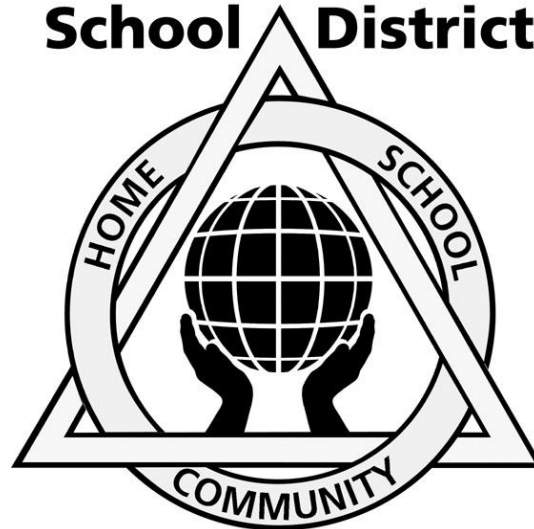


**Anatomy & Physiology  
Science Curriculum  
Francis Howell School District**

**Francis Howell  
School District**



**LEARNING TOGETHER**

**Board Approved: April 21, 2011**

# **Francis Howell School District**

## **Mission Statement**

Francis Howell School District is a learning community where all students reach their full potential.

## **Vision Statement**

Francis Howell School District is an educational leader that builds excellence through a collaborative culture that values students, parents, employees, and the community as partners in learning.

## **Values**

Francis Howell School District is committed to:

- Providing a consistent and comprehensive education that fosters high levels of academic achievement for all
- Operating safe and well-maintained schools
- Promoting parent, community, student, and business involvement in support of the school district
- Ensuring fiscal responsibility
- Developing character and leadership

## **Francis Howell School District Graduate Goals**

Upon completion of their academic study in the Francis Howell School District, students will be able to:

1. Gather, analyze and apply information and ideas.
2. Communicate effectively within and beyond the classroom.
3. Recognize and solve problems.
4. Make decisions and act as responsible members of society.

## **Science Graduate Goals**

The students in the Francis Howell School District will graduate with the knowledge, skills, and attitudes essential to leading a productive, meaningful life.

Graduates will:

- Understand and apply principles of scientific investigation.
- Utilize the key concepts and principles of life, earth, and physical science to solve problems.
- Recognize that science is an ongoing human endeavor that helps us understand our world.
- Realize that science, mathematics, and technology are interdependent, each with strengths and limitations that impact the environment and society.
- Use scientific knowledge and scientific ways of thinking for individual and social purposes.

## **Course Rationale**

Science education develops science literacy. Scientific literacy is the knowledge and understanding of scientific concepts and processes required for personal decision making, participation in civic and cultural affairs, and economic productivity. A sound grounding in science strengthens many of the skills that people use every day, like solving problems creatively, thinking critically, working cooperatively in teams, using technology effectively, and valuing life-long learning. Scientific literacy has become a necessity for everyone.

To accomplish this literacy, science courses will reflect the following:

- Develop scientific reasoning and critical thinking skills.
- Extend problem-solving skills using scientific methods.
- Include lab-based experiences.
- Strengthen positive attitudes about science.
- Incorporate the use of new technologies.
- Provide relevant connections to personal and societal issues and events.

## Course Description

### Physical Science – Course # 131231

**Credit:** 1 unit

**Prerequisite:** Completion of Biology with a “C” or better recommended or teacher recommendation

This is a rigorous course where students will study medical terminology, eleven body systems and their associated organs, and diseases associated with each human system. Students will learn through inquiry based lessons and laboratory experiences including dissections. This course requires a high degree of independent initiative.

### **Coding:**

The Learner Objectives and the concepts are coded to the National Science Education Standards (NSES) and the Student To Do statements are coded to both NSES and the Concepts within the strand.

**Example: (C1a; A)**

“C1a” aligns to the National Science Education Standards

“A” aligns to the concept on the strand

### Francis Howell School District Physical Science Curriculum Writers

Dawn Hahn  
Gayle Perman

Secondary Content Leader  
Director of Student Learning

Donna Taylor  
Travis Bracht

Chief Academic Office  
Superintendent

Mary Hendricks-Harris  
Dr. Pam Sloan

## Francis Howell School District Human Anatomy and Physiology Curriculum Map

### First Semester

<b><u>Fundamentals of Anatomy</u></b>	<b><u>Cell Structure and Tissues</u></b>	<b><u>Skeletal System</u></b>	<b><u>Muscular System</u></b>	<b><u>Digestive/Urinary Systems</u></b>
<ul style="list-style-type: none"> <li>● Directional terms</li> <li>● Planes of the body</li> <li>● Body cavities</li> <li>● Feedback systems</li> <li>● Homeostasis</li> <li>● Chemical reactions</li> <li>● Universal functions of living things</li> <li>● Hierarchical organization of the human body</li> </ul> <p style="text-align: center; margin-top: 20px;">2 week</p>	<ul style="list-style-type: none"> <li>● Cell membrane structure and function</li> <li>● Membrane transport</li> <li>● Cell organelles</li> <li>● Cell nucleus</li> <li>● Process of protein synthesis</li> <li>● Mitosis</li> <li>● Body tissues</li> </ul> <p style="text-align: center; margin-top: 20px;">3 weeks</p>	<ul style="list-style-type: none"> <li>● Skeletal system function</li> <li>● Compact and spongy bone</li> <li>● Remodeling and repair</li> <li>● Axial and appendicular skeleton</li> <li>● Joints</li> <li>● Disease of the skeletal system</li> </ul> <p style="text-align: center; margin-top: 20px;">4 weeks</p>	<ul style="list-style-type: none"> <li>● Muscle movements</li> <li>● Muscle tissues</li> <li>● Sliding filament theory of muscle contraction</li> <li>● Aerobic and anerobic cellular respiraton</li> <li>● Muscular disease.</li> </ul> <p style="text-align: center; margin-top: 20px;">3 weeks</p>	<ul style="list-style-type: none"> <li>● Chemical and mechanical digestion</li> <li>● Absorption and secretion</li> <li>● Exocrine glands and chemical digestion</li> <li>● Layers of the digestive tract</li> <li>● Sequence of food through the digestive tract</li> <li>● Pairetal, visceral, and mesentery membranes</li> <li>● Anabolism</li> <li>● Catabolism</li> <li>● Filtration, secretion and reabsorption of the urinary system</li> <li>● Pattern of urine production and flow</li> <li>● Urinary diseases.</li> </ul> <p style="text-align: center; margin-top: 20px;">3 weeks</p>



**Second Semester**

<u>Nervous System</u>	<u>Senses/Integumentary System</u>	<u>Cardiovascular System</u>	<u>Respiratory System</u>	<u>Reproduction</u>
<ul style="list-style-type: none"> <li>● Function</li> <li>● Action potentials</li> <li>● Types of neurons</li> <li>● Brain and spinal cord</li> <li>● Reflex arc</li> <li>● Regions of the brain</li> <li>● Disorders of the nervous system</li> </ul> <p style="text-align: center;">5 weeks</p>	<ul style="list-style-type: none"> <li>● Function</li> <li>● Structural features of the epidermis</li> <li>● Skin color</li> <li>● Regulation of body temperature</li> <li>● Effects of UV and role of melanocytes</li> <li>● Skin's response to injury and repair</li> <li>● Skin diseases</li> <li>● General and special senses</li> <li>● Receptors for general senses</li> <li>● Receptors for olfaction</li> <li>● Receptors for taste</li> <li>● Receptors for vision</li> <li>● Color vision</li> <li>● Equilibrium</li> <li>● Hearing</li> </ul> <p style="text-align: center;">3 weeks</p>	<ul style="list-style-type: none"> <li>● Blood clotting</li> <li>● Leucocytes and disease</li> <li>● Erythrocytes and distribution of oxygen</li> <li>● Plasma and formed elements</li> <li>● Tissue layers of the heart</li> <li>● EKG</li> <li>● Blood types</li> <li>● Blood vessels</li> <li>● Blood flow</li> <li>● Fetal and adult circulation</li> <li>● Systolic and diastolic blood pressure</li> <li>● Cardiovascular diseases</li> </ul> <p style="text-align: center;">4 weeks</p>	<ul style="list-style-type: none"> <li>● Gas exchange</li> <li>● Path of air through respiratory system</li> <li>● Process of ventilation</li> <li>● Measured capacities of the lungs</li> <li>● Respiratory diseases.</li> </ul> <p style="text-align: center;">3 weeks</p>	<ul style="list-style-type: none"> <li>● Organs of the male and female reproductive systems</li> <li>● Formation of sperm cells and egg cells</li> <li>● Roles of hormones</li> <li>● Fertilization, implantation and development</li> <li>● Events in pregnancy</li> <li>● Diseases/disorders of the reproductive system</li> </ul> <p style="text-align: center;">3 weeks</p>

\* **Mammalian Dissection Unit** – Optional unit with activities to reinforce and enrich the curriculum are included in the Appendix.



<b>Content Area: Science</b>	<b>Course: Anatomy and Physiology</b>	<b>Strand/Topic: Fundamentals of Anatomy</b>
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**Learner Objectives:**

- There is a hierarchical organization of the human body which demonstrates the relationship between form and function. C

**Concepts**

- A. The language of anatomy is essential to the understanding of the structure and function of the human body. C1
- B. The body is arranged in an increasingly complex series of levels from atoms to organ systems. C1
- C. Homeostasis maintains human health through positive and negative feedback mechanisms. B3
- D. There are important chemical reactions necessary for maintaining the body's metabolism. B3

<b>Students Should Know</b>	<b>Students Should Be Able to</b>
<ul style="list-style-type: none"> <li>• There are eight levels of organization in the human body.</li> <li>• There are eleven organ systems of the body, each having specific organs and functions.</li> <li>• DNA contains information on how to make the proteins which determine the components that make up our traits.</li> <li>• The sum of all chemical reactions in the human body is referred to as our metabolism.</li> <li>• Organelles, cells, organs and systems all rely on each other (are interdependent) for functioning of the human body.</li> </ul>	<ul style="list-style-type: none"> <li>• Demonstrate the location of specific directional terms. (C1f; A)</li> <li>• Name and describe the major planes of the body. (C1f; A)</li> <li>• Name and locate major body cavities. C1f; A)</li> <li>• Explain the processes of positive and negative feedback systems. (B3a; C)</li> <li>• Explain how and why the body maintains internal balances and limits by homeostasis. (B3a; C)</li> <li>• Explain why chemical reactions in the body are important. (B3a; D)</li> <li>• Identify the basic functions performed by all living organisms. (C1a; C)</li> <li>• Sequence the levels of organization within the human body. (C1f; B)</li> </ul>

**Instructional Support**

<b>Student Essential Vocabulary</b>					
Anatomy	Physiology	Negative feedback	Positive feedback	Anatomical position	Homeostasis
Metabolism	Disease	Receptor	Control center	Effector	Stimulus
Response	Dissection	Peritoneum	Frontal plane	Sagittal plane	Transverse plane

Diaphragm	Viscera	Organic Molecules			
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<b>Readiness &amp; Equity Section</b>			
<b>SLA = Sample Learning Activities &amp; SA = Sample Assessments</b>			
21 <sup>st</sup> Century Themes		Non Fiction Reading & Writing	
Learning & Innovation Skills	SLA/SA	Enrichment Opportunity	
Information, Media, & Technology Skills		Intervention Opportunity	
Life & Career Skills		Gender, Ethnic, & Disability Equity	

<b>Sample Learning Activities</b>	<b>Sample Assessments</b>
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**Learning Activity #1 : (See Appendix A)**

**Autopsy of a Pickle –**

Students will use anatomical reference terms, directions, and planes to perform a dissection of a dill pickle. Students will draw analogies between the anatomical terminology of an inanimate object with regard to the actual body regions, cavities, and regions of an actual human victim. Students will learn the technique called crime scene investigation as well as the background and importance of autopsy in the real world.

Activity's Alignment	
NSES	C1f; A
CONTENT	CA3, SC3
PROCESS	1.6-Discover/evaluate relationships 3.5-Reason logically
DOK	2 – Skill/Concept
INSTRUCTIONAL STRATEGIES	Similarities and Differences Non-linguistic Representations

**Assessment #1:**

**Formative Assessment Anatomical References Exit Card –**

Students will draw an outline of their hand on a sheet of paper. Teacher will have students label the diagram with various directional terms and planes.

**Terms: proximal, superior, distal, inferior, medial, lateral intermediate, transverse plane**

**Scoring Guide**

**3 Points – Student has correctly identified 6-8 of structures.**

**2 Points – Student has correctly identified 3-5 of structures.**

Assessment's Alignment	
NSES	C1f; A
CONTENT	SC3
PROCESS	1.6 Discover/evaluate relationships
DOK	2-Skill/Concept
LEVEL OF EXPECTATION	Mastery Level – 85%

Readiness & Equity Section			
SLA = Sample Learning Activities & SA = Sample Assessments			
21 <sup>st</sup> Century Themes	SLA/SA	Non Fiction Reading & Writing	
Learning & Innovation Skills		Enrichment Opportunity	
Information, Media, & Technology Skills		Intervention Opportunity	
Life & Career Skills		Gender, Ethnic, & Disability Equity	

Sample Learning Activities		Sample Assessments																												
<p><b>Learning Activity #2 : (See Appendix B)</b>  <b>Feedback Systems</b> – Students will refer to notes to create new example of feedback loop not discussed in class. Students will have already taken notes and had discussion over concept.</p> <p><b>Scoring Guide</b>  <b>3 Points</b> – Student has correctly identified 4 structures.  <b>2 Points</b> – Student has correctly identified 2-3 of structures.  <b>1 Point</b> – Student has correctly identified 1-2 of structures.</p>		<p><b>Assessment #2: (See Appendix C)</b>  <b>Components of Feedback Loops</b> – Students will evaluate several examples of feedback loops. If all components are present, students will sequence and label each component from the example.</p> <p><b>Key –</b></p> <table border="1"> <thead> <tr> <th>Example</th> <th>Receptor</th> <th>Control Center</th> <th>Effector</th> <th>Stimulus Removed</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Pain receptor</td> <td>Brain</td> <td>Muscle contraction</td> <td>Over exertion</td> </tr> <tr> <td>2</td> <td>Eye</td> <td>Brain</td> <td>Tear Ducts</td> <td>Oil from onion</td> </tr> <tr> <td>3</td> <td>Light Receptor</td> <td>Brain</td> <td>Muscles of Iris</td> <td>Excess Light</td> </tr> </tbody> </table>					Example	Receptor	Control Center	Effector	Stimulus Removed	1	Pain receptor	Brain	Muscle contraction	Over exertion	2	Eye	Brain	Tear Ducts	Oil from onion	3	Light Receptor	Brain	Muscles of Iris	Excess Light				
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Student Resources	Teacher Resources
<p><b>General:</b></p> <ul style="list-style-type: none"> <li>• <i>Essentials of Anatomy &amp; Physiology</i>, third edition, Martini/Bartholomew</li> </ul> <p><b>Enrichment:</b></p> <p><b>Intervention:</b></p>	<p><b>General:</b></p> <ul style="list-style-type: none"> <li>• <i>Essentials of Anatomy &amp; Physiology</i>, third edition, Martini/Bartholomew</li> </ul> <p><b>Enrichment:</b></p> <p><b>Intervention:</b></p>

NOTE: These sections will be partially completed during the curriculum writing process and finalized during the year one review process.

<b>Content Area: Science</b>	<b>Course: Anatomy and Physiology</b>	<b>Strand/Topic: Cell Structure and Tissues</b>
<p><b>Learner Objectives:</b></p> <ul style="list-style-type: none"> <li>• The cell is the basic unit of structure and function and is organized into tissues. (C)</li> </ul>		

## Concepts

- A. Cell function is determined by its size, shape, and components. (C1)
- B. The cell membrane regulates what enters and leaves the cell. (C1)
- C. All cells undergo common processes including protein synthesis and reproduction. (C1)
- D. There are four primary tissues of the human body: epithelial, connective, muscular, and nervous. (C1)


Students Should Know	Students Should Be Able to
<ul style="list-style-type: none"> <li>● The structure of the cell membrane.</li> <li>● The cell membrane regulates what enters and leaves the cell through passive and active processes.</li> <li>● Cell organelles have different functions and these functions are essential to main the homeostasis of the cell.</li> <li>● DNA in the nucleus to directs cell activities and controls protein synthesis</li> <li>● The stages of the somatic cell cycle</li> <li>● There are four primary tissues of the human body and each type has specific functions and characteristics.</li> </ul>	<ul style="list-style-type: none"> <li>● Explain the functions of the cell membrane and the structures that enable it to perform those functions. (C1a; A)</li> <li>● Describe the various mechanisms that cells use to transport substances across the cell membrane. (C1a; B)</li> <li>● Describe the organelles of a typical cell and indicate their specific functions. (C1a; A)</li> <li>● Explain the functions of the cell nucleus (C1a; A, C)</li> <li>● Summarize the process of protein synthesis. (C1c; C)</li> <li>● Describe the process of mitosis and explain its significance. (C1f; C)</li> <li>● Define differentiation, and explain its importance. (C1f; D)</li> <li>● Identify the body’s four major types of tissues and their roles. (C1f; D)</li> <li>● Discuss the types and functions of epithelial cells. (C1f; D)</li> <li>● Compare the structures and functions of the various types of connective tissues.(C1f; D)</li> <li>● Explain how epithelial and connective tissues combine to form four types of membranes and specify the functions of each. (C1f; D)</li> <li>● Describe the three types muscle tissue and the special structural features of each type. (C1f; D)</li> <li>● Discuss the basic structure and role of neural tissue. (C1f; D)</li> <li>● Explain how tissues respond in a coordinated manner to maintain homeostasis (C1f; D)</li> </ul>

## Instructional Support

Student Essential Vocabulary					
Active transport	Organelles	Nucleus	Transcriptions	Tissue	Muscular tissue

Cytoplasm	Gene	Mitosis	Translation	Epithelium	Nervous Tissue
Diffusion	Ribosome	Osmosis	Stem cell	Connective Tissue	Membrane
ECF	ICF	ATP			

Readiness & Equity Section			
SLA = Sample Learning Activities & SA = Sample Assessments			
21 <sup>st</sup> Century Themes	SLA	Non Fiction Reading & Writing	
Learning & Innovation Skills	SLA,SA	Enrichment Opportunity	
Information, Media, & Technology Skills	SLA	Intervention Opportunity	
Life & Career Skills		Gender, Ethnic, & Disability Equity	

Sample Learning Activities	Sample Assessments												
<p><b>Learning Activity #1 : (See Appendix D for ppt)</b>  <b>Case Study: Take Two and Call Me in the Morning: A case study in cell structure and function</b>            Using an interrupted case study, students apply their understanding of cell structure and function to discover the cause and treatment of a disease. Two class periods to present the case plus pre-case homework.</p> <p>This is an activity from the case study collection of the National Center for Case Study Teaching in Science.            Go to their website:  <a href="http://sciencecases.lib.buffalo.edu/">http://sciencecases.lib.buffalo.edu/</a>  </p> <p>On the website you will find Case Collections.            Do a key word search (Take Two and Call me in the Morning)            Once you are on the web page for this activity:            View the policy on the copyright and usage for this case study by going to <i>Guidelines for Using Our Cases</i>.            Register as an instructor by going to <i>Applying for a Password to Access Our Answer Keys</i>.            Download PowerPoint by clicking on <i>Anatomy and Physiology</i>; scroll down to the case study, <i>Take Two and Call Me in the Morning</i>, click into the case where you will have the option to download the PowerPoint, student hand outs and/or teaching notes. (Power point found in the electronic appendix.)            The pre and post questions are a part of the answer key found in the teaching notes.</p>	<p><b>Assessment #1: (See Appendix E)</b>  <b>Life is Cellular:</b> A set of multiple -choice questions that assesses the student’s understanding of the differences between prokaryotes, eukaryotes and viruses.</p> <table border="1"> <thead> <tr> <th colspan="2">Assessment’s Alignment</th> </tr> </thead> <tbody> <tr> <td>NSES</td> <td>C1a, C1b; Concept A</td> </tr> <tr> <td>CONTENT</td> <td>SC3</td> </tr> <tr> <td>PROCESS</td> <td>1.10-Apply information, ideas and skills 3.5-Reason logically (inductive/deductive)</td> </tr> <tr> <td>DOK</td> <td>2 – Skill/Concept</td> </tr> <tr> <td>LEVEL OF EXPECTATION</td> <td>Mastery Level - 75%</td> </tr> </tbody> </table>	Assessment’s Alignment		NSES	C1a, C1b; Concept A	CONTENT	SC3	PROCESS	1.10-Apply information, ideas and skills 3.5-Reason logically (inductive/deductive)	DOK	2 – Skill/Concept	LEVEL OF EXPECTATION	Mastery Level - 75%
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DOK	2 – Skill/Concept												
LEVEL OF EXPECTATION	Mastery Level - 75%												



It is important to view the instructor material prior to presenting this case study in class.

Note: Teachers may want to modify the student handout.

Activity's Alignment	
NSES	C1a, C1b; Concepts A,B,C
CONTENT	SC3 ,SC4, SC7
PROCESS	1.7-Evaluate information 1.8-Organize data and ideas 1.10- Apply information, ideas and skills
DOK	4-Extended thinking
INSTRUCTIONAL STRATEGIES	Generating and Testing Hypotheses Identifying Similarities and Differences

Readiness & Equity Section			
SLA = Sample Learning Activities & SA = Sample Assessments			
21 <sup>st</sup> Century Themes		Non Fiction Reading & Writing	

Learning & Innovation Skills		Enrichment Opportunity	
Information, Media, & Technology Skills	SLA	Intervention Opportunity	
Life & Career Skills		Gender, Ethnic, & Disability Equity	

Sample Learning Activities	Sample Assessments																								
<p><b>Learning Activity #2 : (See Appendix F)</b>  <b>Human Tissue Lab:</b> A series of exercises in which the student observes human tissues using prepared slides and answers questions that describe the characteristics of the four types of human tissues.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">Activity's Alignment</th> </tr> </thead> <tbody> <tr> <td style="width: 20%;">NSES</td> <td>C1a, C1f; Concept D</td> </tr> <tr> <td>CONTENT</td> <td>SC3</td> </tr> <tr> <td>PROCESS</td> <td>1.7- Evaluate information 1.10 – Apply information, ideas, and skills 1.6 – Discover/evaluate relationships</td> </tr> <tr> <td>DOK</td> <td>2-Skill/Concept</td> </tr> <tr> <td>INSTRUCTIONAL STRATEGIES</td> <td>Identifying Similarities and Differences Cooperative Learning</td> </tr> </tbody> </table>	Activity's Alignment		NSES	C1a, C1f; Concept D	CONTENT	SC3	PROCESS	1.7- Evaluate information 1.10 – Apply information, ideas, and skills 1.6 – Discover/evaluate relationships	DOK	2-Skill/Concept	INSTRUCTIONAL STRATEGIES	Identifying Similarities and Differences Cooperative Learning	<p><b>Assessment #2: (See Appendix G)</b>  <b>Tissues of the Human Body Assessment:</b> Students will identify 10 different tissues of the human body from micrographs presented in a PowerPoint.</p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th colspan="2" style="text-align: center;">Assessment's Alignment</th> </tr> </thead> <tbody> <tr> <td style="width: 20%;">NSES</td> <td>C1a, C1f; Concept D</td> </tr> <tr> <td>CONTENT</td> <td>SC3</td> </tr> <tr> <td>PROCESS</td> <td>1.10-Apply information, ideas and skills</td> </tr> <tr> <td>DOK</td> <td>2-Skill/Concept</td> </tr> <tr> <td>LEVEL OF EXPECTATION</td> <td>Mastery Level - 80%</td> </tr> </tbody> </table>	Assessment's Alignment		NSES	C1a, C1f; Concept D	CONTENT	SC3	PROCESS	1.10-Apply information, ideas and skills	DOK	2-Skill/Concept	LEVEL OF EXPECTATION	Mastery Level - 80%
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Student Resources	Teacher Resources
<p><b>General:</b></p> <ul style="list-style-type: none"> <li>● <u>Essentials of Anatomy and Physiology</u> 3ed. Martini/Bartholomew</li> <li>● <a href="http://www.anatomyandphysiology.com">www.anatomyandphysiology.com</a> – On-line student resource</li> </ul> <p><b>Enrichment:</b></p> <p><b>Intervention:</b></p>	<p><b>General:</b></p> <ul style="list-style-type: none"> <li>● <u>National Center for Case Study Teaching in Science</u> <a href="http://sciencecases.lib.buffalo.edu/">http://sciencecases.lib.buffalo.edu/</a>.</li> <li>● <u>Essentials of Anatomy and Physiology</u> 3ed. Martini/Bartholomew</li> </ul> <p><b>Enrichment:</b></p> <p><b>Intervention:</b></p>

<b>Content Area: Science</b>	<b>Course: Anatomy and Physiology</b>	<b>Strand/Topic: Skeletal System</b>
<b>Learner Objectives:</b>		
<ul style="list-style-type: none"> <li>The skeletal system provides structure, movement, and homeostasis. (C)</li> </ul>		

**Concepts**

- A. The five functions of the skeletal system are: support, storage, blood cell production, protection, and leverage. (C1)
- B. The functional unit of compact bone is the osteon; spongy bone has a lamellae that form trabeculae. (C1)
- C. The human skeleton is comprised of 206 bones, which are divided into axial and appendicular divisions. (C1)
- D. Articulations are the connections between bones of the skeleton and determine the type of movement. (C1)
- E. The skeletal system responds to injury and disease. (C1)

Students Should Know	Students Should Be Able to
<ul style="list-style-type: none"> <li>The functions of the skeletal system include protection, support, blood production, leverage and storage of minerals.</li> <li>Osteocytes are organized into osteons in compact bone</li> <li>Spongy bone contains red bone marrow which is the site of hemopoiesis</li> <li>Mineral deposition and turnover are regulated by homeostatic mechanisms</li> <li>Identify common bones and describe them as being part of the axial or appendicular skeleton.</li> <li>Identify types of joints and their movements</li> </ul>	<ul style="list-style-type: none"> <li>Describe the functions of the skeletal system (C1f; A)</li> <li>Compare the structures and functions of compact and spongy bones. (C1f; B)</li> <li>Describe remodeling and repair of the skeleton. Discuss homeostatic mechanisms responsible for regulating mineral deposition and turnover. (C1f; A)</li> <li>Distinguish between the components and functions of the axial and appendicular skeletons. (C1f; B)</li> <li>Compare and contrast the different types of joints, linking structural features to joint functions and mobility(C1f; D)</li> <li>Explain how various diseases of the skeletal system affect the body. C1f, F1; E)</li> </ul>

**Instructional Support**

Student Essential Vocabulary					
Amphiarthrosis	Articulation	Bursa	Osteoblast	Periosteum	Ligament
Meniscus	Diaphysis	Epiphysis	Osteoclast	Synarthrosis	Marrow
Osteon	Synovial fluid	Spongy bone	Compact bone	Diarthrosis	Osteocyte
hemopoiesis					

Readiness & Equity Section			
SLA = Sample Learning Activities & SA = Sample Assessments			
21 <sup>st</sup> Century Themes		Non Fiction Reading & Writing	
Learning & Innovation Skills	SLA,SA	Enrichment Opportunity	
Information, Media, & Technology Skills	SLA	Intervention Opportunity	
Life & Career Skills		Gender, Ethnic, & Disability Equity	

Sample Learning Activities	Sample Assessments																								
<p><b>Learning Activity #1 : (See Appendix H)</b>  <b>Bone Investigation:</b> In this activity, students make observations on different examples of skeletal bones that the instructor has obtained from a butcher of either cattle or pigs. As the students move from station to station, they identify the parts of long bones, the different types of cartilage, and the differences between spongy bone and compact bone. They also locate the epiphyseal plate, identify synovial joints, tendons and ligaments. A sample of the lab stations is included, but the lab varies each time based upon the available bones.</p> <table border="1"> <thead> <tr> <th colspan="2">Activity's Alignment</th> </tr> </thead> <tbody> <tr> <td>NSES</td> <td>C1a, C1f; Concepts A, B, D</td> </tr> <tr> <td>CONTENT</td> <td>SC3</td> </tr> <tr> <td>PROCESS</td> <td>1.3-Design/conduct investigations 1.7-Evaulate information 1.10-Applyinformation 3.5-Reason logically (inductive/deductive)</td> </tr> <tr> <td>DOK</td> <td>2-Skill/concept</td> </tr> <tr> <td>INSTRUCTIONAL STRATEGIES</td> <td>Cooperative Learning Cues, Questions, and Advance Organizers</td> </tr> </tbody> </table>	Activity's Alignment		NSES	C1a, C1f; Concepts A, B, D	CONTENT	SC3	PROCESS	1.3-Design/conduct investigations 1.7-Evaulate information 1.10-Applyinformation 3.5-Reason logically (inductive/deductive)	DOK	2-Skill/concept	INSTRUCTIONAL STRATEGIES	Cooperative Learning Cues, Questions, and Advance Organizers	<p><b>Assessment #1: (See Appendix I)</b>  <b>Bone Structure Quiz:</b>  Students label a diagram of a long bone and answer application questions about bone structure.</p> <table border="1"> <thead> <tr> <th colspan="2">Assessment's Alignment</th> </tr> </thead> <tbody> <tr> <td>NSES</td> <td>C1a, C1f; Concepts A, B, D</td> </tr> <tr> <td>CONTENT</td> <td>SC3</td> </tr> <tr> <td>PROCESS</td> <td>1.7-Evaluate information 1.8-Organize data and ideas 1.10-Apply information</td> </tr> <tr> <td>DOK</td> <td>2-Skill/concept</td> </tr> <tr> <td>LEVEL OF EXPECTATION</td> <td>Mastery Level - 80%</td> </tr> </tbody> </table>	Assessment's Alignment		NSES	C1a, C1f; Concepts A, B, D	CONTENT	SC3	PROCESS	1.7-Evaluate information 1.8-Organize data and ideas 1.10-Apply information	DOK	2-Skill/concept	LEVEL OF EXPECTATION	Mastery Level - 80%
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<b>Readiness &amp; Equity Section</b>			
<b>SLA = Sample Learning Activities &amp; SA = Sample Assessments</b>			
21 <sup>st</sup> Century Themes		Non Fiction Reading & Writing	SLA
Learning & Innovation Skills	SLA	Enrichment Opportunity	
Information, Media, & Technology Skills		Intervention Opportunity	
Life & Career Skills	SLA	Gender, Ethnic, & Disability Equity	

<b>Sample Learning Activities</b>	<b>Sample Assessments</b>
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**Learning Activity #2 : (See Appendix J)****Sherlock Bones: The Case of the Mixed-Up Bones**

Students sort the bones from two different skeletons and determine the sex and race based upon sexual and racial parameters.

*(This activity requires at least two sets of bones that consist of: a skull, a pelvis, a femur, and a humerus of different sexes or races. The activity also requires Vernier calipers.)*

Activity's Alignment	
NSES	C1a, C1f; Concept C
CONTENT	SC3, SC7
PROCESS	1.3-Design/conduct investigations 1.7-Evaluate information 1.8-Organize data and ideas 1.10-Apply information 3.5-Reason logically (inductive/deductive)
DOK	3-Strategic Thinking
INSTRUCTIONAL STRATEGIES	Cooperative Learning Cues, Questions, and Advance Organizers

**Assessment #2:****Skeletal System Critical Thinking**

Students are assessed on their understanding of the skeletal system by providing short answers to the following questions. (5 pts)

**1. While playing on her swing set, 10-year-old Sally falls and breaks her right leg. At the emergency room, the physician tells Sally's parents that the proximal end of the tibia, where the epiphysis meets the diaphysis, is fractured. The fracture is properly set and eventually heals. During a routine physical when she is 18, Sally learns that her right leg is 2 cm shorter than her left, probably because of her accident. What might account for this difference?**

*Answer: The fracture might have damaged the epiphyseal cartilage in Sally's right leg. (1pt) Even though the bone healed properly, the damaged leg did not produce as much cartilage as did the undamaged leg. The result would be a shorter bone on the side of the injury. (1pt)*

**2. While working at an excavation, an archaeologist finds several small skull bones. She examines the frontal, parietal, and occipital bones and concludes that the skulls are those of children not yet 1 year of old. How can she tell their ages from examining the bones?**

*Answer: The large bones of a child cranium are not yet fused; they are connected by areas of connective tissue called fontanelles. (1pt) By examining the bones, the archaeologist could readily see if sutures had formed yet. (1pt) By knowing how long it takes for the various fontanelles to close and by determining the sizes of the fontanelles, she could make a good estimation of the child's age. (1pt)*

Assessment's Alignment	
NSES	SC3
CONTENT	C1a, C1f, Concepts C, D, E
PROCESS	1.6 -Discover/evaluate relationships

		1.7 -Evaluate information 1.10- Apply information, ideas and skills
	DOK	2 –Skill/Concept
	LEVEL OF EXPECTATION	Mastery Level - 80%

Student Resources	Teacher Resources
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Student Resources	Teacher Resources
<p><b>General:</b></p> <ul style="list-style-type: none"> <li>Essentials of Anatomy &amp; Physiology (2003)</li> <li><a href="http://highered.mcgraw-hill.com/sites/0072495855/student_view0/">http://highered.mcgraw-hill.com/sites/0072495855/student_view0/</a></li> <li><a href="http://www.bbc.co.uk/science/humanbody/">http://www.bbc.co.uk/science/humanbody/</a></li> </ul> <p><b>Enrichment:</b></p> <p><b>Intervention:</b></p> <ul style="list-style-type: none"> <li><a href="http://www.nlm.nih.gov/medlineplus/tutorials.html">http://www.nlm.nih.gov/medlineplus/tutorials.html</a></li> <li><a href="http://www.medindia.net/index.htm">http://www.medindia.net/index.htm</a></li> </ul> <p><a href="http://www.wiley.com/college/apcentral/anatomydrill/">http://www.wiley.com/college/apcentral/anatomydrill/</a></p>	<p><b>General:</b></p> <ul style="list-style-type: none"> <li>Essentials of Anatomy &amp; Physiology (2003)</li> <li><a href="http://highered.mcgraw-hill.com/sites/0072495855/student_view0/">http://highered.mcgraw-hill.com/sites/0072495855/student_view0/</a></li> <li><a href="http://www.bbc.co.uk/science/humanbody/">http://www.bbc.co.uk/science/humanbody/</a></li> <li><a href="http://www.nlm.nih.gov/medlineplus/tutorials.html">http://www.nlm.nih.gov/medlineplus/tutorials.html</a></li> <li><a href="http://www.medindia.net/index.htm">http://www.medindia.net/index.htm</a></li> <li><a href="http://www.wiley.com/college/apcentral/anatomydrill/">http://www.wiley.com/college/apcentral/anatomydrill/</a></li> </ul> <p><b>Enrichment:</b></p> <p><b>Intervention:</b></p>



NOTE: These sections will be partially completed during the curriculum writing process and finalized during the year one review process.

<b>Content Area: Science</b>	<b>Course: Anatomy and Physiology</b>	<b>Strand/Topic: Muscular System</b>
<b>Learner Objectives:</b> <ul style="list-style-type: none"><li>• The muscular system provides movement and protection. (C)</li></ul>		

**Concepts:**

- A. The muscular system functions in movement. (C1)
- B. There are three types of muscle tissue: cardiac, smooth, and skeletal. (C1)
- C. Muscular contraction at the molecular level incorporates the sliding filament theory. (C1)
- D. Energy is needed for muscle contraction. (C5)
- E. The muscular system responds to injury and disease. (C2)

Students Should Know	Students Should Be Able to
<ul style="list-style-type: none"> <li>• There are three types of muscle tissue that all play a role in movement and or protection.</li> <li>• The size, shape, and location of muscle tissue determine its movement.</li> <li>• Muscles are connected to the skeletal system by other tissues (tendons).</li> <li>• Muscle movement is controlled by the nervous system, carried out by cell organelles, and powered by cellular respiration.</li> </ul>	<ul style="list-style-type: none"> <li>• Distinguish muscle movements (i.e. – flexion, supination). (C5d; A)</li> <li>• Compare and contrast muscle tissues (cardiac, smooth, skeletal). (C1a; B)</li> <li>• Summarize the sliding filament theory of skeletal muscle contraction. (C1a; C)</li> <li>• Contrast the location, products, and reactants of aerobic and anaerobic cellular respiration. (C5c, C1b; D)</li> <li>• Distinguish muscular disease based on its cause, signs and symptoms. (C2c; E)</li> </ul>

### Instructional Support

Student Essential Vocabulary					
Origin	Insertion	Voluntary	Involuntary	Aerobic	Anaerobic
Tendon	Fascicle	Epimysium	Perimysium	Endomysium	Sarcomeres
Actin myofibrils	Myosin myofibrils	Neuromuscular junction	Synergists	Antagonists	Cross bridge
Lactic acid	Isometric contraction	Tetanic contraction	Motor unit	Cross bridge	Aerobic respiration
Anaerobic respiration	Sarcoplasmic reticulum	Glycolysis			

Readiness & Equity Section			
SLA = Sample Learning Activities & SA = Sample Assessments			
21 <sup>st</sup> Century Themes		Non Fiction Reading & Writing	
Learning & Innovation Skills		Enrichment Opportunity	
Information, Media, & Technology Skills		Intervention Opportunity	
Life & Career Skills		Gender, Ethnic, & Disability Equity	

Sample Learning Activities	Sample Assessments
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**Learning Activity #1 : (See Appendix K)**

**The Wing & I by Bill Ekstrom** - Observe the different tissues that make up a bird's wing. Relate the bird wing to the human arm. Observe and identify the movement caused by opposing muscles. Relate the structure of a bird's wing to its function.

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Activity's Alignment	
NSES	C1a, C1f; Concept A, E
CONTENT	SC3
PROCESS	1.6 – Discover/evaluate relationships 3.5 – Reason logically
DOK	2-Skill/Concept
INSTRUCTIONAL STRATEGIES	Similarities and differences Cooperative learning

**Assessment #1:****Exit Card: Comparative Muscle Systems**

Invertebrates possess muscles similar to vertebrate skeletal and smooth muscles. Arthropod skeletal muscles are nearly identical to vertebrate skeletal muscles. An interesting adaptation has been discovered in the muscles that hold clam shells closed. The thick filaments of these muscle fibers contain a unique protein called paramyosin that allows the muscles to remain in a fixed state of contraction for as long as a month. From your knowledge of the cellular mechanisms of contraction, propose a hypothesis to explain how paramyosin might work?

**Answer Key**

*Hypothesis: The student may propose a hypothesis based upon the "sliding filament theory" of muscle contraction. This hypothesis would include the concepts that cross-bridges would form between the filaments in the clam's muscle fibers causing a contraction. The hypothesis should include an explanation of the energy required to cause this reaction may also be a factor in the long sustained state of contraction in the clam being similar to rigor mortis in human skeletal muscle.*

Assessment's Alignment	
NSES	C1a, C1f; Concept A
CONTENT	SC3,
PROCESS	1.6 – Discover/evaluate relationships 3.5 – Reason logically
DOK	3-Strategic Thinking
LEVEL OF EXPECTATION	Mastery Level – 80%

**Readiness & Equity Section**

SLA = Sample Learning Activities & SA = Sample Assessments

21 <sup>st</sup> Century Themes		Non Fiction Reading & Writing	
Learning & Innovation Skills		Enrichment Opportunity	

Information, Media, & Technology Skills	SLA	Intervention Opportunity	
Life & Career Skills		Gender, Ethnic, & Disability Equity	SA

Sample Learning Activities		Sample Assessments																									
<p><b>Learning Activity #2 : (See Appendix L)</b>  <b>The Effect of Fatigue on Muscle</b> - Students perform some repetitive muscle actions and record their results. The students relate the activity of their muscles to the production of lactic acid. The students create a data table and graph their results. They discuss their results and relate the activity to the production of lactic acid during muscle activity.</p>		<p><b>Assessment #2:</b>  <b>Muscle Performance Exit Card</b>  Mary wants to enter a weight lifting competition and consults you as to what type of muscle fibers she needs to develop and how she should go about it. What would you suggest to her?</p> <p><b>Answer Key</b>  <i>1 Pt. Weight lifting requires anaerobic endurance.</i>  <i>1 Pt. Mary would want to develop her fast fibers for short-term maximum strength.</i>  <i>1 Pt. She would achieve this by engaging in activities that involve frequent, brief but intensive workouts such as with progressive resistance machines.</i>  <i>1 Pt. Repeated exhaustive stimulation will have the fast fibers develop more mitochondria and a higher concentration of the enzymes associated with glycolysis as well as increases the size and strength of the muscle.</i></p>																									
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Activity's Alignment																											
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CONTENT	SC3, SC7																										
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Student Resources	Teacher Resources
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NOTE: These sections will be partially completed during the curriculum writing process and finalized during the year one review process.

<b>Content Area: Science</b>	<b>Course: Anatomy and Physiology</b>	<b>Strand/Topic: Digestive/Urinary Systems</b>
<b>Learner Objectives:</b> <ul style="list-style-type: none"> <li>• The digestive system processes food and absorbs nutrients. (C)</li> <li>• The urinary system is responsible for maintaining homeostasis within the blood. (C)</li> </ul>		

**Concepts:**

- A. The four functions of the digestive system include: digestion, absorption, secretion, and defecation. (C1, C5, B3)
- B. The pathway of food through the digestive track include: mouth, pharynx, esophagus, stomach, and small and large intestines. (C5)
- C. Accessory organs associated with the digestive system are: salivary glands, liver, gall bladder, and pancreas. (C5)
- D. The digestive system responds to injury and disease. (C2)
- E. The urinary system regulates blood homeostasis by filtration, secretion, and reabsorption. (C5)
- F. The urinary system responds to injury and disease. (C2)

Students Should Know	Students Should Be Able to
<ul style="list-style-type: none"> <li>• Food travels through the hollowed organs of the digestive system (alimentary canal/Gastrointestinal tract). Food is further processed in each sequential organ as it passes from mouth to anus.</li> <li>• Exocrine glands aid digestion by secreting digestive enzymes and buffers into the GI tract.</li> <li>• Metabolism determines how fast or slow food is digested and absorbed.</li> <li>• Membranes play a vital role in maintaining the integrity and location of digestive organs.</li> <li>• The urinary system (the kidneys) removes metabolic waste from the blood as well as maintaining blood homeostasis through the process of filtration, secretion, and reabsorption.</li> <li>• The organs that make (kidney) transport (ureters, urethra), and store (bladder) urine.</li> </ul>	<ul style="list-style-type: none"> <li>• Differentiate chemical and mechanical digestion and predict where each occurs in the body. (C1b; A, B, C)</li> <li>• Distinguish absorption from secretion and predict where each will occur in the body. (C5d; A, B)</li> <li>• Explain the effects of digestion, secretion, and absorption have on the formation of feces. (C5d; A)</li> <li>• Compare and contrast the roles of salivary, liver, and pancreatic exocrine glands play in the chemical digestion of food. (C1b, B3e; A, C)</li> <li>• Distinguish the four tunics/layers of the digestive tract. (C5d; B)</li> <li>• Trace the sequence of food through the digestive tract. (C5d; B)</li> <li>• Compare and contrast parietal, visceral, and mesentery membranes. (C1a; B, C)</li> <li>• Assess the effects of anabolism and catabolism on metabolism. (C5c; A, B, D)</li> <li>• Distinguish the filtration, secretion, and reabsorption processes by function and location. (C5d; A)</li> <li>• Trace the pattern of urine production and flow. (C5d; A)</li> <li>• Distinguish urinary diseases based on homeostatic imbalance descriptors. (C2c; B)</li> </ul>

## Instructional Support

Student Essential Vocabulary					
digestion	absorption	secretion	defecation	metabolism	anabolism
catabolism	small intestine	large intestine	stomach	esophagus	pharynx
liver	gallbladder	pancreas	salivary glands	mucosa	submucosa
muscularis	serosa	parietal membranes	visceral membranes	mesentery membranes	enzymes
sphincters	villi	bile	uvula	palates	epiglottis
Kidney	Nephron	Ureters	Urinary bladder	Urethra	Urine
Filtration	Secretion	Reabsorption			

Readiness & Equity Section			
SLA = Sample Learning Activities & SA = Sample Assessments			
21 <sup>st</sup> Century Themes		Non Fiction Reading & Writing	
Learning & Innovation Skills	SLA	Enrichment Opportunity	
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Life & Career Skills	SLA; SA	Gender, Ethnic, & Disability Equity	

Sample Learning Activities	Sample Assessments																								
<p><b>Learning Activity #1 : (See Appendix M)</b>  <b>The Cookie Digestion Project</b>            Students will draw, outline, and label the structures associated with the digestive system. They will then trace the digestion of the ingredients associated with a cookie, applying when, where, and how each ingredient is digested within the organs responsible in the body. Students will then display and present their findings to the class.</p> <table border="1"> <thead> <tr> <th colspan="2">Activity's Alignment</th> </tr> </thead> <tbody> <tr> <td>NSES</td> <td>A2b, C5d, B3a; Concepts A, B, C</td> </tr> <tr> <td>CONTENT</td> <td>LO3</td> </tr> <tr> <td>PROCESS</td> <td>1.8 – Organize data 3.5 – Reason logically</td> </tr> <tr> <td>DOK</td> <td>2-Skill/concept</td> </tr> <tr> <td>INSTRUCTIONAL STRATEGIES</td> <td>Cooperative learning Questions, cues, and advance organizers</td> </tr> </tbody> </table>	Activity's Alignment		NSES	A2b, C5d, B3a; Concepts A, B, C	CONTENT	LO3	PROCESS	1.8 – Organize data 3.5 – Reason logically	DOK	2-Skill/concept	INSTRUCTIONAL STRATEGIES	Cooperative learning Questions, cues, and advance organizers	<p><b>Assessment #1: (See Appendix N)</b>  <b>Digestion Assessment</b>            Students will apply knowledge of specific digestion processes to a new situation of digesting the ingredients of a pizza. Students will analyze what ingredients are digested at specific organs of the digestive system, and the processes of how the item is broken down for use in the body.</p> <table border="1"> <thead> <tr> <th colspan="2">Assessment's Alignment</th> </tr> </thead> <tbody> <tr> <td>NSES</td> <td>A2b, C5d, B3a; Concepts A, B, C</td> </tr> <tr> <td>CONTENT</td> <td>LO3</td> </tr> <tr> <td>PROCESS</td> <td>1.7 – Evaluate information 3.5 – Reason logically</td> </tr> <tr> <td>DOK</td> <td>2-Skill/concept</td> </tr> <tr> <td>LEVEL OF EXPECTATION</td> <td>Mastery Level – 80%</td> </tr> </tbody> </table>	Assessment's Alignment		NSES	A2b, C5d, B3a; Concepts A, B, C	CONTENT	LO3	PROCESS	1.7 – Evaluate information 3.5 – Reason logically	DOK	2-Skill/concept	LEVEL OF EXPECTATION	Mastery Level – 80%
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<b>Readiness &amp; Equity Section</b>			
<b>SLA = Sample Learning Activities &amp; SA = Sample Assessments</b>			
21 <sup>st</sup> Century Themes		Non Fiction Reading & Writing	SA
Learning & Innovation Skills	SLA	Enrichment Opportunity	
Information, Media, & Technology Skills		Intervention Opportunity	
Life & Career Skills		Gender, Ethnic, & Disability Equity	

<b>Sample Learning Activities</b>	<b>Sample Assessments</b>
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**Learning Activity #2 : (See Appendix O)****Kidney Structure and Function**

Students will draw and label kidney structures from a dissected kidney. Kidney dissection is an easy process and can be completed by simply separating a kidney into two halves by cutting through the specimen along a frontal plane extending from superior to inferior sections; thus producing two mirror halves. Each half will contain all components of a working kidney.

Students will then identify functions of each of the identified structures. Finally, students will sequence the structures as liquid is filtered from the blood and proceeds to the exit of the body.

Activity's Alignment	
NSES	C5d; Concept E
CONTENT	LO3
PROCESS	1.7 – Evaluate information 3.5 – Reason logically
DOK	2-Skill/concept
INSTRUCTIONAL STRATEGIES	Cooperative learning

**Assessment #2: (See Appendix P)****Drawing Analogies: Respiratory and Urinary Systems**

Students will read information explaining the function of the respiratory lobule in the respiratory system, and then in one paragraph explain the similarities between the urinary and respiratory systems in the human body. There should be structures with very similar functions that connect how both systems work independently, but in very similar manners.

Assessment's Alignment	
NSES	C5d, Concept E
CONTENT	LO3; CA3
PROCESS	1.7 – Evaluate information 2.3 – Exchange ideas and take others' perspectives 3.5 – Reason logically
DOK	3 – Strategic Thinking
LEVEL OF EXPECTATION	Mastery Level – 80%

<b>Student Resources</b>	<b>Teacher Resources</b>
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<p><b>General:</b></p> <ul style="list-style-type: none"> <li>● Essentials of Anatomy &amp; Physiology (2003)</li> <li>● <a href="http://highered.mcgraw-hill.com/sites/0072495855/student_view0/">http://highered.mcgraw-hill.com/sites/0072495855/student_view0/</a></li> <li>● <a href="http://www.bbc.co.uk/science/humanbody/">http://www.bbc.co.uk/science/humanbody/</a></li> <li>● <a href="http://www.nlm.nih.gov/medlineplus/tutorials.html">http://www.nlm.nih.gov/medlineplus/tutorials.html</a></li> <li>● <a href="http://www.medindia.net/index.htm">http://www.medindia.net/index.htm</a></li> <li>● <a href="http://www.wiley.com/college/apcentral/anatomydrill/">http://www.wiley.com/college/apcentral/anatomydrill/</a></li> </ul> <p><b>Enrichment:</b></p> <p><b>Intervention:</b></p>	<p><b>General:</b></p> <ul style="list-style-type: none"> <li>● Essentials of Anatomy &amp; Physiology (2003)</li> <li>● <a href="http://highered.mcgraw-hill.com/sites/0072495855/student_view0/">http://highered.mcgraw-hill.com/sites/0072495855/student_view0/</a></li> <li>● <a href="http://www.bbc.co.uk/science/humanbody/">http://www.bbc.co.uk/science/humanbody/</a></li> <li>● <a href="http://www.nlm.nih.gov/medlineplus/tutorials.html">http://www.nlm.nih.gov/medlineplus/tutorials.html</a></li> <li>● <a href="http://www.medindia.net/index.htm">http://www.medindia.net/index.htm</a></li> <li>● <a href="http://www.wiley.com/college/apcentral/anatomydrill/">http://www.wiley.com/college/apcentral/anatomydrill/</a></li> </ul> <p><b>Enrichment:</b></p> <p><b>Intervention:</b></p>
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NOTE: These sections will be partially completed during the curriculum writing process and finalized during the year one review process.

<b>Content Area: Science</b>	<b>Course: Anatomy and Physiology</b>	<b>Strand/Topic: Nervous System</b>
<p><b>Learner Objectives:</b></p> <ul style="list-style-type: none"> <li>● The nervous system provides communication, integration, and short term regulation of the body through the use of neurons. C</li> </ul>		

**Concepts**

- A. The nervous system monitors internal and external environments, integrates sensory information, and coordinates voluntary and involuntary responses of other organ systems. C1
- B. Neurons and supporting cells (neuroglia) comprise the nervous system. C6
- C. Neurons utilize neurotransmitters to communicate with the body. C6
- D. The nervous system is organized into the central, the peripheral, and the autonomic divisions. C6
- E. The nervous system responds to injury and disease. C6
- F. There are specific changes brought upon the body due to aging of the nervous system. C1

<b>Students Should Know</b>	<b>Students Should Be Able to</b>
<ul style="list-style-type: none"><li>● Neurons are classified according to their differentiated structures and functions.</li><li>● The nervous system is composed of white and gray matter.</li><li>● The human brain consists of different parts each with different functions for the human body.</li></ul>	<ul style="list-style-type: none"><li>● Explain the functions of the nervous system. (C6a, A)</li><li>● Describe how a nerve impulse/action potential is generated and conducted. (C6a, A)</li><li>● Contrast the three types of neurons: sensory, motor, and interneurons. (C1a, D)</li><li>● Describe how the brain and spinal cord are protected and supplied with blood and nutrients. (C1b, B)</li><li>● Describe a reflex arc, and the components which work together in its function. (C6b, C)</li><li>● Classify the major parts of the brain with their specific functions. (C6b, D)</li><li>● List and describe major disorders of the nervous system. (F)</li><li>● Distinguish common diseases/disorders based on homeostatic imbalances within the nervous system. (F)</li></ul>

**Instructional Support**

**Student Essential Vocabulary**

CNS	PNS	SNS	ANS	Dendrite	Axon
Sensory Neuron	Motor Neuron	Interneuron	Myelinated axon	Divergence	Convergence
Reflex arc	EEG	Cerebrum	Cerebellum	Diencephalon	Midbrain
Pons	Medulla Oblongata	Neuroglia/Glia	Action Potential	Synapse	Meninges
Synapse	Neurotransmitters	Cranial nerve	Spinal nerve	CSF	

Readiness & Equity Section			
SLA = Sample Learning Activities & SA = Sample Assessments			
21 <sup>st</sup> Century Themes		Non Fiction Reading & Writing	
Learning & Innovation Skills	SLA/SA	Enrichment Opportunity	
Information, Media, & Technology Skills		Intervention Opportunity	
Life & Career Skills		Gender, Ethnic, & Disability Equity	

Sample Learning Activities		Sample Assessments																									
<p><b>Learning Activity #1 : (See Appendix Q)</b>  <b>Neuron Lab-The Quick and The Dead</b>            Students will simulate the functioning of a reflex arc using common materials set in a specific sequence.</p>		<p><b>Assessment #1:</b>  <b>Sequencing a Reflex Arc-</b>            Give students blank index cards to fill in with structures necessary for reflex arc. Students will label each individual card with a structure, shuffle, and then trade cards with a partner. Each partner will sequence the other stack of cards to represent a workable reflex arc.</p> <p><b>Example:</b>            Stimulus, receptor, sensory neuron, neurotransmitter, synapse, interneuron, neurotransmitter, synapse, motor neuron, neurotransmitter, synapse, effector, response</p>																									
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**Readiness & Equity Section**

SLA = Sample Learning Activities & SA = Sample Assessments

21 <sup>st</sup> Century Themes	SLA	Non Fiction Reading & Writing	
Learning & Innovation Skills	SA	Enrichment Opportunity	
Information, Media, & Technology Skills		Intervention Opportunity	
Life & Career Skills		Gender, Ethnic, & Disability Equity	

Sample Learning Activities		Sample Assessments	
<p><b>Learning Activity #2 : (See Appendix R)</b>  <b>T Puzzle Lab-</b>                      Students will attempt to put together a puzzle, while having certain skills limited while doing so. They will be able to analyze what sections of the brain were being used to complete each stage of the lab.</p>		<p><b>Assessment #2: (See Appendix S)</b>  <b>Case Study of the Brain-</b>                      Students will receive a scenario of a real life situation, read scenario, and answer a question based on how different parts of the brain are responsible for different activities in our bodies.</p>	
<b>Activity's Alignment</b>		<b>Assessment's Alignment</b>	
NSES	C6a; Concept A	NSES	C6b, Concept D
CONTENT	SC3	CONTENT	SC3
PROCESS	1.3-Design/conduct investigations 3.1 Identify and define problems. 3.5 Reason logically.	PROCESS	1.6 Discover/evaluate relationships.
DOK	2-Skill/Concept	DOK	2- Skill/Concept
INSTRUCTIONAL STRATEGIES	Cooperative Learning Generating and testing hypotheses	LEVEL OF EXPECTATION	Mastery Level – 85%

<b>Student Resources</b>	<b>Teacher Resources</b>
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<b>Student Resource</b>	<b>Teacher Resource</b>
<p><b>General:</b></p> <ul style="list-style-type: none"> <li>• <u>Essentials of Anatomy and Physiology</u> 3ed. Martini/Bartholomew</li> </ul> <p><b>Enrichment:</b></p> <p><b>Intervention:</b></p>	<p><b>General:</b></p> <ul style="list-style-type: none"> <li>• Video: Human Body Pushing The Limits-Sensation, Discovery Channel</li> <li>• <u>Essentials of Anatomy and Physiology</u> 3ed. Martini/Bartholomew</li> </ul> <p><b>Enrichment:</b></p> <p><b>Intervention:</b></p>

NOTE: These sections will be partially completed during the curriculum writing process and finalized during the year one review process.



<b>Content Area: Science</b>	<b>Course: Anatomy and Physiology</b>	<b>Strand/Topic: Integumentary System and Senses</b>
<b>Learner Objectives:</b> <ul style="list-style-type: none"> <li>• The integumentary system is important in regulating the external and internal environment of the body. (C)</li> <li>• Senses receive external and internal stimuli to be interpreted by the nervous system. (C)</li> </ul>		

### Concepts

- The integumentary system has five main functions: temperature regulation, protection, synthesis and storage of nutrients, sensory reception, and excretion/secretion. C1
- The integument consists of the epidermis, the dermis, the subcutaneous layer, and accessory structures. C1
- The skin responds to injury and disease. C1
- There are general and special senses. (C1)
- Receptors are classified according to the type of stimulus. (C1)

<b>Students Should Know</b>	<b>Students Should Be Able to</b>
<ul style="list-style-type: none"> <li>• The skin plays an important role in temperature regulation through conductive and radiant heat gain/loss.</li> <li>• The skin is a waterproof barrier that protects the body from the environment and the invasion of pathogens.</li> <li>• The skin produces essential components of vitamin D and also stores nutrients in the hypodermis</li> <li>• Many sensory receptors located in the skin provide the body with important information about temperature, pressure and pain.</li> <li>• Waste products of metabolism are excreted through the skin in sweat.</li> <li>• The integument consists of the epidermis, the dermis, the subcutaneous layer and accessory structures.</li> <li>• The skin modulates the effects of UV radiation on the body through melanocytes.</li> <li>• Accessory structures of the skin include hair and nails.</li> <li>• The skin is a vital organ that responds to injury and disease.</li> </ul>	<ul style="list-style-type: none"> <li>• Describe the general functions of the integumentary system. (C1b, C1d, C1f; A)</li> <li>• Describe the main structural features of the epidermis and explain their functional significance. (C1d, C1f; B)</li> <li>• Summarize the factors that determine skin color. (C1d, C1f; B)</li> <li>• Describe how the integumentary system helps regulate body temperature.(C1f; A)</li> <li>• Discuss the effects of ultraviolet radiation on the skin and the role played by melanocytes. (C1d, C1f; B)</li> <li>• Discuss the function of the skin’s accessory structures. (C1d, C1f; B)</li> <li>• Describe the mechanisms that produce hair and that determine hair texture and color. (C1c, C1d, C1f; B)</li> <li>• Explain how the skin responds to injury and repairs itself. (C1d, C1f; C)</li> <li>• Describe common skin disorders and disease (C1d, C1f; C)</li> </ul>

- The general senses are receptors sensitive to pain (nociceptors), temperature (thermoreceptors), touch (tactile), pressure (baroreceptors) and position, (proprioceptors) and chemical stimuli (chemoreceptors).
- The special senses are smell, taste, vision, hearing, and equilibrium
- The sense of smell (olfaction) is provided by the olfactory organs of the upper nasal cavity. These organs synapse with the olfactory bulbs of the frontal lobes of the cerebrum.
- Taste receptors are found on the surface of the tongue.
- There are four primary taste sensations: sweet, salty, bitter, sour.
- Accessory structures of the eye provide protection, lubrication, and support
- The structure of the eye permits the formation of an image on the retina.
- Photoreceptors of the eye are rods and cones.
- Cones are sensitive to different wavelengths of light and permit color vision
- The CNS process information related to vision in such a way as to permit depth perception.
- The receptors and processes for equilibrium are found in the inner ear.
- The external ear collects and directs sound waves toward the middle ear. Structures in the middle ear collect and amplify sound waves and transmit them to structures of the inner ear. The inner ear contains the sensory organs for hearing.

- Distinguish between the general senses and the special senses. ( C1.a, C1.f; A)
- Identify the receptors for the general senses, and describe how they function. (C1.f, A)
- Describe the receptors and processes involved in the sense of smell. (C1.b, C1.f, A)
- Discuss the receptors and processes involved in the sense of taste. C1.b, C1.f, A)
- Identify the parts of the eye and their functions. (C1.b, C1.f, A)
- Explain how we are able to see objects and distinguish colors. C1.b, C1.d, C1.f, A)
- Discuss how the central nervous system processes information related to vision. (C1.f, A)
- Discuss the receptors and processes involved in the sense of equilibrium C1.f, A,B)
- Describe the parts of the ear and their roles in the process of hearing. (C1.f, A,B)

### Instructional Support

Student Essential Vocabulary					
Cutaneous membrane	Subcutaneous layer	Sebaceous (oil) glands	Nail	dermis	Hair follicle
Epidermis	Melanocytes	Sweat (sudoriferous)	Hair	keratin	melanin

Accomodation	Cochlea	Fovea	Gustation	Iris	Macula
Nociceptors	Olfaction	Proprioception	Pupil	Retina	Sclera
Rods	Cones	Malleus	Incus	Stapes	Timpanic membrane

<b>Readiness &amp; Equity Section</b>			
<b>SLA = Sample Learning Activities &amp; SA = Sample Assessments</b>			
21 <sup>st</sup> Century Themes	SLA	Non Fiction Reading & Writing	
Learning & Innovation Skills	SA	Enrichment Opportunity	
Information, Media, & Technology Skills		Intervention Opportunity	
Life & Career Skills		Gender, Ethnic, & Disability Equity	

<b>Sample Learning Activities</b>	<b>Sample Assessments</b>
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**Learning Activity #1 : (See Appendix T)****Ouch!! Don't Touch Me!!!**

An activity in which the students determine the distribution of sensory (touch) receptors in different parts of the skin.

**Assessment #1: (See Appendix U)**

**Exit Card - Integumentary System:** The students answer a question that relates the placement of Braille dots and the density of human touch receptors on fingertips.

**Activity's Alignment**

NSES	C1f; Concept D, E
CONTENT	SC3, SC7
PROCESS	1.10-Apply information, ideas, skills
DOK	2-Skill/Concept
INSTRUCTIONAL STRATEGIES	Identifying similarities and differences Generating and Testing Hypotheses

**Assessment's Alignment**

NSES	C1f; Concept A, E
CONTENT	SC3, SC7
PROCESS	1.10-Apply information, ideas and skills
DOK	2-Skill/Concept
LEVEL OF EXPECTATION	Mastery Level - 80%

**Readiness & Equity Section**

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21 <sup>st</sup> Century Themes	SLA	Non Fiction Reading & Writing	SA
Learning & Innovation Skills	SLA,SA	Enrichment Opportunity	
Information, Media, & Technology Skills	SLA	Intervention Opportunity	
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Sample Learning Activities		Sample Assessments																									
<p><b>Learning Activity #2 : (See Appendix V)</b>  <b>Dyeing to Know if You're a Super-Taster?</b>            Students count their fungiform papillae to determine if they are a super taster and then map their individual taste regions of the tongue</p>		<p><b>Assessment #2:</b>  <b>Exit Card: Senses</b>            Twenty-five percent of all humans are non-tasters. Discuss the possible evolutionary advantages and consequences for this.</p> <p>Rubric            4pts-Student lists two advantages and two disadvantages for being a non-taster.            3 pts-Student lists two advantages and one disadvantage for being a non-taster            3pts-Student lists one advantage and two disadvantages for being a non-taster            2pts –Student lists one advantage and one disadvantage for being a non-taster            1pts- Student lists addresses only one of the two parameters, either the advantage or disadvantage but not both            0 pt-Student's answer not relevant to the question.</p> <p>Sample responses:            Advantages:           <ul style="list-style-type: none"> <li>• Can eat a wide variety of food—increases chances of survival</li> <li>• Eating spoiled food not a problem—increases chances of survival</li> </ul>           Disadvantages:           <ul style="list-style-type: none"> <li>• May eat foods that contain harmful chemicals or poisons and not really taste them</li> <li>• May eat foods that are spoiled or contaminated with bacteria that are harmful</li> </ul> </p>																									
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Student Resources	Teacher Resources
<p><b>General:</b></p> <ul style="list-style-type: none"> <li>● <i>Essentials of Anatomy and Physiology</i> 3<sup>rd</sup> edition. Martini/Bartholomew</li> <li>● <a href="http://www.anatomyandphysiology.com">www.anatomyandphysiology.com</a></li> </ul> <p><b>Enrichment:</b></p> <p><b>Intervention:</b></p>	<p><b>General:</b></p> <ul style="list-style-type: none"> <li>● <i>Essentials of Anatomy and Physiology</i> 3<sup>rd</sup> edition. Martini/Bartholomew</li> </ul> <p><b>Enrichment:</b></p> <p><b>Intervention:</b></p>

NOTE: These sections will be partially completed during the curriculum writing process and finalized during the year one review process.

<b>Content Area: Science</b>	<b>Course: Anatomy and Physiology</b>	<b>Strand/Topic: Cardiovascular System</b>
<b>Learner Objectives:</b>		
<ul style="list-style-type: none"> <li>The cardiovascular system regulates and transports materials throughout materials throughout the body. (C)</li> </ul>		

**Concepts:**

- A. The functions of cardiovascular system include transporting materials throughout the body to: restrict fluid loss, fight infection, distribute gasses and hormones, and maintain body temperature and pressure. (C5, F1)
- B. Blood is composed of plasma and formed elements. (C5)
- C. The heart’s structure allows it to pump blood throughout the body. (C5)
- D. The vascular system is a series of vessels that transport blood throughout the body. (C5)
- E. The cardiovascular system responds to injury and disease. (C2)
- F. The lymphatic system plays a role in fluid circulation and the body’s defense against pathogens and cancer. (C2, F1)

Students Should Know	Students Should Be Able to
<ul style="list-style-type: none"> <li>Blood is composed of cells (formed elements) and liquid (plasma), both of which help it to carry out its many functions in the body.</li> <li>The human heart consists of four chambers (spaces) and four valves (to prevent the backflow of blood).</li> <li>The hearts structure allows it to pump blood throughout the body while isolating oxygenated from deoxygenated blood.</li> <li>Blood can be transfused between humans based on compatibilities of blood antigens.</li> <li>Blood is formed through the process of hemopoiesis primarily in bones.</li> <li>Blood is transported from the heart to body tissues and back to the heart again using vessels of varying structure.</li> <li>The human heart consists of four heart chambers (spaces) and four heart valves (to prevent backflow of blood).</li> <li>Blood is formed through the process of hemopoiesis primarily in bones.</li> </ul>	<ul style="list-style-type: none"> <li>Identify thrombocytes (platelets) as being the cells responsible for clotting blood. (C5d; B, E)</li> <li>Distinguish various leucocytes (white blood cells) roles in fighting infections and cancers. (F1b; B, E)</li> <li>Identify erythrocytes (red blood cells) role in distributing the gasses oxygen and carbon dioxide. (C5d; B, E)</li> <li>Identify how blood can be separated into components and infer the functions each performs. Those components include formed elements (blood cells) and plasma (the liquid portion of blood). (C5d; A, B, E)</li> <li>Distinguish the three tissue layers of the heart; the endocardium (lining), myocardium (pumping), and epicardium (protection). (C5d; B)</li> <li>Identify the pattern of electricity through the heart. (C5d, B)</li> <li>Utilize an EKG chart to determine what is occurring in the heart. (C5d, B, E)</li> </ul>

- Predict which blood type(s) can be donated or received via transfusion. (C1d, C2a; B, E, F)
- Distinguish the blood vessels (arteries, capillaries, veins) based on blood pressure, blood speed, blood direction, lumen size, and thickness. (C1f; D)
- Distinguish and identify the pattern of blood flow via systemic, pulmonary, and coronary circulation. (C1f; D)
- Compare and contrast fetal and adult blood circulation. (C5d; D)
- Compare and contrast systolic and diastolic blood pressure. (C5d; C, E)
- Distinguish cardiovascular diseases based on homeostatic imbalance descriptors. (C2c, F1b; E, F)

**Instructional Support**

Student Essential Vocabulary					
erythrocyte/rbc	leucocytes/wbc's	thrombocyte/platelet	blood plasma	hemopoiesis	agglutinogens/antigens
agglutinins/antibodies	atria	ventricles	arteries	veins	capillaries
av valves	semilunar valves	electrocardium (EKG)	systole	diastole	hemopoeisis



<b>Readiness &amp; Equity Section</b>			
<b>SLA = Sample Learning Activities &amp; SA = Sample Assessments</b>			
21 <sup>st</sup> Century Themes	SLA; SA	Non Fiction Reading & Writing	
Learning & Innovation Skills		Enrichment Opportunity	
Information, Media, & Technology Skills		Intervention Opportunity	
Life & Career Skills		Gender, Ethnic, & Disability Equity	

<b>Sample Learning Activities</b>	<b>Sample Assessments</b>
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**Learning Activity #1 : (See Appendix W)****Blood Flow in Capillaries**

Students will analyze data from an investigation on blood flow in the tail of a goldfish. Students will be able to identify patterns and draw conclusions to relate ideas to human blood flow in the body.

Activity's Alignment	
NSES	C1f, C5d; Concept D
CONTENT	SC3
PROCESS	1.6 – Discover/evaluate relationships 1.8 – Organize data and ideas
DOK	3 – Strategic Thinking
INSTRUCTIONAL STRATEGIES	Similarities and differences

**Assessment #1: (See Appendix X)****Effect of Drugs on Blood Flow**

Students will answer two questions based on the negative impact that drugs have on their own circulatory system.

Assessment's Alignment	
NSES	C1f, C5d; Concept D
CONTENT	SC3
PROCESS	1.6 – Discover/evaluate relationships 1.8 – Organize data and ideas
DOK	3 – Strategic Thinking
LEVEL OF EXPECTATION	Mastery Level – 80%

**Readiness & Equity Section**

SLA = Sample Learning Activities & SA = Sample Assessments

21 <sup>st</sup> Century Themes	SLA; SA	Non Fiction Reading & Writing	
Learning & Innovation Skills		Enrichment Opportunity	
Information, Media, & Technology Skills		Intervention Opportunity	
Life & Career Skills		Gender, Ethnic, & Disability Equity	

Sample Learning Activities		Sample Assessments																									
<p><b>Learning Activity #2 : (See Appendix Y)</b>  <b>Heart Rate Lab</b>            Students will analyze heart rate and pulse rate for themselves, evaluating their own fitness levels. They will answer questions based on knowledge of the circulatory system as it relates to heart rate and heart function.</p>		<p><b>Assessment #2:</b>  <b>Comparing Heart Rate and Physical Fitness</b>            Students will answer one question with justification of what they have learned regarding heart function, blood pressure, and heart rate on the overall fitness of a person in good shape vs. a person in poor shape.  <b>EXIT CARD</b>            The maximum heart rate of a conditioned athlete and a person in poor shape, both the same age are approximately the same. True or false? Explain.  <i><b>Answer Key</b></i>  <i>False- students should justify their answer in some of the following ways, but not limited to these</i>  <i>1-athletes will have more capillaries and need less oxygen repaid when active</i>  <i>2-athletes will have more oxygen stored and need less replaced keeping heart rate lower</i>  <i>3-both individuals will see increase, but athlete heart rate will accelerate later in activity</i>  <i>4-athletes blood vessels are larger in diameter due to training at high levels and periodic dilation of vessels during exercise</i>  <i>5-athlete vessels will be more elastic and accommodate blood flow changes without as large of change in blood pressure</i></p>																									
<table border="1"> <thead> <tr> <th colspan="2">Activity's Alignment</th> </tr> </thead> <tbody> <tr> <td>NSES</td> <td>C1f; D</td> </tr> <tr> <td>CONTENT</td> <td>SC3</td> </tr> <tr> <td>PROCESS</td> <td>1.6 – Discover/evaluate relationships 1.3 – Design/conduct investigations</td> </tr> <tr> <td>DOK</td> <td>3 – Strategic Thinking</td> </tr> <tr> <td>INSTRUCTIONAL STRATEGIES</td> <td>Similarities and differences Cooperative learning</td> </tr> </tbody> </table>		Activity's Alignment		NSES	C1f; D	CONTENT	SC3	PROCESS	1.6 – Discover/evaluate relationships 1.3 – Design/conduct investigations	DOK	3 – Strategic Thinking	INSTRUCTIONAL STRATEGIES	Similarities and differences Cooperative learning	<table border="1"> <thead> <tr> <th colspan="2">Assessment's Alignment</th> </tr> </thead> <tbody> <tr> <td>NSES</td> <td>C1f; D</td> </tr> <tr> <td>CONTENT</td> <td>SC3</td> </tr> <tr> <td>PROCESS</td> <td>1.6 – Discover/evaluate relationships 3.5 – Reason logically</td> </tr> <tr> <td>DOK</td> <td>3 – Strategic Thinking</td> </tr> <tr> <td>LEVEL OF EXPECTATION</td> <td>Mastery Level – 80%</td> </tr> </tbody> </table>		Assessment's Alignment		NSES	C1f; D	CONTENT	SC3	PROCESS	1.6 – Discover/evaluate relationships 3.5 – Reason logically	DOK	3 – Strategic Thinking	LEVEL OF EXPECTATION	Mastery Level – 80%
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Student Resources	Teacher Resources
<p><b>General:</b></p> <ul style="list-style-type: none"> <li>● <a href="http://www.nobelprize.org">www.nobelprize.org</a> – Blood Typing Tutorial</li> <li>● <a href="http://www.blaufuss.org">www.blaufuss.org</a> – Heart Sounds and Structures Tutorial</li> <li>● Essentials of Anatomy &amp; Physiology (2003)</li> <li>● <a href="http://highered.mcgraw-hill.com/sites/0072495855/student_view0/">http://highered.mcgraw-hill.com/sites/0072495855/student_view0/</a></li> <li>● <a href="http://www.bbc.co.uk/science/humanbody/">http://www.bbc.co.uk/science/humanbody/</a></li> <li>● <a href="http://www.nlm.nih.gov/medlineplus/tutorials.html">http://www.nlm.nih.gov/medlineplus/tutorials.html</a></li> <li>● <a href="http://www.medindia.net/index.htm">http://www.medindia.net/index.htm</a></li> <li>● <a href="http://www.wiley.com/college/apcentral/anatomydrill/">http://www.wiley.com/college/apcentral/anatomydrill/</a></li> </ul> <p><b>Enrichment:</b></p> <p><b>Intervention:</b></p>	<p><b>General:</b></p> <ul style="list-style-type: none"> <li>● <a href="http://www.nobelprize.org">www.nobelprize.org</a> – Blood Typing Tutorial</li> <li>● <a href="http://www.blaufuss.org">www.blaufuss.org</a> – Heart Sounds and Structures Tutorial</li> <li>● Essentials of Anatomy &amp; Physiology (2003)</li> <li>● <a href="http://highered.mcgraw-hill.com/sites/0072495855/student_view0/">http://highered.mcgraw-hill.com/sites/0072495855/student_view0/</a></li> <li>● <a href="http://www.bbc.co.uk/science/humanbody/">http://www.bbc.co.uk/science/humanbody/</a></li> <li>● <a href="http://www.nlm.nih.gov/medlineplus/tutorials.html">http://www.nlm.nih.gov/medlineplus/tutorials.html</a></li> <li>● <a href="http://www.medindia.net/index.htm">http://www.medindia.net/index.htm</a></li> <li>● <a href="http://www.wiley.com/college/apcentral/anatomydrill/">http://www.wiley.com/college/apcentral/anatomydrill/</a></li> </ul> <p><b>Enrichment:</b></p> <p><b>Intervention:</b></p>

NOTE: These sections will be partially completed during the curriculum writing process and finalized during the year one review process.

<b>Content Area: Science</b>	<b>Course: Anatomy and Physiology</b>	<b>Strand/Topic: Respiratory System</b>
<b>Learner Objectives:</b>		
<ul style="list-style-type: none"> <li>The respiratory system is responsible for collection and exchange of oxygen and carbon dioxide within the body. B, C</li> </ul>		

**Concepts**

- A. The basic functions of the respiratory system are to provide surface area for oxygen and carbon dioxide exchange, sound production, and surface area for olfaction. C1
- B. The respiratory pathway includes: mouth/nose, pharynx, larynx, trachea, bronchi, bronchioles, and alveoli. C1
- C. The respiratory system responds to injury and disease. C1

Students Should Know	Students Should Be Able to
<ul style="list-style-type: none"> <li>The respiratory system is where gas exchange occurs in the human body.</li> <li>Ventilation is the exchange of air with the external environment.</li> <li>Internal respiration is the exchange of gasses with the body cells within a human body.</li> </ul>	<ul style="list-style-type: none"> <li>Summarize how and where gas exchange occurs during circulation. (C1a, B)</li> <li>Trace the path of air into and out of the respiratory system. (C1a, B)</li> <li>Explain how ventilation takes place. (B)</li> <li>Compare and contrast different measured capacities of the lungs. (B)</li> <li>Distinguish common diseases/disorders based on homeostatic imbalances within the respiratory system. (B3a, C)</li> </ul>

**Instructional Support**

Student Essential Vocabulary					
Pleura	Residual volume	Pulmonary ventilation	Diaphragm	Trachea	Vital capacity
Diffusion	Bronchi	Bronchioles	Alveoli	Respiratory cycle	Lobule
Larynx	Respiratory Membrane				

<b>Readiness &amp; Equity Section</b>			
<b>SLA = Sample Learning Activities &amp; SA = Sample Assessments</b>			
21 <sup>st</sup> Century Themes	SA	Non Fiction Reading & Writing	
Learning & Innovation Skills	SLA	Enrichment Opportunity	
Information, Media, & Technology Skills		Intervention Opportunity	
Life & Career Skills		Gender, Ethnic, & Disability Equity	

<b>Sample Learning Activities</b>	<b>Sample Assessments</b>
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**Learning Activity #1 : (See Appendix Z)**

**Lung Model Simulation-**

Students will create and demonstrate the working parts of a lung model made out of common materials. Students will evaluate how the parts work together to simulate the overall function of human ventilation.

Activity's Alignment	
NSES	C1a; Concept B
CONTENT	SC3
PROCESS	3.5-Reason logically
DOK	2-Skill/Concept
INSTRUCTIONAL STRATEGIES	Non-linguistic Representations

**Assessment #1:**

**Exit Card-Sequencing the Pathway of Respiration-**

1. Students will sequence respiratory structures in the correct order that air follows from the atmosphere into the bloodstream. The following terms will be sequenced.

Alveoli, bronchi, capillaries, lobule, secondary bronchioles, tertiary bronchioles, trachea

Students will then answer a question based on the sequence.

2. At what point in the sequence does the respiration become internal respiration. Explain why.

**Answer Key:**

**1. Sequence- *trachea, bronchi, secondary bronchioles, tertiary bronchioles, lobule, alveoli, capillaries***

**2. *The point in which the air is diffused into the bloodstream, respiration is considered internal. Internal respiration is the exchange of gasses between the blood and body cells.***

Assessment's Alignment	
NSES	C1a; Concept B
CONTENT	HPE1, SC3
PROCESS	1.6-Discover/evaluate relationships. 3.5-Reason logically
DOK	3 – Strategic Thinking
LEVEL OF EXPECTATION	Mastery level – 85%

**Readiness & Equity Section**

SLA = Sample Learning Activities & SA = Sample Assessments

21 <sup>st</sup> Century Themes	SLA	Non Fiction Reading & Writing	
Learning & Innovation Skills	SA	Enrichment Opportunity	
Information, Media, & Technology Skills		Intervention Opportunity	
Life & Career Skills		Gender, Ethnic, & Disability Equity	

Sample Learning Activities		Sample Assessments																									
<p><b>Learning Activity #2 : (See Appendix Z1)</b>  <b>Lung Capacity Lab -</b>            Students will use a dry spirometer to measure various lung capacities, to better understand the working of the lungs and associated muscles which help the lungs to work.</p>		<p><b>Assessment #2: (See Appendix Z2)</b>  <b>Diffusion and the Respiratory System</b>            Students will answer questions based upon their ability to connect biological principles of diffusion and the function of the respiratory system.</p>																									
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Student Resources	Teacher Resources
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<p><b>General:</b></p> <ul style="list-style-type: none"> <li>• <i>Essentials of Anatomy and Physiology</i> 3<sup>rd</sup> edition. Martini/Bartholomew</li> </ul> <p><b>Enrichment:</b></p> <p><b>Intervention:</b></p>	<p><b>General:</b></p> <ul style="list-style-type: none"> <li>• <b>Video: Discovery “The Science of Lance Armstrong”</b></li> <li>• <i>Essentials of Anatomy and Physiology</i> 3<sup>rd</sup> edition. Martini/Bartholomew</li> </ul> <p><b>Enrichment:</b></p> <p><b>Intervention:</b></p>
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NOTE: These sections will be partially completed during the curriculum writing process and finalized during the year one review process.

<b>Content Area: Science</b>	<b>Course: Anatomy and Physiology</b>	<b>Strand/Topic: Reproductive System</b>
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**Learner Objectives:**

- The reproductive system deals with secondary sexual characteristics and the formation of gametes for the perpetuation of the human species. C

**Concepts:**

- A. There are structural and functional differences between the male and female reproductive systems. C2
- B. Hormones regulate reproductive cycles. C2
- C. The reproductive system responds to injury and disease. C1

Students Should Know	Students Should Be Able to
<ul style="list-style-type: none"> <li>• Reproductive cycles are dependent upon the hormones of the endocrine system.</li> <li>• The process of meiosis leads to formation of the human sex cells.</li> <li>• Meiosis leads to development of different traits of offspring from parents.</li> </ul>	<ul style="list-style-type: none"> <li>• Describe the location, structure, and functions of the organs of the male and female reproductive systems. (C2b, A)</li> <li>• Describe how sperm and egg cells form in the body. (C2b, A)</li> <li>• Explain the roles of hormones in the male and female reproductive cycles. (C1a, B)</li> <li>• Explain the processes of fertilization, implantation, and development for a human fetus.(C2b, B)</li> <li>• Outline the events of the three trimesters of pregnancy.(B)</li> <li>• Distinguish common diseases/disorders based on homeostatic imbalances within the reproductive system. (C)</li> </ul>

**Instructional Support**

Student Essential Vocabulary					
Spermatogenesis	Oogenesis	Meiosis	Spermatozoa	Ova	Ovarian follicle
Hormones	Prenatal period	Postnatal period	Zygote	Morula	Blastocyst
Amnion	Chorion	Lutenizing Hormone	Follicle Stimulating Hormone	Neonatal period	Gestation period
Prolactin	Estrogen	Progesterone	Human Chorionic Gondatotropin	Endometrium	Ovulation
Menses/Menstruation	Corpus Luteum				

Readiness & Equity Section			
SLA = Sample Learning Activities & SA = Sample Assessments			
21 <sup>st</sup> Century Themes	SLA; SA	Non Fiction Reading & Writing	
Learning & Innovation Skills		Enrichment Opportunity	
Information, Media, & Technology Skills		Intervention Opportunity	
Life & Career Skills		Gender, Ethnic, & Disability Equity	

Sample Learning Activities	Sample Assessments																								
<p><b>Learning Activity #1 : (See Appendix Z3)</b>  <b>Analyzing Data: Hormonal Changes</b>            Students will use a multi-line graph to analyze the hormonal changes throughout the menstrual cycle. From this information, students will then be able to assess the most fertile period of the female hormone cycle. Students will also be able to conclude the correlations between hormones and the activities of the reproductive organs.</p> <table border="1"> <thead> <tr> <th colspan="2">Activity's Alignment</th> </tr> </thead> <tbody> <tr> <td>NSES</td> <td>C1a; Concept B</td> </tr> <tr> <td>CONTENT</td> <td>LO3; H/PE1</td> </tr> <tr> <td>PROCESS</td> <td>1.6-Discover/evaluate relationships. 3.5-Reason logically.</td> </tr> <tr> <td>DOK</td> <td>2-Skill/concept</td> </tr> <tr> <td>INSTRUCTIONAL STRATEGIES</td> <td>Similarities and differences</td> </tr> </tbody> </table>	Activity's Alignment		NSES	C1a; Concept B	CONTENT	LO3; H/PE1	PROCESS	1.6-Discover/evaluate relationships. 3.5-Reason logically.	DOK	2-Skill/concept	INSTRUCTIONAL STRATEGIES	Similarities and differences	<p><b>Assessment #1: (See Appendix Z4)</b>  <b>Hormones: Cause and Effect</b>            Students will identify the cause or effect of given hormones on the reproductive system. Using the cause and effects, they will answer one question analyzing the effect of a specific hormone on the reproductive organs of the body.</p> <table border="1"> <thead> <tr> <th colspan="2">Assessment's Alignment</th> </tr> </thead> <tbody> <tr> <td>NSES</td> <td>C1a; Concept B</td> </tr> <tr> <td>CONTENT</td> <td>LO3; H/PE1</td> </tr> <tr> <td>PROCESS</td> <td>1.10-Apply information, skills. 3.5 Reason logically.</td> </tr> <tr> <td>DOK</td> <td>2-Skill/concept</td> </tr> <tr> <td>LEVEL OF EXPECTATION</td> <td>Mastery level-85%</td> </tr> </tbody> </table>	Assessment's Alignment		NSES	C1a; Concept B	CONTENT	LO3; H/PE1	PROCESS	1.10-Apply information, skills. 3.5 Reason logically.	DOK	2-Skill/concept	LEVEL OF EXPECTATION	Mastery level-85%
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Information, Media, & Technology Skills	SLA	Intervention Opportunity	
Life & Career Skills		Gender, Ethnic, & Disability Equity	

Sample Learning Activities	Sample Assessments																								
<p><b>Learning Activity #2 : (See Appendix Z5)</b>  <b>Timeline Project-Phases of Embryological and Fetal Development</b>            Students will research and create a time line depicting the processes of fertilization, implantation and development of a human fetus. Students will follow a scoring guide to locate photos, images and information of the processes that include how a new human embryo is created and how it develops from conception to birth. The time line will summarize the major events that lead to a completely developed human.</p> <table border="1"> <thead> <tr> <th colspan="2">Activity's Alignment</th> </tr> </thead> <tbody> <tr> <td>NSES</td> <td>C2b, Concept B</td> </tr> <tr> <td>CONTENT</td> <td>LO3</td> </tr> <tr> <td>PROCESS</td> <td>1.2 Conduct research. 1.7 Evaluate information. 2.1 Plan and make presentations.</td> </tr> <tr> <td>DOK</td> <td>2-Skill/concept</td> </tr> <tr> <td>INSTRUCTIONAL STRATEGIES</td> <td>Non-linguistic representations Cooperative Learning</td> </tr> </tbody> </table>	Activity's Alignment		NSES	C2b, Concept B	CONTENT	LO3	PROCESS	1.2 Conduct research. 1.7 Evaluate information. 2.1 Plan and make presentations.	DOK	2-Skill/concept	INSTRUCTIONAL STRATEGIES	Non-linguistic representations Cooperative Learning	<p><b>Assessment #2: (See Appendix Z6)</b>  <b>Reproductive System: Work-Alikes and Look-Alikes</b>            Students will draw structural and functional analogies to the working organs of the reproductive systems of both males and females. The organs identified will focus on fertilization, implantation and development of a fetus.</p> <table border="1"> <thead> <tr> <th colspan="2">Assessment's Alignment</th> </tr> </thead> <tbody> <tr> <td>NSES</td> <td>C2b, Concepts B, A</td> </tr> <tr> <td>CONTENT</td> <td>LO3</td> </tr> <tr> <td>PROCESS</td> <td>1.6 Discover/evaluate relationships. 3.5 Reason logically.</td> </tr> <tr> <td>DOK</td> <td>2-Skill/concept</td> </tr> <tr> <td>LEVEL OF EXPECTATION</td> <td>Mastery level-85%</td> </tr> </tbody> </table>	Assessment's Alignment		NSES	C2b, Concepts B, A	CONTENT	LO3	PROCESS	1.6 Discover/evaluate relationships. 3.5 Reason logically.	DOK	2-Skill/concept	LEVEL OF EXPECTATION	Mastery level-85%
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LEVEL OF EXPECTATION	Mastery level-85%																								

Student Resources	Teacher Resources
<p><b>General:</b></p> <ul style="list-style-type: none"> <li>● <i>Essentials of Anatomy and Physiology</i> 3<sup>rd</sup> edition. Martini/Bartholomew</li> <li>● Video: The Incredible Human Body</li> <li>● Video: Life's Greatest Miracle</li> </ul> <p><b>Enrichment:</b></p> <p><b>Intervention:</b></p>	<p><b>General:</b></p> <ul style="list-style-type: none"> <li>● <i>Essentials of Anatomy and Physiology</i> 3<sup>rd</sup> edition. Martini/Bartholomew</li> </ul> <p><b>Enrichment:</b></p> <p><b>Intervention:</b></p>

NOTE: These sections will be partially completed during the curriculum writing process and finalized during the year one review process.

<b>Content Area: Science</b>	<b>Course: Anatomy and Physiology</b>	<b>Strand/Topic: Mammalian Dissection</b>
<b>Learner Objectives:</b>		
<ul style="list-style-type: none"> <li>Mammalian dissection is a 3-D perspective of structures and relationships between organs of the human body. C</li> </ul>		

**Concepts:**

- A. Tissues and organs of mammals have common characteristics that are related to their functions. (C1), (C5)
- B. To view mammalian tissues and organs, proper dissection techniques must be used. (E2)

Students Should Know	Students Should Be Able to
<ul style="list-style-type: none"> <li>The structures of the mammalian heart and their functions</li> <li>The regions of the brain and their areas of control and function.</li> <li>The superficial muscles of the body and their actions</li> <li>The organs and their functions of the respiratory, digestive, urinary, circulatory and reproductive systems</li> </ul>	<ul style="list-style-type: none"> <li>Identify the structures of a mammalian heart and relate their function to the cardiac cycle.(C1a, C1f, C5d,E2a; A, B)</li> <li>Describe the functions of the different regions and structures of the brain and locate those regions and structures on dissected specimens. (C1a.C1f, C5d; A)</li> <li>Classify specific structures on dissected specimens according to the different organ systems.(digestive, reproductive, respiratory, circulatory, urinary)(C1a,C1f,C5d, E2a; A,B)</li> <li>Describe how the specific structures are related to their functions in different organ systems. (C1a, C1f, C5d; A)</li> </ul>

**Instructional Support**

Student Essential Vocabulary					
Superior	Inferior	Proximal	Distal	Lateral	Medial

Saggital	Transverse	Coronal	Cranial	Caudal	Anterior
Posterior	Superficial	Deep			

<b>Readiness &amp; Equity Section</b>			
SLA = Sample Learning Activities & SA = Sample Assessments			
21 <sup>st</sup> Century Themes	SLA,	Non Fiction Reading & Writing	
Learning & Innovation Skills	SA	Enrichment Opportunity	
Information, Media, & Technology Skills		Intervention Opportunity	
Life & Career Skills		Gender, Ethnic, & Disability Equity	

<b>Sample Learning Activities</b>	<b>Sample Assessments</b>
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**Learning Activity #1 : (See Appendix Z7)****Sheep Heart Dissection**

Students locate structures of a mammalian heart and relate their function to the cardiac cycle.

Activity's Alignment	
NSES	C1, C5, E2; Concept A, B
CONTENT	SC3
PROCESS	1.6-Discover/evaluate relationships 1.10-Apply information, ideas and skills
DOK	2-Skill/concept
INSTRUCTIONAL STRATEGIES	Nonlinguistic representation

**Assessment #1: (See Appendix Z7)****Sheep Heart Practicum**

Students identify labeled structures of a mammalian heart and relate those structures to their functions in the cardiac cycle.

Assessment's Alignment	
NSES	C1, C5; Concept A, B
CONTENT	SC3
PROCESS	1.6-Discover/evaluate relationships 1.10-Apply information, ideas and skills
DOK	2-Skill/concept
LEVEL OF EXPECTATION	Mastery Level - 75%

**Readiness & Equity Section**

SLA = Sample Learning Activities & SA = Sample Assessments

21 <sup>st</sup> Century Themes	SLA	Non Fiction Reading & Writing	
Learning & Innovation Skills	SA	Enrichment Opportunity	
Information, Media, & Technology Skills		Intervention Opportunity	
Life & Career Skills		Gender, Ethnic, & Disability Equity	



Sample Learning Activities		Sample Assessments																									
<p><b>Learning Activity #2 : (See Appendix Z8)</b>  <b>Mammal Brain Dissection</b>            The students will locate and identify specific regions and structures of a mammalian brain. They will relate these structures to their functions in the central nervous system.</p>		<p><b>Assessment #2: (See Appendix Z8)</b>  <b>Mammalian Brain Lab Practicum</b>            Students will identify labeled structures of a mammalian brain and relate those structures to their functions in the central nervous system.</p>																									
<table border="1"> <thead> <tr> <th colspan="2">Activity's Alignment</th> </tr> </thead> <tbody> <tr> <td>NSES</td> <td>C1, C5, E2; Concepts A, B</td> </tr> <tr> <td>CONTENT</td> <td>SC3</td> </tr> <tr> <td>PROCESS</td> <td>1.6-Discover/evaluate relationships 1.10-Apply information, ideas and skills</td> </tr> <tr> <td>DOK</td> <td>2-Skill/concept</td> </tr> <tr> <td>INSTRUCTIONAL STRATEGIES</td> <td>Nonlinguistic representations</td> </tr> </tbody> </table>		Activity's Alignment		NSES	C1, C5, E2; Concepts A, B	CONTENT	SC3	PROCESS	1.6-Discover/evaluate relationships 1.10-Apply information, ideas and skills	DOK	2-Skill/concept	INSTRUCTIONAL STRATEGIES	Nonlinguistic representations	<table border="1"> <thead> <tr> <th colspan="2">Assessment's Alignment</th> </tr> </thead> <tbody> <tr> <td>NSES</td> <td>C1, C5; Concepts A, B</td> </tr> <tr> <td>CONTENT</td> <td>SC3</td> </tr> <tr> <td>PROCESS</td> <td>1.6-Discover/evaluate relationships 1.10-Apply information, ideas and skills</td> </tr> <tr> <td>DOK</td> <td>2-Skill/concept</td> </tr> <tr> <td>LEVEL OF EXPECTATION</td> <td>Mastery Level - 75%</td> </tr> </tbody> </table>		Assessment's Alignment		NSES	C1, C5; Concepts A, B	CONTENT	SC3	PROCESS	1.6-Discover/evaluate relationships 1.10-Apply information, ideas and skills	DOK	2-Skill/concept	LEVEL OF EXPECTATION	Mastery Level - 75%
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Student Resources	Teacher Resources
<p><b>General:</b></p> <ul style="list-style-type: none"> <li>Essentials of Anatomy &amp; Physiology (2003)</li> <li><a href="http://highered.mcgraw-hill.com/sites/0072495855/student_view0/">http://highered.mcgraw-hill.com/sites/0072495855/student_view0/</a></li> <li><a href="http://www.bbc.co.uk/science/humanbody/">http://www.bbc.co.uk/science/humanbody/</a></li> </ul> <p><b>Enrichment:</b></p>	<p><b>General::</b></p> <ul style="list-style-type: none"> <li>Essentials of Anatomy &amp; Physiology (2003)</li> <li><a href="http://highered.mcgraw-hill.com/sites/0072495855/student_view0/">http://highered.mcgraw-hill.com/sites/0072495855/student_view0/</a></li> <li><a href="http://www.bbc.co.uk/science/humanbody/">http://www.bbc.co.uk/science/humanbody/</a></li> </ul>

<b>Intervention:</b>	<b>Enrichment:</b>  <b>Intervention:</b>
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NOTE: These sections will be partially completed during the curriculum writing process and finalized during the year one review process.

## **Appendix**

### **Learning Activities and Assessments**

<b>A</b>	<b>Autopsy of a Pickle</b>
<b>B</b>	<b>Feedback Systems</b>
<b>C</b>	<b>Components of Feedback Loops</b>
<b>D</b>	<b>Case Study: Take Two and ... power point</b>
<b>E</b>	<b>Life is Cellular</b>
<b>F</b>	<b>Human Tissue Lab</b>
<b>G</b>	<b>Tissues of the Human Body Assessment</b>
<b>H</b>	<b>Bone Investigation</b>
<b>I</b>	<b>Bone Structure Quiz</b>
<b>J</b>	<b>Sherlock Bones: The Case of the Mixed-Up Bones</b>
<b>K</b>	<b>The Wing &amp; I</b>
<b>L</b>	<b>The Effect of Fatigue on Muscle</b>
<b>M</b>	<b>The Cookie Digestion Project</b>
<b>N</b>	<b>Digestion Assessment</b>
<b>O</b>	<b>Kidney Structure and Function</b>
<b>P</b>	<b>Drawing Analogies: Respiratory and Urinary Systems</b>
<b>Q</b>	<b>Neuron Lab-The Quick and the Dead</b>
<b>R</b>	<b>T Puzzle Lab</b>
<b>S</b>	<b>Case Study of the Brain</b>
<b>T</b>	<b>Ouch!! Don't Touch Me!!!</b>
<b>U</b>	<b>Exit Card - Integumentary System</b>
<b>V</b>	<b>Dyeing to Know if You're a Super-Taster</b>
<b>W</b>	<b>Blood Flow in Capillaries</b>
<b>X</b>	<b>Effect of Drugs on Blood Flow</b>
<b>Y</b>	<b>Heart Rate Lab</b>
<b>Z</b>	<b>Lung Model Simulation</b>
<b>Z1</b>	<b>Lung Capacity Lab</b>
<b>Z2</b>	<b>Diffusion and the Respiratory System</b>
<b>Z3</b>	<b>Analyzing Data: Hormonal Changes</b>
<b>Z4</b>	<b>Hormones: Cause and Effect</b>
<b>Z5</b>	<b>Timeline Project-Phases of Embryological and Fetal Development</b>
<b>Z6</b>	<b>Reproductive System: Work-Alikes and Look-Alikes</b>
<b>Z7</b>	<b>Sheep Heart Dissection , Sheep Heart Practicum</b>

**Z8 Mammal Brain Dissection, Mammalian Brain Lab Practicum**