Course Title - Human Biology

Implement start year: 2018-2019

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Unit #2 - Anatomy and Physiology

Transfer Goal –
Students will be able to independently use their learning to describe how all body systems work in correlation to maintain homeostasis.

Stage 1 – Desired Results

Established Goals	**21st Century Themes**
New Jersey Student Learning Standards (NJSLS)-Science http://www.state.nj.us/education/cccs/2016/science/ HS-LS1-2.Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.	**(www.21stcenturyskills.org)** _x_ Global Awareness ___Financial, Economic, Business and Entrepreneurial Literacy _x__Civic Literacy _x__Health Literacy _x__Environmental Literacy

HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. HS-LS1-4.Use a model to illustrate the role of cellular division and differentiation in producing and maintaining complex organisms HS-LS1-7. Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen molecules are broken and the bonds in new compounds are formed resulting in a net transfer of energy.	**21st Century Skills** *Learning and Innovation Skills:* _x__Creativity and Innovation _x__Critical Thinking and Problem Solving _x__Communication and Collaboration *Information, Media and Technology Skills:* _x__Information Literacy _x__Media Literacy _x__ICT (Information, Communications and Technology) Literacy *Life and Career Skills:* _x__Flexibility and Adaptability _x__Initiative and Self-Direction _x__Social and Cross-Cultural Skills _x__Productivity and Accountability _x__Leadership and Responsibility
Enduring Understandings: *Students will understand that . . .* *EU1* multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. *EU2* feedback mechanisms maintain homeostasis by stabilizing or destabilizing a system. *EU3* the endocrine and nervous system interact to coordinate and integrate the activity of body cells. *EU4* you are what you eat. *EU5*	**Essential Questions:** *EU1* • How do the four main tissues' structure relate to function in the body? • How can scientists effectively communicate the location of one part of the body in relation to the location of other parts of the body? • How is the body composed of systems with structures and functions that are related? *EU2* • How do feedback loops maintain the internal environment of the human body? *EU3* • How does the endocrine and nervous systems act individually and together in regulating human physiology? • How do hormones and other signaling molecules trigger specific response pathways?

the cardiovascular and respiratory systems work intimately together to ensure complexity of tissues within the human body while maintaining efficiency.	• How does the nervous system maintain homeostasis by controlling and regulating the other parts of the body? *EU4* • How do the organs of the digestive and excretory system aid in transferring nutrients from the external environment to the internal environment? • How do the structures of organisms enable life's functions? • How do homeostatic mechanisms contribute to human energy balance? • What impact does "new" technology have on body systems? (IE→ Nanotechnology, GM, GMO's, technology, etc) • How do organisms obtain and use matter and energy in order to grow, develop and reproduce? *EU5* • How does the circulatory system link exchange surfaces with cells throughout the body? • How do the structures of the cardiovascular and respiratory systems facilitate gas exchange? • How does the respiratory system function in coordination with other systems of the body?

Knowledge: *Students will know . . .*	**Skills:** *Students will be able to . . .*
EU1 • the four main tissues' structure relate to function in the body. • scientists effectively communicate the location of one part of the body in relation to the location of other parts of the body. • the body is composed of systems with structures and functions that are related. *EU2* • feedback loops maintain the internal environment of the human body. *EU3* • the endocrine and nervous systems act individually and together in regulating human physiology. • hormones and other signaling molecules trigger specific response pathways. • the nervous system maintains homeostasis by controlling and regulating the other parts of the body. *EU4* • the organs of the digestive and excretory system aid in transferring nutrients from external environment to the internal environment. • there are possible implications of "new" technology on body systems • homeostatic mechanisms contribute to human energy balance. *EU5* • the circulatory system links exchange surfaces with cells throughout the body. • the structures of the cardiovascular and respiratory systems facilitate gas exchange. • the respiratory system functions in coordination with other systems of the body.	*EU1* • site evidence to show how structure of the main tissue relates to the function in the body. • evaluate how scientists effectively communicate the location of one part of the body in relation to the location of other parts of the body. • model the body and its systems with structures and functions that are related. • dissect a fetal pig and perform a practical demonstrating skills learned. *EU2* • create an experiment to model feedback loops and how they maintain the internal environment of the human body. • dissect a fetal pig and perform a practical demonstrating skills learned *EU3* • demonstrate how the endocrine and nervous system act individually and together in regulating human physiology. • develop and carry out an experiment to demonstrate how hormones and other signaling molecules trigger specific response pathways. • analyze how the nervous system maintains homeostasis by controlling and regulating the other parts of the body. • dissect a fetal pig and perform a practical demonstrating skills learned *EU4* • create a model of the organs of the digestive and excretory system demonstrating how they aid in transferring nutrients. • create a flow chart showing how nutrients from a recently ingested meal are not "really" inside your body prior to the absorption stage of food processing. • Explain how science reaches outside of the classroom/lab and impacts daily life • collect data to show that homeostatic mechanisms contribute to human energy balance.

	• dissect a fetal pig and perform a practical demonstrating skills learned *EU5* • design an experiment to show surface area to volume ratio to demonstrate gas exchange. • represent as a model the structures of the cardiovascular and respiratory systems and how they facilitate gas exchange. • draw evidence to show that the respiratory system function in coordination with other systems in the body. • dissect a fetal pig and perform a practical demonstrating skills learned

Stage 2 – Assessment Evidence

Other Recommended Evidence:

- Laboratory activities
- Lab reports and notebooks
- Quizzes and tests
- Concept maps, graphic organizers, charts, tables, and graphs

- Presentations
- Class discussion
- Research
- Debate
- Dissect a fetal pig and perform a practical demonstrating skills learned

Stage 3 – Learning Plan

Suggested Learning Activities to Include Differentiated Instruction and Interdisciplinary Connections: *A= Acquiring basic knowledge and skills, M= Making meaning and/or a T= Transfer.*

- Discuss the 4 types of tissues - epithelial, connective, muscle, nervous -A
- Histology Webquest -A, M
- Draw the different types of tissues found in the human body -M
- Histology practicum with microscope/slides -M
- hhmi Classroom Activity How do Fibers Form? http://www.hhmi.org/biointeractive/how-do-fibers-form
- Discuss Homeostasis -A
- Homeostasis Interactive (Fever)-A, M, T
- Interactive Simulation of Human Homeostasis https://www.explorelearning.com/index.cfm?method=cResource.dspDetail&ResourceID=519
- Feedback Mechanism Lab to demonstrate the regulation of hormones in the body -M
- hhmi Neurophysiology virtual lab- M,T http://media.hhmi.org/biointeractive/vlabs/neurophysiology/index.html?_ga=2.204843027.228014891.1498139177-37658674.1498139177
- Enzymes and Cellular Regulation POGIL (Digestive Enzymes)- A, M
- Discuss parts and functions of the digestive system and excretory system -A
- Design a Digestive System Interactive https://www.explorelearning.com/index.cfm?method=cResource.dspDetail&ResourceID=1050
- Investigate nutrient absorption/dysfunction - A
- Use Polymerase Chain Reaction to analyze foods for Genetic Modification -M
- Write a position paper - Pro/Con Genetic Modification -T
- Create a Public service announcement on the pros and cons of Genetic Modification. M
- Use spectrophotometer/pH meter/microscope to analyze urine -M, T
- Discuss body planes and terms of dissection -A

- Chordate Comparative Anatomy Lab -A, M
- Discuss the parts and functions of the Circulatory and Respiratory Systems -A
- Sheep/Cow Heart dissection -M
- hhmi Cardiology virtual lab- M,T
  http://media.hhmi.org/biointeractive/vlabs/cardiology2/?_ga=2.180349863.228014891.1498139177-37658674.1498139177
- Human Physiology with Vernier “Heart Rate and Exercise” -M, T
- Human Physiology with Vernier “Heart Rate Response to Baroreceptor Feedback” -M, T
- Human Physiology with Vernier “Blood Pressure and Exercise” -M, T
- Human Physiology with Vernier “Heart Rate and Blood Pressure as Vital Signs” -M,T
- Human Physiology with Vernier “Analyzing the Heart with EKG” -M,T
- Human Physiology with Vernier “Respiratory Response to Physiologic Challenges” M, T
- Human Physiology with Vernier “Lung Volumes and Capacities” M, T
- Fetal pig dissection / Autopsy -M, T
- Pig Practical - M
- Watch ‘Lorenzo’s Oil’ - Evaluate response to disease/disorder – T
- Field trip in coordination with sports medicine to cadaver lab-M
- Utilize proficiently a stethoscope, and blood pressure cuff. – M
- Analyze an EKG-M