



Science Department Curriculum Guide

Anatomy & Physiology – Honors

Course Description
<p>This elective course will explore the major human organ systems: integumentary, skeletal, muscular, nervous, cardiovascular, respiratory, digestive, and endocrine. The focus of the course will be on students learning how these systems interact to maintain homeostasis. An examination of the current medical issues will be covered through general course work, collaborative laboratory investigations, independent research projects, and presentations. This course is designed for students planning on pursuing a career in the healthcare sciences, including nursing, pharmacology, sports medicine, and biotechnology. This course is for self-motivated students that have satisfactorily completed honors biology and chemistry. Laboratory investigations will provide real-world experiences for students, including dissections and biotechnology activities related to the pharmaceutical industry. This course is offered as Dual Enrollment through Quincy College.</p>
Content Standards
<p>LS1. From Molecules to Organisms: Structures and Processes</p> <p>HS-LS1-2. Develop and use a model to illustrate the key functions of animal body systems, including (a) food digestion, nutrient uptake, and transport through the body; (b) exchange of oxygen and carbon dioxide; (c) removal of wastes; and (d) regulation of body processes.</p> <p>Clarification Statement: Emphasis is on the primary function of the following body systems (and structures): digestive (mouth, stomach, small intestine [villi], large intestine, pancreas), respiratory (lungs [alveoli], diaphragm), circulatory (heart, veins, arteries, capillaries), excretory (kidneys, liver, skin), and nervous (neurons, brain, spinal cord).</p> <p>HS-LS1-3. Provide evidence that homeostasis maintains internal body conditions through both body-wide feedback mechanisms and small-scale cellular processes.</p> <p>Clarification Statements: 1. Feedback mechanisms include the promotion of a stimulus through positive feedback (e.g., injured tissues releasing chemicals in blood that activate platelets to facilitate blood clotting), and the inhibition of stimulus through negative feedback (e.g., insulin reducing high blood glucose to normal levels). 2. Cellular processes include (a) passive transport and active transport of materials across the cell membrane to maintain specific concentrations of water and other nutrients in the cell and (b) the role of lysosomes in recycling wastes, macromolecules, and cell parts into monomers.</p> <p>HS-LS1-6. Construct an explanation based on evidence that organic molecules are primarily composed of six elements, where carbon, hydrogen, and oxygen atoms may combine with nitrogen, sulfur, and phosphorus to form monomers that can further combine to form large carbon-based macromolecules.</p> <p>Clarification Statements: 1. Monomers include amino acids, mono- and disaccharides, nucleotides, and fatty acids. 2. Organic macromolecules include proteins, carbohydrates (polysaccharides), nucleic acids, and lipids</p>



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Units	Topics / Standards	Activities May Include
Intro to cells and biochemistry and homeostasis 2 weeks	<ul style="list-style-type: none"> Review cells Review homeostasis and feedback loops Review biochemistry mechanisms 	<ul style="list-style-type: none"> Picasso anatomy Soccer homeostasis HASPI Lab Career project/interview Body Worlds Field trip
Body Directionals and Cavities 2 weeks	<ul style="list-style-type: none"> Learn directional terms Body planes Imaging techniques General anatomical terms prefix and suffix 	<ul style="list-style-type: none"> Paper directionals HASPI Lab Pickle Lab Operation lab Playdoh lab
Body Tissues 3-4 weeks	<ul style="list-style-type: none"> Use microscopes to learn Epithelium, connective, nervous, and muscular tissue 	<ul style="list-style-type: none"> Microscope work Tissue book
Integumentary System 3-4 weeks	<ul style="list-style-type: none"> Skin hair and nails anatomy and physiology Cross section of skin Skin pigmentation Diseases and disorders Wound healing Layers of integument and functions of sensory mechanisms 	<ul style="list-style-type: none"> Tattoo project Layers of skin tissue box Skin pigmentation case study Skin sensory lab Henna and suture lab
Skeletal System 3-4 weeks	<ul style="list-style-type: none"> Micro and gross anatomy of bones Fractures Diseases and disorders 	<ul style="list-style-type: none"> Build a skeleton X-ray lab Microscopic bone tissue Case study osteoporosis
Muscular System 4 weeks	<ul style="list-style-type: none"> Micro and gross anatomy of muscles Exercise science Skeletal muscle physiology Neuromuscular junction Muscle cell anatomy and physiology 	<ul style="list-style-type: none"> Trainer for a day Reflexes lab Proprioception lab HASPI Lab
Nervous System 6 weeks	<ul style="list-style-type: none"> Micro and gross anatomy of nervous system Action potential/innervation Nerves Structure of neurons Neurotransmitters drugs 	<ul style="list-style-type: none"> Build a brain Zombie autopsies novel Epidemics/pandemics



Units	Topics / Standards	Activities May Include
Reproductive System and Development 5 weeks	<ul style="list-style-type: none"> ▪ Micro and gross anatomy of male and female reproductive systems ▪ Physiology of testes and follicular maturation ▪ Pathway sperm take ▪ Composition of semen ▪ Primary and secondary sex characteristics ▪ Contraceptives, conception and birth ▪ Development from zygote to birth 	<ul style="list-style-type: none"> ▪ Chick development lab ▪ Reproduction lecture ▪ Speed dating contraceptives ▪ Pregnancy timeline ▪ <i>9 months that made me</i>
Digestive System 3 weeks	<ul style="list-style-type: none"> ▪ Micro and gross anatomy of Gastrointestinal tract ▪ Diets and nutrients ▪ Enzymes and accessory organs 	<ul style="list-style-type: none"> ▪ Enzyme lab ▪ Fad diet project ▪ Modeling GI tract
Endocrine System 2 weeks	<ul style="list-style-type: none"> ▪ Micro and gross anatomy of endocrine system ▪ Watch Greatest Showman 	<ul style="list-style-type: none"> ▪ Hormones and gland lab ▪ Hormone project
Rat Dissection 1 week	<ul style="list-style-type: none"> ▪ Lab 	<ul style="list-style-type: none"> ▪ Dissection lab

Textbook

- ***Hole's Essentials of Human Anatomy & Physiology***, by Shier, Butler, and Lewis; published by McGraw-Hill, 2008