Living Environment Unit 2 – Human Body Systems

Unit Overview: Humans are complex organisms that maintain a narrow set of internal conditions through a system of feedback and communication mechanisms between multiple organ systems. In this unit, students will explore how body systems interact to effectively monitor and respond to both internal and external environmental changes. Emphasis will be placed on the immune system and how a failure to maintain homeostasis results in disease or death.

Essential Questions:
- How is homeostasis important in the maintenance of human systems?
- How does the human body respond to internal and external changes in its environment?
- How do the endocrine and nervous systems work together to maintain homeostasis?
- How do the respiratory and circulatory systems work together?
- How do the digestive and excretory systems work to maintain homeostasis?
- How do our muscles and bones work together to allow us to move?
- How does the immune system work to keep the body healthy?
- What is a vaccine and how does it protect the body from disease?

MST Standard 4 – Science
Key Idea 1: Living things are both similar and different from each other and from nonliving things.
Key Idea 5: Organisms maintain a dynamic equilibrium that sustains life.

New York State Science Learning Standard Performance Expectation
HS-LS1-2: Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.
HS-LS1-3: Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.
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<th>Time Frame</th>
<th>Skills, Practices, or Expectations</th>
<th>Specific Standards / Performance Indicators</th>
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| 11.30.2020 – 01.15.2020 | **Multi-cellular Life:** Diagram levels of organization in multi-cellular organisms.           | MST Standard 4 Science Key Idea 1  
1.2 - Describe and explain the structures and functions of the human body at different organizational levels (e.g., systems, tissues, cells, organelles)  
1.2a – Important levels of organization for structure and function includes organelles, cells, tissues, organs, organ systems, and whole organisms.  
1.2b – Humans are complex organisms. They require multiple systems for digestion, respiration, reproduction, circulation, excretion, movement, coordination, and immunity. The systems interact to perform the life functions.  
1.2c – The components of the human body, from organ systems to cell organelles, interact to maintain a balanced internal environment. To successfully accomplish this, organisms possess a diversity of control mechanisms that detect deviations to make corrective actions.  
1.2d – If there is disruption in any human system, there may be a corresponding imbalance in homeostasis.  
1.2e – The organs and systems of the body help to provide all the cells with their basic needs. The cells of the body are of different kinds and are grouped in ways that enhance how they function together.  
1.2f – Receptor molecules play an important role in the interactions between cells. Two primary agents of cellular communications are hormones and chemicals produced by nerve cells. If a nerve or hormone signals are multicellular organisms have a hierarchical structural organization, in which any one system is made of numerous parts and is itself a component of the next level.  
Feedback mechanisms maintain a living system’s internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system.  
Disease is a failure of homeostasis. Organisms have a variety of mechanisms to prevent and combat disease. Technological advances including vaccinations and antibiotics have contributed to the prevention and treatment of disease. | Castle Learning- Access through Clever  
BPS Science Department Recommended Virtual Labs – must be logged into BPS google document account through BPS Gmail account to access  
McDougal-Littell Biology Living Environment Chapters 28, 29, 30, 31, 32, 33  
BPS Science K-12 Schoology Folder ➔ 9-12 Resources ➔ Living Environment Resources  
Khan Academy Homeostasis  
PBS Nova – Nervous System and Chronic Pain This is a link to the article - Teaching the Nervous System to Forget Chronic Pain by Eleanor Nelson Stateclearly.com Video Series  
Where Do New Viruses Come From?  
What is Metabolism? | differentiation  
issues  
organ  
organ system  
nervous system  
endocrine system  
stimulus  
central nervous system (CNS)  
peripheral nervous system (PNS)  
neuron  
dendrite  
axon  
synapse  
neurotransmitter  
cerebrum  
cerebral cortex  
cerebellum  
brain stem  
reflex arc  
somatic nervous system  
autonomic nervous system  
sympathetic nervous system  
parasympathetic nervous system  
hormone gland  
hypothalamus | • Ticket Out  
• Think-Pair –Share  
• Formative Assessment  
• Weekly Quiz  
• Unit Test  
• Homework  
• Review Questions  
• DDI process using data from Edoctrina & Castle learning to generate data | Higher Order Questions from LE Regents Exams  
LE Regents Exams are hyperlinked for ease of access to questions |
### Immune System and Disease:
Describe how the immune system works to keep the body healthy by protecting it from disease. Compare and contrast bacteria and viruses. Understanding how vaccines function in the human body.

**Key Idea 5**

5.2 Explain disease as a failure of homeostasis.
5.2b – Viruses, bacteria, fungi, and other parasites may infect plants and animals and interfere with normal life functions.
5.2c – The immune system protects against antigens associated with pathogenic organisms of foreign substances and some cancer cells.
5.2d – Some white blood cells engulf invaders. Others produce antibodies that attack them or mark them for killing. Some specialized white blood cells will remain, able to fight off subsequent invaders of the same kind.
5.2e – Vaccinations are weakened microbes (or parts of them) to stimulate the immune system to react. The reaction prepares the body to fight subsequent invasions by the same microbes.
5.2f – Some viral diseases, such as AIDS, damage the immune system, leaving the body unable to deal with multiple infectious agents and cancerous cells.
5.2g – Some allergic reactions are caused by the body’s immune responses to usually harmless environmental substances. Sometimes the immune system may attach some of the body’s own cells or transplanted organs.
5.2h – Disease may also be caused by inheritance, toxic substances, poor nutrition, organ malfunction, and some personal behavior. Some effects show up right away; others may not show up for many years.
5.2j – Biological research generates knowledge used to design ways of diagnosing, preventing, treating, controlling, or curing diseases of plants and animals.

### Video Animations from the Genetic Science Learning Center at the University of Utah
- Metabolism: From Food to Fuel
- Sensory Systems: The Neuroscience of our Senses
- Video Animations from Sumanasinc.com
  - Reflex Arc
  - Blood Flow through the Human Heart

### Required NYS Lab - Making Connections
- Connecting Concepts – Homeostasis Interactive Lesson

### Relevant Terms
- pituitary gland
- circulatory system
- respiratory system
- trachea
- lung
- alveoli
- diaphragm
- heart
- artery
- vein
- capillary
- red blood cell
- hemoglobin
- emphysema
- asthma
- atrium
- ventricle
- valve
- pacemaker
- pulmonary circulation
- systemic circulation
- blood pressure
- systolic pressure
- diastolic pressure
- platelet
- plasma
- rh factor
- white blood cells
- lymphatic system
- lymph
5.3 – Related processes at the systems level to the cellular level in order to explain dynamic equilibrium in multicelled organisms.

5.3a – Dynamic equilibrium results from detection of and response to stimuli. Organisms detect and respond to change in a variety of ways both at the cellular level and at the organismal level.

5.3b – Feedback mechanisms have evolved that maintain homeostasis. Examples include the changes in heart rate or respiratory rate in response to increased activity in muscle cells, the maintenance of blood sugar levels by insulin from pancreas, and the changes in openings in the leaves of plants by guard cells to regulate water loss and gas exchange.
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<tbody>
<tr>
<td>• villi</td>
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<tr>
<td>• excretory system</td>
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<tr>
<td>• kidney</td>
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<td>• ureter</td>
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<tr>
<td>• urinary bladder</td>
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<tr>
<td>• nephron</td>
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<td>• skeletal system</td>
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<td>• cartilage</td>
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<td>• joint</td>
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<td>• ligament</td>
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<td>• muscular system</td>
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<tr>
<td>• skeletal muscle</td>
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<tr>
<td>• tendon</td>
</tr>
<tr>
<td>• smooth muscle</td>
</tr>
<tr>
<td>• cardiac muscle</td>
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<tr>
<td>• integumentary system</td>
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<tr>
<td>• dermis</td>
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## English Language Learners (ELL) Enhancements

To access [hyperlinked](http://ngss.nsta.org/Classroom-Resources.aspx) material, you must be logged into your BPS Google Drive.

### Listening
- **Translanguaging**: Use of their entire linguistic repertoire. Have things translated into their language (if student can read in their home language)
- **Build background knowledge**
- **Visuals**: GIFs, pictures - will assist students in understanding what they are listening to
- **Video to review or introduce a topic** - use [closed captioning](http://ngss.nsta.org/Classroom-Resources.aspx) to help students see the words and pronunciations while they listen to the content
- **Word stretching / Vowel stretching** when instructing allows student to listen closely to the pronunciation of the word

### Speaking
- **Sentence Frames** - to begin a sentence - such as *Evolution is...* or *I think that evolution is...*
- **Academic Conversation Starters**: Have a visual of a list of academic sentence starters that students can refer to in a discussion. Examples include - I expect ____ to happen. My data shows that...
- **Choral Reading**: To build fluency, self-confidence and motivation with reading/speaking
- **Create movement** to go with the word. Movement can be a motivating factor, as well as a kinesthetic tool for conceptualizing the rhythm and flow of fluent reading while triggering brain function for optimal learning

### Reading
- **Supplementary Text** to help reinforce concepts. If necessary, use lower Lexile levels to ensure comprehension.
- **Visual Aids**: Pictures or models to support vocabulary words and concepts
- **Video to review or introduce a topic** - use [closed captioning](http://ngss.nsta.org/Classroom-Resources.aspx) to help students read along while they listen to the content
- **4 Square / Frayer models** to help students gain a deeper understanding of vocabulary.
- **Highlighting** important text to assist students in answering questions after the reading.
- **Chunking**: Break reading of text into chunks or paragraphs

### Writing
- **Sentence Frames** - to begin a sentence - such as *Biodiversity is...* or *An example of competition is....*
- **Cloze passages** with word banks
- **Word banks**
- **Graphic Organizers** to help break down the writing process and organize thoughts
- **Standards-based sentence stems**

### Instructional Accommodations

Depending on the student’s needs:
- **Extended time** for tests in class, projects and assignments
- **Directions read**: Broken down as necessary
- **Model** how to complete the activity in the lesson
- **Oral simplification** of directions or questions
- **Translated version** of test when available. Student may have both version English and native language version

Use of approved bilingual glossaries from NYS in each subject
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**Special Education Modifications**
- Special Education students must have accommodations as per Individual Educational Plan (IEP)

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<th>Instructional</th>
<th>Technology</th>
<th>In Class Assessments</th>
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<tbody>
<tr>
<td>- Pre-teach vocabulary</td>
<td>- Audio reading of text</td>
<td>- Provide review packet or review sheet of concepts covered on the test</td>
</tr>
<tr>
<td>- Use picture vocabulary</td>
<td>- Text to type functions</td>
<td>- Practice similar questions prior to the test</td>
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<tr>
<td>- Scaffold Depth of Knowledge questions</td>
<td>- Videos to clarify/visualize Living Environment concepts</td>
<td>- Provide multiple options for projects</td>
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<tr>
<td>- Provide copy of notes/notes in “cloze” form</td>
<td>- Record class lecture/discussions and make accessible to student</td>
<td>- Give a timeline of when things are due and remind them of the process often.</td>
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<tr>
<td>- Use of Think, Pair, and Share strategy to help process information</td>
<td>- Nearpod - interactive presentations of notes</td>
<td>- Use of timer in class</td>
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<tr>
<td>- Scaffold written assignments with the use of graphic organizers</td>
<td>- Playposit - show a video clip about the topic and add your own questions for them to answer as they watch</td>
<td>- Break all complex tasks into chunks</td>
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<tr>
<td>- Allow for multiple ways to respond (verbal, written, response board)</td>
<td>- Scaffold written assignments with the use of graphic organizers</td>
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<td>- Provide model of performance task</td>
<td>- Allow students to type answers in chat on Teams</td>
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<tr>
<td>- Modify informational text to fit the needs of the students</td>
<td>- Provide mnemonic strategies for Living Environment concepts</td>
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<tr>
<td>- Provide a digital or paper interactive notebook</td>
<td>- Present complex tasks in multiple ways</td>
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**Other:**
- Arrange seating for maximum engagement and minimum distraction
- Accessible lab space (counter level)

**Step Up to Writing**
- Step Up to Writing materials can be found in BPS Science K-12 Schoology Folder ➔ 9-12 Resources ➔ Living Environment ➔ Resources ➔ Curriculum Materials

**SUTW Strategies**
- Transitions for Different Purposes
- Four Step Summary Paragraph
- Meaningful Sentences
- Planning Paragraphs with Informal Outline
- Stretching Paragraphs in Essays and Reports
- Traffic Light Colors for Informative Explanatory Writing