1	Engage in multiple forms of discussion in order to process, make sense of, and learn from others' ideas, observations, and experiences.
SCI.9-12.5.1.12.D.2	Represent ideas using literal representations, such as graphs, tables, journals, concept maps, and diagrams.
SCI.9-12.5.1.12.D.c	Ensure that instruments and specimens are properly cared for and that animals, when used, are treated humanely, responsibly, and ethically.
SCI.9-12.5.1.12.D.3	Demonstrate how to use scientific tools and instruments and knowledge of how to handle animals with respect for their safety and welfare.
SCI.9-12.5.3.12.A.b	Cellular processes are carried out by many different types of molecules, mostly by the group of proteins known as enzymes.
SCI.9-12.5.3.12.A.c	Cellular function is maintained through the regulation of cellular processes in response to internal and external environmental conditions.
SCI.9-12.5.3.12.A.3	Predict a cell's response in a given set of environmental conditions.
SCI.9-12.5.3.12.A.f	There is a relationship between the organization of cells into tissues and the organization of tissues into organs. The structures and functions of organs determine their relationships within body systems of an organism.
SCI.9-12.5.3.12.A.6	Describe how a disease is the result of a malfunctioning system, organ, and cell, and relate this to possible treatment interventions (e.g., diabetes, cystic fibrosis, lactose intolerance).

## Differentiation

Students in the Medical Sciences Learning Center are a homogeneous group. Students will experience a variety of modalities to accommodate all learning styles. Each unit will have visual representations through multimedia presentations and animations, kinesthetic and interpersonal interactions through laboratory activities and manipulation of models; project based assignments and senior externship at CentraState Medical Center.

## Technology

Technology is utilized throughout the units. Multimedia presentations, animations, virtual labs are used to support the content. Students are required to use variety of media including multimedia presentations and desktop publishing software to present research and organize information to better their understanding of the content.

## College and Workplace Readiness

Students will engage in activities that will require higher order thinking skills where analysis, interpretation and evaluation of data in lab and clinical settings are essential for success. Students must be able to collaborate and communicate with others to effectively and efficiently complete research, organize information and manage time effectively to meet deadlines.