2016 – 2017

Anatomy & Physiology
Curriculum Map

Volusia County Schools
Created For Teachers By Teachers
Curriculum Mapping Committee:
Angela Hilsenbeck
Leanna Parrish

Regular and Honors
Parts of the Curriculum Map

The curriculum map defines the curriculum for each course taught in Volusia County. They have been created by teachers from Volusia Schools on curriculum mapping and assessment committees. The following list describes the various parts of each curriculum map:

- **Units**: the broadest organizational structure used to group content and concepts within the curriculum map created by teacher committees.
- **Topics**: a grouping of standards and skills that form a subset of a unit created by teacher committees.
- **Learning Targets and Skills**: the content knowledge, processes, and skills that will ensure successful mastery of the NGSSS as unpacked by teacher committees according to appropriate cognitive complexities.
- **Standards**: the Next Generation Sunshine State Standards (NGSSS) required by course descriptions posted on CPALMS by FLDOE.
- **Pacing**: recommended time frames created by teacher committees and teacher survey data within which the course should be taught in preparation for the EOC.
- **Vocabulary**: the content-specific vocabulary or phrases both teachers and students should use, and be familiar with, during instruction and assessment.

Maps may also contain other helpful information, such as:

- **Resources**: a listing of available, high quality and appropriate materials (strategies, lessons, textbooks, videos and other media sources) that are aligned to the standards. These resources can be accessed through the county Anatomy and Physiology Edmodo page. Contact the District Science Office to gain access to the code and log in at [www.edmodo.com](http://www.edmodo.com).
- **Teacher Hints**: a listing of considerations when planning instruction, including guidelines to content that is inside and outside the realm of the course descriptions on CPALMS in terms of state assessments.
- **Sample FOCUS Questions**: sample questions aligned to the standards and in accordance with EOC style, rigor, and complexity guidelines; they do NOT represent all the content that should be taught, but merely a sampling of it.
- **Labs**: The NSTA and the District Science Office recommend that all students experience and participate in at least one hands-on, inquiry-based, lab per week were students are collecting data and drawing conclusions. The district also requires that at least one (1) lab per grading period should have a written lab report with analysis and conclusion.
- **Common Labs (CL)**: Each grade level has one common Lab (CL) for each nine week period. These common labs have been designed by teachers to allow common science experiences that align to the curriculum across the district.
- **Science Literacy Connections (SLC)**: Each grade level has one common Science Literacy Connection (Common SLC) for each nine week period. These literacy experiences have been designed by teachers to provide complex text analysis that aligns to the curriculum across the district. Additional SLCs are provided to supplement district textbooks and can be found on the Edmodo page.
- **DIA:** (District Interim Assessments) content-specific tests developed by the district and teacher committees to assist in student progress monitoring. The goal is to prepare students for the 8th grade SSA or Biology EOC using rigorous items developed using the FLDOE Item Specifications Documents.

The last few pages of the map form the appendix that includes information about methods of instruction, cognitive complexities, and other Florida-specific standards that may be in the course descriptions.

**Appendix Contents**

1. Volusia County Science 5E Instructional Model
2. FLDOE Cognitive Complexity Information
3. Florida ELA and Math Standards
### High School Weekly Curriculum Trace

<table>
<thead>
<tr>
<th>2016</th>
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**Weeks 38 – 39 are set aside for course review and EOC administration.**
## 2016 -2017 Instructional Calendar

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* See school-based testing schedule for the course EOC administration time

## Lab Information

**Expectations:**
The National Science Teacher Association, NSTA, and the district science office recommend that all students experience and participate in at least one hands-on-based lab per week. At least one (1) lab per grading period should have a written lab report with analysis and conclusion.

**Safety Contract:**
[http://www.nsta.org/docs/SafetyInTheScienceClassroom.pdf](http://www.nsta.org/docs/SafetyInTheScienceClassroom.pdf)

**Safety, Cleanup, and Laws:**
[http://labsafety.flinnsci.com/Chapter.aspx?ChapterId=88&UnitId=1](http://labsafety.flinnsci.com/Chapter.aspx?ChapterId=88&UnitId=1)
### Unit 1: The Human Body and Orientation

<table>
<thead>
<tr>
<th>Standards</th>
<th>Learning Targets and Skills</th>
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</thead>
</table>
| SC.912.N.1.1    | Students will:  
|                 | • **describe** what characterizes science and its methods/processes, including:  
|                 |   o systematic observations and make inferences; examine multiple resources to research problem; use tools to gather, analyze, and interpret data using metric units; pose answers, explanations through hypothesis and predictions; use appropriate evidence and reasoning to justify these explanations to others; communicate results |
| SC.912.N.1.2    | Students will:  
|                 | • **differentiate** anatomy from physiology  
|                 | • **locate and describe** the orientation and directional terms:  
|                 |   o superior, inferior, anterior, posterior, medial, lateral, intermediate, proximal, distal, superficial, deep  
|                 | • **locate and describe** the regional terms:  
|                 |   o cephalic; thoracic, abdominal, cervical, pelvic, pubic, back (dorsal); upper limb; lower limb  
|                 | • **identify and describe** the body planes:  
|                 |   o frontal, oblique, transverse, sagittal  
|                 | • **identify and describe** the body cavities:  
|                 |   o cranial, dorsal, vertebral, thoracic, abdominal, pelvic, abdominopelvic, ventral  
|                 | • **distinguish** between the complexity levels of structural organization: cells → tissue → organ → organ system → organism  
|                 | • **introduce** the importance of homeostasis and how it relates to processes in the human body.  
|                 |   o **identify** the parts and **describe** the process of the homeostatic control system  
|                 | • **evaluate** how environment and personal health are interrelated  
|                 |   o given a scenario predict and justify whether it is a positive or negative feedback system |
| HE.912.C.1.3    | Students will:  
|                 | • **describe** the basic molecular structures and primary functions of the four major categories of biological macromolecules  
|                 |   o nucleic acids, proteins, carbohydrates, and lipids |
| SC.912.L.18.1   | Students will:  
|                 | • **describe** the structures of fatty acids, triglycerides, phospholipids and steroids and **explain** the functions of lipids in living organisms  
|                 | • **describe** the important structures of proteins and amino acids and **explain** the functions of proteins in living organisms  
|                 | • **identify** some reactions that fatty acids and amino acids undergo  
|                 | • **relate** the structure and function of the cell membranes as they relate to lipids  
|                 | • **describe** the important structural characteristics of monosaccharides, disaccharides, and polysaccharides and **explain** the functions of carbohydrates in living things |
| HONORS SC.912.18.2 | Students will:  
|                 | • **describe** the role of enzymes as catalysts that lower the activation energy of biochemical reactions  
|                 | • **identify** factors (pH, temperature, and concentration) and their effect on enzyme activity |
Terminology

- homeostasis
- physiology
- anatomy
- frontal
- orbital
- nasal
- oral
- axillary
- mammary
- umbilical
- inguinal
- brachial
- antecubital
- carpal
- metacarpal
- palmar
- digital
- coxal
- femoral
- patellar
- popliteal
- crural
- sural
- tarsal
- metatarsal
- plantar
- otic
- occipital
- scapular
- vertebral
- lumbar
- sacral
- gluteal

Anatomy and Physiology Resources

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Teacher Hints & Instruction Focus

- All resources will be available on the Anatomy and Physiology PLC EDMODO page. The code to this group site will be available at the District Science Office.
- An interactive science notebook is a compilation of student learning that provides a partial record of the instructional experiences for a student. Some teachers use spiral-bound notebooks, some use composition notebooks, while others use 3-ring binder to organize. Pages should not be taken out of the science notebook so careful consideration should be given to the type of notebook that is used.
- Scientists learn from doing investigations AND from reading non-fiction reference materials, such as, journals, newspapers, etc.
- Get students acclimated with human body systems by doing the “Super Hero Activity” and/or “When Did She Die?”
- Students should first learn how to identify tissue microscope images using internet or images from book. Then have students practice using a microscope to identify tissue. Microscope repair and slides can be purchased from 1040 account. Most students will not have experience using a microscope.
- Teachers may teach students how to make and use flash cards and note-taking for study skills.

Resources

Unit 1:

**Common Lab:**

CL1 - When did she die?

**Writing Prompts:**

“Name 10 things you cannot live without”

“Why is anatomical position important?”

“What is the purpose of directional terminology?”

**Labs/Activities:**

- Lab Gummy Bear
- Lab Clothes Pin
- Activity Super Hero Comic Strip
- Activity Super Hero Scavenger Hunt
- Powerpoint Orientation
### Unit 2: Cells and Tissues  
**Weeks 4 – 5**

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<td>- <strong>identify</strong> the defining characteristics of tissues in terms of: types of cells, location, and function</td>
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<td>- <strong>classify</strong> tissues: epithelial, connective, muscle, or nervous</td>
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<td>- <strong>compare</strong> different types of tissues (microscope, internet images, microslide viewers) and prepare scientific drawings</td>
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<td>- <strong>identify</strong> the criteria used when naming epithelial tissue</td>
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**Terminology**
- fibroblasts, microphages, mast cells, adipocytes, apical surface, basal surface, avascular, vascular, squamous, cuboidal, columnar, transitional, simple, stratified, pseudostratified, stem cell, macrophages, neuron
- **Honors only**: fibrosis, regeneration, amitotic

### Unit 3: Integumentary System  
**Weeks 6 – 7**

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<td>- <strong>describe</strong> the functions of the vertebrate integumentary system, including:</td>
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<td>- regulates body temperature, protection, cutaneous sensations, excretion and absorption, synthesis of vitamin D</td>
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<td>- <strong>explain</strong> why skin has different colors</td>
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<td>- <strong>explain</strong> how the layers of skin relate to their function</td>
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<td>- <strong>describe</strong> the structure and function of hair, skin, glands and nails</td>
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<td>- <strong>describe</strong> the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer</td>
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<td>- <strong>analyze</strong> strategies for prevention, detection, and treatment of integumentary system</td>
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<tr>
<td></td>
<td>- such as: skin cancer, acne, psoriasis, and burns</td>
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**Terminology**
- integumentary, skin, hair, nails, glands, cell cycle, cancer, mutation, carcinogen, carcinoma, pigment, hemoglobin, keratin, melanin
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<td><strong>Videos</strong></td>
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<td><strong>Guest Speakers</strong></td>
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<td>Lab Tech – Phlebotomist (Big Red Bus)</td>
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<td>Firefighter – Burns</td>
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<td>Lab Hair and Nail Microscopy</td>
</tr>
<tr>
<td>Activity Play Dough Paper Skin</td>
</tr>
<tr>
<td>Lab Finger Printing</td>
</tr>
</tbody>
</table>
### Unit 4: Skeletal System

<table>
<thead>
<tr>
<th>Standards</th>
<th>Learning Targets and Skills</th>
<th>Weeks 8 – 10</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC.912.L.14.12 HE.912.C.1.5</td>
<td>Students will:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- <strong>describe</strong> the anatomy and histology of bone tissue</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- <strong>discuss</strong> how environment and personal health are interrelated to the skeletal system</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- such as: osteoporosis, rickets, fractures, osteoarthritis, gout, and arthritis</td>
<td></td>
</tr>
<tr>
<td>SC.912.L.14.14 SC.912.L.14.13</td>
<td>Students will:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- <strong>distinguish</strong> between bones of the axial skeleton and the appendicular skeleton</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- <strong>identify</strong> the major bones of the axial and appendicular skeleton:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- axial- cervical, thoracic, lumbar, sacrum, coccyx, skull (cranial and facial), ribs, sternum</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- appendicular- clavicle, scapula, humerus, radius, ulna, femur, patella, tibia, fibula, carpals, tarsals, phalanges, hyoid bone, auditory ossicles, metacarpals, and metatarsals</td>
<td></td>
</tr>
<tr>
<td>HONORS SC.912.L.14.15</td>
<td>Students will:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- <strong>identify</strong> the major bone markings (such as foramina, fossae, tubercles, etc.) on a skeleton</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- <strong>differentiate</strong> between the major bone markings</td>
<td></td>
</tr>
<tr>
<td></td>
<td>- such as: tuberosity, crest, trochanter, line, tubercle, epicondondyle, spine, process, head, facet, condyle, ramus, groove, fissure, foramen, notch, meatus, sinus, and fossa</td>
<td></td>
</tr>
</tbody>
</table>

### Terminology

- Osteon, axial, appendicular, spongy bone, compact bone, diaphysis, epiphysis, metaphysis, trabeculae, osteocyte, canaliculi, red and yellow bone marrow, hematopoiesis, chondroblast
### Anatomy and Physiology Resources

#### Skeletal System

<table>
<thead>
<tr>
<th>Videos</th>
<th>Youtube- “Bone Shapes – Drawn and Defined” <a href="https://www.youtube.com/watch?v=WhWEAF5i7iw">https://www.youtube.com/watch?v=WhWEAF5i7iw</a></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Youtube- “Long Bone Anatomy- Drawn and Defined” <a href="https://www.youtube.com/watch?v=q4vXr9IuPVc">https://www.youtube.com/watch?v=q4vXr9IuPVc</a></td>
</tr>
</tbody>
</table>

| Guest Speakers  | EMT – Basic First Aide |

| Websites        | [www.edheads.org](http://www.edheads.org) Virtual Hip and/or Knee Replacement |

<table>
<thead>
<tr>
<th>Teacher Hints &amp; Instruction Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>All resources will be available on the Anatomy and Physiology PLC EDMODO page. The code to this group site will be available at the District Science Office.</td>
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<tr>
<td>A science notebook is a compilation of student learning that provides a partial record of the instructional experiences for a student. Some teachers use spiral-bound notebooks, some use composition notebooks, while others use 3-ring binder to organize. Pages should not be taken out of the science notebook so careful consideration should be given to the type of notebook that is used.</td>
</tr>
<tr>
<td>Scientists learn from doing investigations AND from reading non-fiction reference materials, such as, journals, newspapers, etc.</td>
</tr>
<tr>
<td>Demonstrate isometric contraction in doorway.</td>
</tr>
<tr>
<td>Use Textbook simulations from CD.</td>
</tr>
<tr>
<td><strong>REMINDER- No bodily fluids (including blood, cheek cells, and saliva) are to be used in the classroom!</strong></td>
</tr>
<tr>
<td>All dissection materials must be purchased through a biological company. No raw or homegrown specimens should be used in the classroom.</td>
</tr>
<tr>
<td>Common SLC 1 reviews all of the material from the first 9 weeks. It should be administered at the end of the first 9 weeks.</td>
</tr>
</tbody>
</table>

### Resources

#### Unit 4:

**Lab/Activities:**
- Activity Bone Coloring WS
- Activity Disarticulated Skeleton WS
- Lab Bag of Bones
- Lab Bone ID and Function
- Lab The Aging Hand

**Common Science Literacy Connection:**
- Common SLC 1 - Lost in The Desert
<table>
<thead>
<tr>
<th>Standards</th>
<th>Learning Targets and Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC.912.L.14.19</td>
<td>Students will:</td>
</tr>
<tr>
<td></td>
<td>• describe the origin, insertion, and action of the muscles</td>
</tr>
<tr>
<td></td>
<td>• differentiate antagonist and agonist</td>
</tr>
<tr>
<td>SC.912.L.14.16</td>
<td>Students will:</td>
</tr>
<tr>
<td>SC.912.L.14.20</td>
<td>• describe the anatomy and histology, including the ultrastructure of muscle tissue (skeletal, cardiac, and smooth)</td>
</tr>
<tr>
<td></td>
<td>• identify the major muscles of the human on a model or diagram, including:</td>
</tr>
<tr>
<td></td>
<td>o masseter, rectus abdominis, sartorius, ulnaris, trapezius, external oblique, intercostals, radialis, orbicularis oculi, internal oblique, quadriceps, gluteus maximus, occipitofrontalis, transverse abdominis, hamstrings, gluteus medius, buccinator, deltoid, peroneus, gluteus minimus, temporalis, triceps, brachialis, zygomaticus, biceps, flexor carpi, serratus, and sternocleidomastoid</td>
</tr>
<tr>
<td>SC.912.L.14.17</td>
<td>Students will:</td>
</tr>
<tr>
<td></td>
<td>• list the steps involved in the sliding filament of muscle contraction:</td>
</tr>
<tr>
<td></td>
<td>o splitting ATP, forming cross bridges, power stroke, binding ATP and detaching</td>
</tr>
<tr>
<td><strong>HONORS</strong></td>
<td>Students will:</td>
</tr>
<tr>
<td>SC.912.L.14.19</td>
<td>• describe the physiology of skeletal muscle</td>
</tr>
<tr>
<td>SC.912.L.18.6</td>
<td>• describe the role of anaerobic respiration in living things and in human society</td>
</tr>
<tr>
<td>SC.912.L.18.8</td>
<td>• identify the reactants, products and basic functions of aerobic and anaerobic cellular respiration.</td>
</tr>
</tbody>
</table>

**Terminology**

tendon, synergists, fixators, epimysium, perimysium, endomysium, fascicles, sacromeres, myofilaments, actin, myosin, contraction,

**Honors only:** acetylcholine, glycolysis, lactic acid, pyruvic acid, creatine phosphate, oxygen deficit
## Anatomy and Physiology Resources

| Textbook | Muscular System  
<table>
<thead>
<tr>
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<tbody>
<tr>
<td></td>
<td>Unit 5</td>
</tr>
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</table>

| Videos   | Youtube- “Muscle Contraction Process”  
<table>
<thead>
<tr>
<th></th>
<th></th>
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<tbody>
<tr>
<td></td>
<td><a href="https://www.youtube.com/watch?v=BMT4PtXRCVA">https://www.youtube.com/watch?v=BMT4PtXRCVA</a></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Guest Speakers</th>
<th>Athletic Trainer – Strength and Conditioning</th>
</tr>
</thead>
</table>

<table>
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<tr>
<th>Websites</th>
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<tr>
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</table>

<table>
<thead>
<tr>
<th>Unit 5:</th>
<th></th>
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</thead>
<tbody>
<tr>
<td><strong>Optional SLC:</strong></td>
<td></td>
</tr>
<tr>
<td>SLC Lactic Acid CLOSE Read</td>
<td></td>
</tr>
<tr>
<td>SLC Metabolic Storm</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Lab/Activities:</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Activity Muscle Contraction WS</td>
<td></td>
</tr>
<tr>
<td>Activity Muscle Shirt Project</td>
<td></td>
</tr>
<tr>
<td>Lab Grip Strength Comparison/Vernier Probe Lab</td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Common Science Literacy Connection:</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Common SLC 2 – It’s Like Pulling Teeth</td>
<td></td>
</tr>
<tr>
<td>Standards</td>
<td>Learning Targets and Skills</td>
</tr>
<tr>
<td>-----------------------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>SC.912.L.14.21</td>
<td>Students will:</td>
</tr>
<tr>
<td>SC.912.L.14.49</td>
<td>• <strong>Identify</strong> the major divisions of the nervous system</td>
</tr>
<tr>
<td>SC.912.L.14.24</td>
<td>• <strong>Describe</strong> the anatomy, histology and physiology of the central and peripheral nervous systems</td>
</tr>
<tr>
<td></td>
<td>• <strong>Identify</strong> the major functions associated with the sympathetic and parasympathetic nervous system</td>
</tr>
<tr>
<td></td>
<td>• <strong>Identify</strong> the general parts of a synapse and describe the physiology of signal transmission across a synapse</td>
</tr>
<tr>
<td><strong>HONORS SC.912.L.14.22</strong></td>
<td>Students will:</td>
</tr>
<tr>
<td></td>
<td>• <strong>Describe</strong> the chemical physiology of nerve conduction, including:</td>
</tr>
<tr>
<td></td>
<td>o synapse, neurotransmitters, action potential, sodium/potassium pump</td>
</tr>
<tr>
<td>SC.912.L.14.26</td>
<td>Students will:</td>
</tr>
<tr>
<td>SC.912.L.14.25</td>
<td>• <strong>Identify</strong> the major parts of the brain on diagrams or models including:</td>
</tr>
<tr>
<td>SC.912.L.14.28</td>
<td>o cerebrum, cerebellum, diencephalon, pons, medulla oblongata, brain stem, frontal lobe, parietal lobe, occipital lobe, and temporal lobe</td>
</tr>
<tr>
<td></td>
<td>• <strong>Identify</strong> the major parts of a cross section through the spinal cord</td>
</tr>
<tr>
<td></td>
<td>• <strong>Identify</strong> the major functions of the spinal cord</td>
</tr>
<tr>
<td><strong>HONORS SC.912.L.14.27</strong></td>
<td>Students will:</td>
</tr>
<tr>
<td></td>
<td>• <strong>Identify and Describe</strong> the functions of the major parts of the brain including:</td>
</tr>
<tr>
<td></td>
<td>o meninges, medulla, pons, midbrain, hypothalamus, thalamus, cerebellum and cerebrum</td>
</tr>
<tr>
<td>SC.912.L.14.23</td>
<td>Students will:</td>
</tr>
<tr>
<td>SC.912.L.14.18</td>
<td>• <strong>Identify</strong> the parts of a reflex arc, including:</td>
</tr>
<tr>
<td></td>
<td>o a receptor, a sensory neuron, an integrating center, a motor neuron and an effector</td>
</tr>
<tr>
<td></td>
<td>• <strong>Describe</strong> signal transmission across the myoneural junction</td>
</tr>
<tr>
<td>HE.912.C.1.3</td>
<td>Students will:</td>
</tr>
<tr>
<td>HE.912.C.1.5</td>
<td>• <strong>Describe</strong> how environment and personal health are related to the nervous system</td>
</tr>
<tr>
<td>HE.912.C.1.7</td>
<td>• <strong>Describe</strong> strategies for prevention, detection, and treatment of neurological disease</td>
</tr>
<tr>
<td></td>
<td>• <strong>Describe</strong> how heredity and family history can impact neurological disease</td>
</tr>
</tbody>
</table>
## Anatomy and Physiology Resources

### Nervous System

**Videos EDMODO**
- Youtube- “All or Nothing Action Potential ”
  https://www.youtube.com/watch?v=4M1zzT9J_y4
- National Geographic- “Your Memory Under Stress”

**Guest Speakers**
- Neurologist
- Psychologist
- Physical or Occupational Therapist
- Speech Pathologist

**Websites**
- [www.edheads.org](http://www.edheads.org)
- deep brain simulation

**Teacher Hints & Instruction Focus**
- All resources will be available on the Anatomy and Physiology PLC EDMODO page. The code to this group site will be available at the District Science Office.
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## Resources

**Unit 6:**
**Common Lab:**
CL 2 - Sheep Brain Dissection

**Common Science Literacy Connection:**
SLC 3 – Tired Swimmer
<table>
<thead>
<tr>
<th>Standards</th>
<th>Learning Targets and Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC.912.L.14.50</td>
<td>Students will:</td>
</tr>
<tr>
<td></td>
<td>• <strong>describe</strong> the structure of vertebrate sensory organs (eye, ear, nose, skin, tongue)</td>
</tr>
<tr>
<td></td>
<td>• <strong>relate</strong> structure and function in vertebrate sensory systems</td>
</tr>
<tr>
<td><strong>Terminology</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>stimulus, response, sensory receptor, olfactory, gustatory, vision, hearing, taste buds, equilibrium, touch</td>
</tr>
</tbody>
</table>

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<thead>
<tr>
<th>Standards</th>
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<tr>
<td>SC.912.L.14.32</td>
<td>Students will:</td>
</tr>
<tr>
<td>SC.912.L.14.29</td>
<td>• <strong>describe</strong> the anatomy and histology of the endocrine system</td>
</tr>
<tr>
<td></td>
<td>• <strong>define</strong> the terms endocrine and exocrine</td>
</tr>
<tr>
<td><strong>HONORS</strong></td>
<td></td>
</tr>
<tr>
<td>SC.912.L.14.31</td>
<td>Students will:</td>
</tr>
<tr>
<td></td>
<td>• <strong>describe</strong> the physiology of hormones including the different types and the mechanisms of their action</td>
</tr>
<tr>
<td>HE.912.C.1.3</td>
<td>Students will:</td>
</tr>
<tr>
<td>HE.912.C.1.5</td>
<td>• <strong>describe</strong> how environment and personal health are related to the endocrine system</td>
</tr>
<tr>
<td>HE.912.C.1.7</td>
<td>• <strong>describe</strong> strategies for prevention, detection, and treatment of diseases of the endocrine system</td>
</tr>
<tr>
<td>SC.912.L.14.30</td>
<td>Students will:</td>
</tr>
<tr>
<td></td>
<td>• <strong>compare</strong> endocrine and neural controls of physiology</td>
</tr>
<tr>
<td><strong>Terminology</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>endocrine, exocrine, hormones, target cells, feedback (systems) mechanisms</td>
</tr>
</tbody>
</table>
### Videos
- **Youtube- “Reflex Actions”**
  - https://www.youtube.com/watch?v=nKPEW-ao2Wg

### Guest Speakers
- Optomitrist
- Endocrinologist

### Websites
- [http://www.exploratorium.edu/learning_studio/cow_eye/](http://www.exploratorium.edu/learning_studio/cow_eye/)
- [http://www.pennmedicine.org/health_info/animationplayer/](http://www.pennmedicine.org/health_info/animationplayer/)

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- Use Textbook simulations from CD.
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### Resources

#### Unit 7: Optional SLC:
- SLC Humans and Squid Eye Printable Article
- SLC Humans and Squid Eye Student Questions

**Labs/Activities:**
- Activity Senses Presentation
- Activity Sense Organ Foldable
- Lab Sheep eye dissection

#### Unit 8: Optional SLC:
- SLC Chemical Eric

**Writing Prompts:**
- How do hormones change with food?
- How do hormones change with drugs?
- How do hormones change with exercise?

**Labs/Activities:**
- Activity Coloring Endocrine WS
### Unit 9: Lymphatic & Immune Systems

<table>
<thead>
<tr>
<th>Standards</th>
<th>Learning Targets and Skills</th>
</tr>
</thead>
</table>
| **SC.912.L.14.42** | Students will:  
- **describe** the anatomy and physiology of the lymph system |
| **SC.912.L.14.52**  
**HE.912.C.1.3**  
**HE.912.C.1.5**  
**HE.912.C.1.7** | Students will:  
- **explain** the basic functions of the human immune system, including specific and nonspecific immune response, vaccines and antibiotics  
- **describe** how environment and personal health are related to the immune system  
- **describe** strategies for prevention, detection, and treatment of diseases of the immune system  
- **describe** how heredity and family history can impact diseases of the immune system |

### Terminology

**All:** immunity, specific and nonspecific immune response, antibodies, lymph, lymph node, environmental factors, thymus, spleen, tonsils, inflammation  
**Honors Only:** basophils, neutrophils, eosinophils, B-cells, T-cells,
### Anatomy and Physiology Resources

#### Lymphatic and Immune System

**Videos**

- Youtube
  - “Bacteria Infection” [https://www.youtube.com/watch?v=zQGOcOUBL6s](https://www.youtube.com/watch?v=zQGOcOUBL6s)

**Guest Speakers**

- Immunologist

**Websites**

- [www.edmodo.com](http://www.edmodo.com)

**Teacher Hints & Instruction Focus**

- All resources will be available on the Anatomy and Physiology PLC EDMODO page. The code to this group site will be available at the District Science Office.
- Preview all videos and internet labs dealing with the reproductive or urinary system prior to student presentations.
- Do not use bodily fluids for student labs. Simulated blood, urine and saliva can be purchased. In addition, there are recipes online.

### Resources

**Unit 9:**

- **Optional SLC:**
  - SLC Your Cells Mutate Daily Online Article
  - SLC Your Cells Mutate Daily Printable Article
  - SLC Your Cells Mutate Daily Student Questions

- **Labs/Activities:**
  - Lab Patient Zero
### Unit 10: Cardiovascular System

<table>
<thead>
<tr>
<th>Standards</th>
<th>Learning Targets and Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC.912.L.14.34&lt;br&gt;SC.912.L.14.35</td>
<td>Students will:&lt;ul&gt;&lt;li&gt;&lt;strong&gt;describe&lt;/strong&gt; the composition and physiology of blood, including that of the plasma and the formed elements&lt;/li&gt;&lt;li&gt;&lt;strong&gt;describe&lt;/strong&gt; the steps in hemostasis, including the mechanisms of coagulation. Include the basis for blood typing and transfusion reactions&lt;/li&gt;&lt;/ul&gt;</td>
</tr>
<tr>
<td>SC.912.L.14.38</td>
<td>Students will:&lt;ul&gt;&lt;li&gt;&lt;strong&gt;describe&lt;/strong&gt; the normal heart sounds and what they mean&lt;/li&gt;&lt;/ul&gt;</td>
</tr>
<tr>
<td><strong>HONORS</strong> SC.912.L.14.37&lt;br&gt;SC.912.L.14.40</td>
<td>Students will:&lt;ul&gt;&lt;li&gt;&lt;strong&gt;explain&lt;/strong&gt; the components of an electrocardiogram&lt;/li&gt;&lt;li&gt;&lt;strong&gt;describe&lt;/strong&gt; the histology of the major arteries and veins of systematic, pulmonary, hepatic portal and coronary circulation&lt;/li&gt;&lt;/ul&gt;</td>
</tr>
<tr>
<td>SC.912.L.14.36&lt;br&gt;SC.912.L.14.39&lt;br&gt;HE.912.C.1.5&lt;br&gt;HE.912.C.1.7</td>
<td>Students will:&lt;ul&gt;&lt;li&gt;&lt;strong&gt;describe&lt;/strong&gt; the factors affecting blood flow through the cardiovascular system&lt;/li&gt;&lt;li&gt;&lt;strong&gt;describe&lt;/strong&gt; the hypertension and some of the factors that produce it&lt;/li&gt;&lt;li&gt;&lt;strong&gt;analyze&lt;/strong&gt; how heredity and family history can impact personal health&lt;br&gt;  o such as: hemophilia, fibrillation, murmur, tachycardia, bradycardia.&lt;/li&gt;&lt;/ul&gt;</td>
</tr>
<tr>
<td>SC.912.L.14.41</td>
<td>Students will:&lt;ul&gt;&lt;li&gt;&lt;strong&gt;describe&lt;/strong&gt; fetal circulation and changes that occur to the circulatory system at birth&lt;/li&gt;&lt;/ul&gt;</td>
</tr>
<tr>
<td>SC.912.L.14.44</td>
<td>Students will:&lt;ul&gt;&lt;li&gt;&lt;strong&gt;describe&lt;/strong&gt; the physiology of the respiratory system including the mechanisms of ventilation, gas exchange, gas transport and the mechanisms that control the rate of ventilation&lt;/li&gt;&lt;/ul&gt;</td>
</tr>
<tr>
<td>HE.912.C.1.3&lt;br&gt;HE.912.C.1.5&lt;br&gt;HE.912.C.1.7</td>
<td>• &lt;strong&gt;describe&lt;/strong&gt; how environment and personal health are related to the respiratory system&lt;br&gt;• &lt;strong&gt;describe&lt;/strong&gt; strategies for prevention, detection, and treatment of respiratory disease&lt;br&gt;• &lt;strong&gt;describe&lt;/strong&gt; how heredity and family history can impact respiratory disease</td>
</tr>
<tr>
<td><strong>HONORS</strong> SC.912.L.14.43</td>
<td>Students will:&lt;ul&gt;&lt;li&gt;&lt;strong&gt;describe&lt;/strong&gt; the histology of the respiratory system&lt;br&gt;  o nasopharynx, oropharynx, laryngopharynx; epiglottis, trachea, bronchi, bronchioles, terminal bronchi, alveoli, respiratory membrane&lt;/li&gt;&lt;li&gt;&lt;strong&gt;explain&lt;/strong&gt; the relationship between pressure and volume (Boyle’s Law) and how it relates to respiration&lt;/li&gt;&lt;/ul&gt;</td>
</tr>
</tbody>
</table>

**Terminology**
- plasma, erythrocytes, platelets, hemoglobin, hematopoiesis, leukocytes, coagulation, antigens, transfusions, systole, diastole, hypertension, hypotension
- respiration, pulmonary ventilation, gas exchange, oxygen, carbon dioxide, nose, pharynx, larynx, trachea, bronchi, bronchioles, pleural cavity, alveoli, diaphragm
### Anatomy and Physiology Resources

#### Cardiovascular System

| Videos | TEDEd - “How Breathing Works”
|        | http://ed.ted.com/lessons/how-breathing-works-nirvair-kaur
|        | Youtube - “Normal Heart Sounds”
|        | https://www.youtube.com/watch?v=dDg7GDpR1RE
|        | Youtube - “Cardiac Conduction System”
|        | https://www.youtube.com/watch?v=RYZ4daFwMa8
|        | Youtube - “Diver Takes On World’s Deepest Pool”
|        | https://www.youtube.com/watch?v=v4-RAkkfWQM&feature=youtu.be

| Guest Speakers | Respiratory Therapist:
|                | American Lung Society

| Websites | www.edheads.org
|         | Aortic Aneurism Simulation
|         | www.edmodo.com

#### Teacher Hints & Instruction Focus

- All resources will be available on the Anatomy and Physiology PLC EDMODO page. The code to this group site will be available at the District Science Office.
- A science notebook is a compilation of student learning that provides a partial record of the instructional experiences for a student. Some teachers use spiral-bound notebooks, some use composition notebooks, while others use 3-ring binder to organize. Pages should not be taken out of the science notebook so careful consideration should be given to the type of notebook that is used.
- Scientists learn from doing investigations AND from reading non-fiction reference materials, such as, journals, newspapers, etc.
- Demonstrate isometric contraction in doorway.
- Use Textbook simulations from CD.
- REMINDER: No bodily fluids (including blood, cheek cells, and saliva) are to be used in the classroom!
- All dissection materials must be purchased through a biological company. No raw or homegrown specimens should be used in the classroom.

#### Resources

**Unit 10:**

**Common Science Literacy Connection:**
Common SLC 3 - Tired Swimmer

**Writing Prompt:**
“Describe the pathway of the blood through the body?”

**Activities:**
Activity Blood Typing Simulation – Ernie’s Exit
Activity RAFT Respiratory System

**Optional SLC:**
SLC Blood Does The Body Good Online Article
SLC Blood Does The Body Good Printable Article
SLC Blood Does The Body Good Student Questions
SLC I Have Fallen And I Can’t Get Up

**Common Lab:**
CL 3 - Build a Lung

**Labs:**
Lab Height vs Lung Volume
### Unit 11: Digestive System

<table>
<thead>
<tr>
<th>Standards</th>
<th>Learning Targets and Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC.912.L.14.46</td>
<td>Students will:</td>
</tr>
<tr>
<td></td>
<td>• <strong>describe</strong> the basic anatomy and physiology of the human digestive system</td>
</tr>
<tr>
<td></td>
<td>• <strong>describe</strong> and compare the process of mechanical digestion, chemical digestion, absorption and neural and hormonal mechanism of control</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HONORS SC.912.L.14.45</th>
<th>Students will:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• <strong>describe</strong> the histology of the alimentary canal and its associated accessory organs (GI tract)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HONORS SC.912.L.14.45</th>
<th>Students will:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• <strong>describe</strong> how environment and personal health are related to the digestive system</td>
</tr>
<tr>
<td></td>
<td>• <strong>describe</strong> strategies for prevention, detection, and treatment of diseases of the digestive system</td>
</tr>
<tr>
<td></td>
<td>• <strong>describe</strong> how heredity and family history can impact diseases of the digestive system</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SC.912.L.18.1</th>
<th>Students will:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• <strong>describe</strong> the basic molecular structures and primary functions of the four major categories of biological macromolecules</td>
</tr>
<tr>
<td></td>
<td>o <strong>nucleic acids, proteins, carbohydrates, and lipids</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>HONORS SC.912.18.3</th>
<th>Students will:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• <strong>describe</strong> the structures of fatty acids, triglycerides, phospholipids and steroids and <strong>explain</strong> the functions of lipids in living organisms</td>
</tr>
<tr>
<td></td>
<td>• <strong>describe</strong> the important structures of proteins and amino acids and <strong>explain</strong> the functions of proteins in living organisms</td>
</tr>
<tr>
<td></td>
<td>• <strong>identify</strong> some reactions that fatty acids and amino acids undergo</td>
</tr>
<tr>
<td></td>
<td>• <strong>relate</strong> the structure and function of the cell membranes as they relate to lipids</td>
</tr>
<tr>
<td></td>
<td>• <strong>describe</strong> the important structural characteristics of monosaccharides, disaccharides, and polysaccharides and <strong>explain</strong> the functions of carbohydrates in living things</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SC.912.L.18.11</th>
<th>Students will:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• <strong>explain</strong> the role of enzymes as catalysts that lower the activation energy of biochemical reactions</td>
</tr>
<tr>
<td></td>
<td>• <strong>identify</strong> factors (pH, temperature, and concentration) and their effect on enzyme activity</td>
</tr>
</tbody>
</table>

### Terminology

Mucosa, ingestion, secretion, absorption, defecation, peristalsis, segmentation, bile, bolus, chyme, mastication, villi, microvilli, rugae, sphincter
<table>
<thead>
<tr>
<th><strong>Anatomy and Physiology Resources</strong></th>
<th>Digestive System</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Videos</strong></td>
<td>Youtube- “The Digestive System”&lt;br&gt;<a href="https://www.youtube.com/watch?v=_QYwscALNng">https://www.youtube.com/watch?v=_QYwscALNng</a></td>
</tr>
<tr>
<td><strong>Guest Speakers</strong></td>
<td>Gastroenterologist</td>
</tr>
<tr>
<td><strong>Websites</strong></td>
<td><a href="http://www.edmodo.com">www.edmodo.com</a></td>
</tr>
<tr>
<td><strong>Teacher Hints &amp; Instruction Focus</strong>&lt;br&gt; • All resources will be available on the Anatomy and Physiology PLC EDMODO page. The code to this group site will be available at the District Science Office.&lt;br&gt; • Preview all videos and internet labs dealing with the reproductive or urinary system prior to student presentations.&lt;br&gt; • Do not use bodily fluids for student labs. Simulated blood, urine and saliva can be purchased. In addition, there are recipes online.</td>
<td></td>
</tr>
<tr>
<td><strong>Resources</strong></td>
<td></td>
</tr>
</tbody>
</table>

**Unit 11:**

**Writing Prompt:**
Write a journal to explain the journey of a slice of pizza through the digestive system.

**Common Labs:**
CL 4 - Why might I be flatulent?
<table>
<thead>
<tr>
<th>Standards</th>
<th>Learning Targets and Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>SC.912.L.14.47</td>
<td>Students will:</td>
</tr>
<tr>
<td></td>
<td>• describe the physiology of urine formation by the kidney</td>
</tr>
<tr>
<td>HE.912.C.1.3</td>
<td>Students will:</td>
</tr>
<tr>
<td>HE.912.C.1.5</td>
<td>• describe how environment and personal health are related to the urinary system</td>
</tr>
<tr>
<td>HE.912.C.1.7</td>
<td>• describe strategies for prevention, detection, and treatment of diseases of the urinary system</td>
</tr>
<tr>
<td>HONORS SC.912.L.14.48</td>
<td>Students will:</td>
</tr>
<tr>
<td></td>
<td>• describe how heredity and family history can impact diseases of the urinary system</td>
</tr>
</tbody>
</table>

**Terminology**

- kidney, ureters, urinary bladder, urethra, urine, excretory, nephrons, medulla, cortex, glomerulus, the loop of Henle, Bowman’s capsule, proximal tubules, distal tubules, renal pelvis, kidney stones
Anatomy and Physiology Resources

<table>
<thead>
<tr>
<th>Textbook</th>
<th>Urinary System</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Unit 12</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Videos</th>
<th>Youtube- “The Urinary System in 7 minutes”</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><a href="https://www.youtube.com/watch?v=CkGqp5tr-Qk">https://www.youtube.com/watch?v=CkGqp5tr-Qk</a></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Guest Speakers</th>
<th>Urologist</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Websites</th>
<th><a href="http://www.edmodo.com">www.edmodo.com</a></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Teacher Hints &amp; Instruction Focus</th>
</tr>
</thead>
<tbody>
<tr>
<td>• All resources will be available on the Anatomy and Physiology PLC EDMODO page. The code to this group site will be available at the District Science Office.</td>
</tr>
<tr>
<td>• Preview all videos and internet labs dealing with the reproductive or urinary system prior to student presentations.</td>
</tr>
<tr>
<td>• Do not use bodily fluids for student labs. Simulated blood, urine and saliva can be purchased. In addition, there are recipes online.</td>
</tr>
</tbody>
</table>

Resources

Unit 12:

**Writing Prompt:**
Is drinking your urine safe?
<table>
<thead>
<tr>
<th>Standards</th>
<th>Learning Targets and Skills</th>
</tr>
</thead>
</table>
| SC.912.L.14.33 | **Students will:**  
|             | • **describe** the basic anatomy and physiology of the male reproductive system:  
|             |   o testes: produce sperm and the male sex hormone testosterone  
|             |   o ducts: transport, store, and assist in maturation of sperm  
|             |   o accessory sex gland: secrete most of the liquid portion of the semen  
|             |   o penis: contains the urethra, a passageway for ejaculation of semen and excretion of urine  
| HONORS SC.912.L.16.13 | **Students will:**  
|             | • **describe** the process of human development from fertilization to birth and major changes that occur in each trimester of pregnancy  
| SC.912.L.14.33 | **Students will:**  
|             | • **describe** the basic anatomy and physiology of the female reproductive system:  
|             |   o ovaries: produce secondary oocytes and hormones including estrogen  
|             |   o uterine tubes: transport a secondary oocyte to the uterus and site where fertilization usually occurs  
|             |   o uterus: site of implantation of a fertilized ovum, development of fetus during pregnancy and labor.  
|             |   o vagina: receives the penis during sexual intercourse and is a passageway for childbirth  
|             |   o mammary glands (nipple, areola): synthesize, secrete, and eject milk for nourishment of the newborn  
| HE.912.C.1.3  | **Students will:**  
|             | • **describe** how environment and personal health are related to the reproductive system  
| HE.912.C.1.5  | **describe** strategies for prevention, detection, and treatment of diseases of the reproductive system  
| HE.912.C.1.7  | **describe** how heredity and family history can impact diseases of the reproductive system  
| HONORS SC.912.L.16.10 | **Students will:**  
|             | • **evaluate** the impact of biotechnology on the individual, society and the environment, including medical and ethical issues, such as:  
|             |   o birth control (IUD, pill, spermicides), infertility technology, abortion procedures, Stem cell research,  
|             |   hermaphroditism, gender reassignment surgery, birth defects (conjoined twins)  
| **Terminology**                          | Male: scrotum, epididymis, vas deferens, ejaculatory ducts, urethra, seminal vesicle, prostate, bulbouethral/Cowper’s gland, spermatogenesis  
|                                         | Female reproductive: germinal epithemium, corpus luteum, infundibulum, fimbria, fundus, body, uterine cavity, myometrium, endometrium, hymen, vaginal orifice, fornix, oogenesis  
|                                         | **Honors only:** ovarian cortex, ovarian follicle, mature follicle, corpus albicans, ovarian medulla  
|                                         | **EOC Review and EOC Administration weeks 37 - 39**
### Anatomy and Physiology Resources

| Videos | Safari Montage: Miracle of Life  
YouTube – “Male Reproductive System- Hormonal Regulation” [https://www.youtube.com/watch?v=Sr4recOxmNc](https://www.youtube.com/watch?v=Sr4recOxmNc)  
“Female Reproductive System – Hormonal Regulation” [https://www.youtube.com/watch?v=2_owp8kNMus](https://www.youtube.com/watch?v=2_owp8kNMus)  
“Ovulation” [https://www.youtube.com/watch?v=nLmg4wSHdxQ](https://www.youtube.com/watch?v=nLmg4wSHdxQ)  
“The Miracle of Life: How it all began” [https://www.youtube.com/watch?v=1hwKIsxs15A](https://www.youtube.com/watch?v=1hwKIsxs15A) |
|---|---|
| Guest Speakers | OB/GYN, Physician assistant (PA)  
Nurse Practitioner/Midwife |
| Websites | All resources will be available on the Anatomy and Physiology PLC EDMODO page. The code to this group site will be available at the District Science Office.  
Preview all videos and internet labs dealing with the reproductive or urinary system prior to student presentations.  
Do not use bodily fluids for student labs. Simulated blood, urine and saliva can be purchased. In addition, there are recipes online.  
Additional time has been provided to allow for state testing and the graduation of seniors. |
<table>
<thead>
<tr>
<th>Teacher Hints &amp; Instruction Focus</th>
<th>Resources</th>
</tr>
</thead>
</table>
| Unit 13:  
**Writing Prompt:**  
Journal documenting your travels of the development and pathway of a gametes.  
**Common Science Literacy Connections:**  
Common SLC 4 – Uretero What |
### Volusia County Science 5E Instructional Model

<table>
<thead>
<tr>
<th>Description</th>
<th>Implementation</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Engage</strong></td>
<td>Learners engage with an activity that captures their attention, stimulates their thinking, and helps them access prior knowledge. A successful engagement activity will reveal existing misconceptions to the teacher and leave the learner wanting to know more about how the problem or issue relates to his/her own world. <em>(e.g. ISN-preview, Probe, Teacher Demonstration...)</em></td>
</tr>
<tr>
<td><strong>Explore</strong></td>
<td>Learners explore common, hands-on experiences that help them begin constructing concepts and developing skills related to the learning target. The learner will gather, organize, interpret, analyze and evaluate data. <em>(e.g. investigations, labs...)</em></td>
</tr>
<tr>
<td><strong>Explain</strong></td>
<td>Learners explain through analysis of their exploration so that their understanding is clarified and modified with reflective activities. Learners use science terminology to connect their explanations to the experiences they had in the engage and explore phases. <em>(e.g. Lecture, ISN-notes, Research, Close-reading, reading to learn, videos, websites...)</em></td>
</tr>
<tr>
<td><strong>Elaborate</strong></td>
<td>Learners elaborate and solidify their understanding of the concept and/or apply it to a real world situation resulting in a deeper understanding. Teachers facilitate activities that help the learner correct remaining misconceptions and generalize concepts in a broader context. <em>(e.g. labs, web-quest, presentations, debate, discussion, ISN-reflection...)</em></td>
</tr>
<tr>
<td><strong>Evaluate</strong></td>
<td>Teachers and Learners evaluate proficiency of learning targets, concepts and skills throughout the learning process. Evaluations should occur before activities, to assess prior knowledge, after activities, to assess progress, and after the completion of a unit to assess comprehension. <em>(i.e. formatives and summatives)</em></td>
</tr>
</tbody>
</table>

The diagram below shows how the elements of the 5E model are interrelated. Although the 5E model can be used in linear order (engage, explore, explain, elaborate and evaluate), the model is most effective when it is used as a cycle of learning.

Each lesson begins with an engagement activity, but evaluation occurs throughout the learning cycle. Teachers should adjust their instruction based on the outcome of the evaluation. In addition, teachers are encouraged to differentiate at each state to meet the needs of individual students.

*Adapted from The BSCS 5E Instructional Model: Origins, Effectiveness, and Applications, July 2006, Bybee, et.al, pp. 33-34.*
Cognitive Complexity

The benchmarks in the Next Generation Sunshine State Standards (NGSSS) identify knowledge and skills students are expected to acquire at each grade level, with the underlying expectation that students also demonstrate critical thinking.

The categories—**low complexity, moderate complexity, high complexity**—form an ordered description of the demands a test item may make on a student. Instruction in the classroom should match, at a minimum, the complexity level of the learning target in the curriculum map.

<table>
<thead>
<tr>
<th>Low</th>
<th>Moderate</th>
<th>High</th>
</tr>
</thead>
<tbody>
<tr>
<td>This category relies heavily on the recall and recognition of previously learned concepts and principles. Items typically specify what the student is to do, which is often to carry out some procedure that can be performed mechanically. It is not left to the student to come up with an original method or solution.</td>
<td>This category involves more flexible thinking and choice among alternatives than low complexity items. They require a response that goes beyond the habitual, is not specified, and ordinarily has more than a single step or thought process. The student is expected to decide what to do—using formal methods of reasoning and problem-solving strategies—and to bring together skill and knowledge from various domains.</td>
<td>This category makes heavy demands on student thinking. Students must engage in more abstract reasoning, planning, analysis, judgment, and creative thought. The items require that the student think in an abstract and sophisticated way often involving multiple steps.</td>
</tr>
</tbody>
</table>

Students will:

- **retrieve information** from a chart, table, diagram, or graph
- **recognize** a standard scientific representation of a simple phenomenon
- **complete** a familiar single-step procedure or equation using a reference sheet

Students will:

- **interpret** data from a chart, table, or simple graph
- **determine** the best way to organize or present data from observations, an investigation, or experiment
- **describe** examples and non-examples of scientific processes or concepts
- **specify** or **explain** relationships among different groups, facts, properties, or variables
- **differentiate** structure and functions of different organisms or systems
- **predict** or **determine** the logical next step or outcome
- **apply** and **use concepts** from a standard scientific model or theory

Students will:

- **analyze** data from an investigation or experiment and formulate a conclusion
- **develop** a generalization from multiple data sources
- **analyze** and **evaluate** an experiment with multiple variables
- **analyze** an investigation or experiment to identify a flaw and propose a method for correcting it
- **analyze** a problem, situation, or system and make long-term predictions
- **interpret, explain, or solve** a problem involving complex spatial relationships

*Adapted from Webb's Depth of Knowledge and FLDOE FCAT 2.0 Specification Documentation, Version 2.*
### Grades 9 - 10 ELA Florida Standards

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAFS.910.RST.1.1 – Cite specific textual evidence to support analysis of science and technical texts, attending to the precise details of the explanations or descriptions.</td>
<td>LAFS.910.WHST.3.9 – Draw evidence from informational texts to support analysis, reflection, and research.</td>
</tr>
<tr>
<td>LAFS.910.RST.1.3 – Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.</td>
<td></td>
</tr>
<tr>
<td>LAFS.910.RST.2.4 – Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 9 – 10 texts and topics.</td>
<td></td>
</tr>
<tr>
<td>LAFS.910.RST.2.5 – Analyze the structure of the relationship among concepts in a text, including relationships among key terms (e.g., force, friction, reaction force, energy.)</td>
<td></td>
</tr>
<tr>
<td>LAFS.910.RST.3.7 – Translate quantitative or technical information expressed in words in a text into visual form (e.g., a table or chart) and translate information expressed visually or mathematical (e.g., in an equation) into words.</td>
<td></td>
</tr>
<tr>
<td>LAFS.910.RST.4.10 – by the end of grade 10, read and comprehend science / technical texts in the grades 9 – 10 text complexity band independently and proficiently.</td>
<td></td>
</tr>
</tbody>
</table>

### Grades 9 - 12 Math Florida Standards (select courses)

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>MAFS.912.A-CED.1.4 – Rearrange formulas to highlight a quantity of interest, using the same reasoning as in solving equations.</td>
<td>MAFS.912.N-VM.1.1 – Recognize vector quantities as having both magnitude and direction. Represent vector quantities by directed line segments, and use appropriate symbols for vectors and their magnitudes.</td>
</tr>
<tr>
<td>MAFS.912.S-IC.2.6 – Evaluate reports based on data.</td>
<td>MAFS.912.N-VM.1.2 – Find the components of a vector by subtracting the coordinates of an initial point from the coordinates of a terminal point.</td>
</tr>
<tr>
<td></td>
<td>MAFS.912.N-VM.1.3 – Solve problems involving velocity that can be represented as vectors.</td>
</tr>
</tbody>
</table>
### Grades 11 - 12 ELA Florida Standards

<table>
<thead>
<tr>
<th>Standards</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAFS.1112.RST.1.1</td>
<td>Cite specific textual evidence to support analysis of science and technical texts, attending to important distinctions the author makes and any gaps or inconsistencies in the account.</td>
</tr>
<tr>
<td>LAFS.1112.RST.1.3</td>
<td>Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.</td>
</tr>
<tr>
<td>LAFS.1112.RST.2.4</td>
<td>Determine the meaning of symbols, key terms, and other domain-specific words and phrases as they are used in a specific scientific or technical context relevant to grades 11 – 12 texts and topics.</td>
</tr>
<tr>
<td>LAFS.1112.RST.3.7</td>
<td>Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.</td>
</tr>
<tr>
<td>LAFS.1112.RST.4.10</td>
<td>By the end of grade 12, read and comprehend science/technical texts in grades 11 – 12 text complexity band independently and proficiently.</td>
</tr>
<tr>
<td>LAFS.1112.WHST.3.9</td>
<td>Draw evidence from information texts to support analysis, reflection, and research.</td>
</tr>
</tbody>
</table>
| LAFS.1112.WHST.1.2 | Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.  
   a. Introduce a topic and organize complex ideas, concepts, and information so that each new element builds on that which precedes it to create a unified whole; include formatting (e.g., headings), graphics (e.g., figures, tables), and multimedia when useful to aiding comprehension.  
   b. Develop the topic thoroughly by selecting the most significant and relevant facts, extended definitions, concrete details, quotations, or other information and examples appropriate to the audience’s knowledge of the topic.  
   c. Use varied transitions and sentence structures to link the major sections of the text, create cohesion, and clarify the relationships among complex ideas and concepts.  
   d. Use precise language, domain-specific vocabulary and techniques such as metaphor, simile, and analogy to manage the complexity of the topic; convey a knowledgeable stance in a style that responds to the discipline and context as well as to the expertise of likely readers.  
   e. Provide a concluding statement or section that follows from and supports the information or explanation provided (e.g., articulating implications or the significance of the topic). |

### Grades 9 - 12 Math Florida Standards (all courses)

<table>
<thead>
<tr>
<th>Standards</th>
<th>Description</th>
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| MAFS.912.F-IF.3.7 | Graph functions expressed symbolically and show key features of the graph, by hand in simple cases and using technology for more complicated cases.  
   a. Graph linear and quadratic functions and show intercepts, maxima, and minima.  
   b. Graph square root, cube root, and piecewise-defined functions, including step functions and absolute value functions.  
   c. Graph polynomial functions, identifying zeros when suitable factorizations are available, and showing end behavior.  
   d. Graph rational functions, identifying zeros and asymptotes when suitable factorizations are available, and showing end behavior.  
   e. Graph exponential and logarithmic functions, showing intercepts and end behavior, and trigonometric functions, showing period, midline, and amplitude. |
| MAFS.912.N-Q.1.1 | Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays. |
| MAFS.912.N-Q.1.3 | Choose a level of accuracy appropriate to limitations measurement when reporting quantities. |