

East Penn School District
Curriculum and Instruction

Curriculum for: Human Anatomy/Physiology, College Preparatory

Course(s): CP Human Anatomy/Physiology

Grades: 10-12

Department: Science

Length of Period (average minutes): 42

Periods per cycle: 6

Length of Course (yrs): 1

Type of offering: elective

Credit(s) awarded: 1.0 4.0/4.0

Developed by: Corinna Kramer-Hinks and Kelly Musselman

ADOPTED: 2018

Enduring Understandings	Essential Questions	Knowledge	Skills	Standards
<ul style="list-style-type: none"> The human body is more than a sum of its individual parts. 	<ul style="list-style-type: none"> How do medical professionals communicate using a common language? How does the body maintain homeostasis? Which diagnostic techniques are used to gain information about the body? 	<ul style="list-style-type: none"> Relationship between anatomy & physiology Levels of organization Related fields of study and careers in those fields Overview of 11 body systems (basic structures and functions) Regional and directional terminology Body planes and cavities Prefixes, suffixes, and root words Mechanisms for homeostatic control Feedback loops Survival needs & necessary life functions Various diagnostic techniques 	<ul style="list-style-type: none"> Navigate a model of the human body and analyze its structures as they relate to the body systems. Evaluate the effects of exercise on homeostasis. Design a model and manipulate it to illustrate planes, cavities, and directional terms. Communicate and follow directives using correct directional and regional terms. Propose techniques for diagnosing homeostatic imbalances. 	<p>NGSS Standards:</p> <ul style="list-style-type: none"> HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. <ul style="list-style-type: none"> LS1.A: Structure and Function <p>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.</p>
<ul style="list-style-type: none"> Not all body tissues are the same. Cancer interferes with normal tissue development. 	<ul style="list-style-type: none"> How does cell shape and arrangement within tissues relate to their functions? 	<ul style="list-style-type: none"> Basic components and functions of the four types of tissues (epithelial, connective, muscle, nervous) 	<ul style="list-style-type: none"> Using microscopes, visually compare, contrast, and distinguish between various types of tissues. 	<p>NGSS Standards:</p> <ul style="list-style-type: none"> HS-LS1-1. Construct an explanation based on evidence for how the structure of DNA

	<ul style="list-style-type: none"> • What is cancer and how does it affect the human body? 	<ul style="list-style-type: none"> • Structure vs function of epithelial tissue (simple, stratified, squamous, cuboidal, columnar, pseudostratified, transitional, glandular) • Structure vs function of connective tissue (osseous, 3 types of cartilage, dense, areolar, blood, adipose, reticular) including proteins and cell types of each • Structure vs function of muscle tissue (skeletal, smooth, cardiac) • Structure vs function of nervous tissue (neurons, support cells) • Cancer (oncogene, carcinogens, benign vs malignant, metastasis, and standard treatments) 	<ul style="list-style-type: none"> • Make inferences about functions based upon observations of cell shape and arrangement. • Map out the progression of cancer starting with possible causes through malignancy and metastasis. • Investigate the advantages and disadvantages of available cancer treatments. 	<p>determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.</p> <ul style="list-style-type: none"> - LS1.A: Structure and Function Systems of specialized cells within organisms help them perform the essential functions of life. • HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. - LS1.A: Structure and Function 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.
<ul style="list-style-type: none"> • The CNS and PNS control the body in different and complex ways. 	<ul style="list-style-type: none"> • How does information travel throughout our body? 	<ul style="list-style-type: none"> • 3 functions of the nervous system (sensory input, integration, motor output) 	<ul style="list-style-type: none"> • Relate the 3 functions of the nervous system based upon the 	<p>NGSS Standards:</p> <ul style="list-style-type: none"> • HS-LS1-1. Construct an explanation based on

	<ul style="list-style-type: none"> • What happens when our nervous system fails? 	<ul style="list-style-type: none"> • Cells of the nervous system and their functions (neurons and support cells) • Parts of a neuron & their significance • Electrical conditions during resting and action potential and how they are maintained. • Structures, and events that occur, at a synapse (including synaptic transmission) • Conduction of action potentials along an axon and factors that affect them • Different kinds of neurotransmitters and where and how they function. • Anatomy and physiology of reflex arcs • General organization and physiology of the divisions and subdivisions of the nervous system (sensory, motor, somatic, autonomic, sympathetic, parasympathetic) 	<p>classification of the nerves.</p> <ul style="list-style-type: none"> • Characterize the different types of support cells in CNS and PNS. • Model the generation of a nerve impulse and its subsequent pathway through a neuron and across a synapse. • Numerically represent electrical conditions of a neuron during resting and action potentials. • Identify and propose the action of specific neurotransmitters based upon various goal-oriented scenarios. • Differentiate between various kinds of action potentials and factors by which they are affected. • Trace the pathway of impulses through the spinal 	<p>evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.</p> <ul style="list-style-type: none"> - LS1.A: Structure and Function Systems of specialized cells within organisms help them perform the essential functions of life. • HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. - LS1.A: Structure and Function 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.
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<ul style="list-style-type: none"> ● Membranes functionally support the the organs to which they are associated. ● The integumentary system protects the body from damage. 	<ul style="list-style-type: none"> ● How do membranes and organs relate to their functions? ● How does the body respond when organs do not function properly? ● What happens when we injure our skin? 	<ul style="list-style-type: none"> ● 4 types of body membranes (cutaneous, serous, mucous, synovial) ● Structures vs functions of the integumentary system ● Structures vs functions of integumentary organs including skin (epidermis, 5 strata of epidermis, dermis, hypodermis, keratinocytes, melanocytes), hair, nails, cutaneous 	<ul style="list-style-type: none"> ● Identify through illustration the locations of cutaneous, serous, mucous, and synovial membranes in the human body. ● Design models to demonstrate and relate membrane structure with its functions. ● Based upon the anatomy, evaluate and justify the physiological need for integumentary 	<p>NGSS Standards:</p> <ul style="list-style-type: none"> ● HS-LS1-1. Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells. - LS1.A: Structure and Function Systems of specialized cells within organisms help them perform the essential functions of life.

		<p>glands (sebaceous and sweat glands and their products)</p> <ul style="list-style-type: none"> ● Burns (types of burns , rule of nines, etc) ● Skin injuries & consequences ● Stages of wound healing ● Skin cancer (squamous cell, basal cell, melanoma and treatments) ● Integumentary homeostatic imbalances 	<p>organs such as hair, nails and glands.</p> <ul style="list-style-type: none"> ● Categorize and classify burns and other integumentary homeostatic imbalances and infer consequences of the conditions. 	<ul style="list-style-type: none"> ● HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. <ul style="list-style-type: none"> - LS1.A: Structure and Function 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. ● HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. <ul style="list-style-type: none"> - LS1.A: Structure and Function 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
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				feedback) what is going on inside the living system.
<ul style="list-style-type: none"> ● Location of skeletal muscles allow different types of movements. ● Muscles are composed of a complex hierarchy of structures. 	<ul style="list-style-type: none"> ● How do muscles enable movement? 	<ul style="list-style-type: none"> ● Naming skeletal muscles and their locations ● Origins, insertions, and actions of major skeletal muscles ● 3 types of muscle tissue (skeletal, smooth, cardiac) ● Hierarchy of skeletal muscles (skeletal muscle, fascicle, myofibers, myofibrils, myofilaments) ● How motor units (motor neuron and myofibers of neuromuscular junction) function in promoting muscle contraction ● Role of ATP molecules in muscle contraction ● Muscular homeostatic imbalances 	<ul style="list-style-type: none"> ● Identify and locate major skeletal muscles ● Recognize and make sense of origins, insertions and actions of major skeletal muscles ● Demonstrate relationships between muscles and their antagonists. ● Microscopically compare and contrast the 3 types of muscle tissue ● Use a model to convey the hierarchical organization of skeletal muscles. ● Document the mechanisms involved in the physiology of a neuromuscular junction. ● Self-assess and critique peers' narratives of 	<p>NGSS Standards:</p> <ul style="list-style-type: none"> ● HS-LS1-1. Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells. <ul style="list-style-type: none"> - LS1.A: Structure and Function Systems of specialized cells within organisms help them perform the essential functions of life. ● HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. <ul style="list-style-type: none"> - LS1.A: Structure and Function Multicellular organisms have a hierarchical structural organization, in

			<p>muscle contraction.</p> <ul style="list-style-type: none"> ● Make connections between various factors and their influence on muscle contraction. 	<p>which any one system is made up of numerous parts and is itself a component of the next level.</p> <ul style="list-style-type: none"> ● HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. - LS1.A: Structure and Function 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.
<ul style="list-style-type: none"> ● Our skeleton is shaped to serve many different functions. ● Our bones change throughout our 	<ul style="list-style-type: none"> ● Why do we need our skeleton? ● What is the life cycle of a bone? 	<ul style="list-style-type: none"> ● Functions of the skeletal system ● Locations and classification of 	<ul style="list-style-type: none"> ● Express the various functions of the skeletal system. ● Create illustrations to convey the 	<p>NGSS Standards:</p> <ul style="list-style-type: none"> ● HS-LS1-1. Construct an explanation based on evidence for how the

<p>lifetime and in response to external factors.</p>	<ul style="list-style-type: none"> • How do bones relate to each other to support movement? 	<p>bones within the skeleton</p> <ul style="list-style-type: none"> • Structures of a long bone • Ossification • Bone growth and remodeling • Bone fractures and repair • Bones of the axial and appendicular skeletons, their important surface markings and their functions • Types and locations of articulations and the actions they allow • Ancillary joint structures and functions (bursae, menisci, synovial fluid, articular capsule, articular cartilage, ligaments, tendons) • Skeletal injuries and homeostatic imbalances 	<p>process of ossification, bone growth and remodeling.</p> <ul style="list-style-type: none"> • Investigate gross anatomical and microscopic structures of a long bone • Recognize and communicate the locations and classification of bones in the skeleton. • Distinguish between axial and appendicular bones, their markings and functions. • Identify types of articulations and model movements of synovial joints based upon their structures • Justify the need for various ancillary joint structures including: ligaments, bursae, joint capsules, etc • Analyze implications of skeletal 	<p>structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.</p> <ul style="list-style-type: none"> - LS1.A: Structure and Function Systems of specialized cells within organisms help them perform the essential functions of life. • HS-LS1-2. Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms. - LS1.A: Structure and Function 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. • HS-LS1-3. Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis. - LS1.A: Structure and Function Feedback mechanisms
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			homeostatic imbalances.	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.
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Materials and Resources:

"Essentials of Human Anatomy & Physiology 7th edition"

ISBN 0-8053-5385-2 (Benjamin Cummings) 2003