

Treasure Coast Science Scope and Sequence 2012-2013

Course: Anatomy and Physiology Honors

Course Code: 2000360

Quarter: 1A

Topic(s) of Study: The Science of Anatomy and Physiology

Bodies of Knowledge: Nature of Science and Life Science

Standard(s): 1: Practice of Science, 16: Heredity and Reproduction

Essential Questions: How do scientists design an investigation to answer a scientific question and communicate their findings? What is the impact of biotechnology on the individual, society and the environment, including medical and ethical issues? What are the factors that can affect personal and public health?

[Syllabus: Click here](#)

[Resources: Click here](#)

[CCSS Literacy Standards: Click here](#)

NGSSS	OUTLINE OF CONTENT (CONCEPT/SKILLS)	TARGETS
<p>SC.912.N.1.1: Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:</p> <ol style="list-style-type: none"> 1.pose questions about the natural world, 2.conduct systematic observations, 3.examine books and other sources of information to see what is already known, 4.review what is known in light of empirical evidence, 5.plan investigations, 6.use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), 7.pose answers, explanations, or descriptions of events, 8.generate explanations that explicate or describe natural phenomena (inferences), 	<p>I What is science? Science is the study of the natural world around us</p> <ol style="list-style-type: none"> 1. Pure Science 2. Pseudoscience 3. Answers questions that deal with the natural world unlike religion, art, and philosophy 4. Provides an empirically-based perspective to inform society's decision making <p>II Approaches to Science</p> <ol style="list-style-type: none"> 1. Observation can lead to inference which can be studied 2. Empirical Evidence 3. Systematic Investigations <ol style="list-style-type: none"> a. Field investigation <ol style="list-style-type: none"> i. Descriptive ii. Comparative iii. Correlative b. Controlled Investigations 	<ul style="list-style-type: none"> • Define a scientific problem or question based on the specific body of knowledge correlated to the anatomy and physiology honors science course. (I, II) • Explain the difference between an experiment and other types of scientific investigations. (I, II) • Use appropriate reference materials to support scientific investigations of various types, such as systematic observation or experiments. (II, IV) • Recognize, identify and know how to safely and accurately use lab equipment. (III) • Identify the safety equipment in the science lab/classroom (safety shower, fire extinguisher, fire blanket, hood, eye wash, first aid kit, gloves, sharps container, MSDS sheets). (III) • Identify and find the following information such as chemical name, hazardous components, health hazards, first aid and emergency procedures using MSDS sheets. (III) • Identify protective clothing worn in the lab: safety goggles, aprons, gloves. • Recognize that different types of wastes are disposed of in specific ways. (III)

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<p>9. use appropriate evidence and reasoning to justify these explanations to others,</p> <p>10. communicate results of scientific investigations, and</p> <p>11. evaluate the merits of the explanations produced by others. Cognitive Complexity: High</p> <p>SC.912.N.1.2: Describe and explain what characterizes science and its methods. Cognitive Complexity: Moderate</p> <p>SC.912.L.16.10: Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues. Cognitive Complexity : High</p> <p>HE.912.C.1.3: Evaluate how environment and personal health are interrelated.</p> <p>HE.912.C.1.4: Analyze how heredity and family history can impact personal health</p> <p>MA.912.S.1.2: Determine appropriate and consistent standards of measurement for the data to be collected in a survey or experiment. Cognitive Complexity: Moderate</p> <p>MA.912.S.3.2: Collect, organize, and analyze data sets, determine the best format for the data and present visual summaries from the following: bar graphs line graphs stem and leaf plots</p>	<p>4. Experimentation</p> <p>5. Inquiry</p> <p>6. Research</p> <p style="padding-left: 20px;">a. Quantitative</p> <p style="padding-left: 20px;">b. Qualitative</p> <p>7. Measurements</p> <p>III Lab</p> <p style="padding-left: 20px;">1. Equipment</p> <p style="padding-left: 20px;">2. Tools</p> <p style="padding-left: 20px;">3. Chemicals</p> <p style="padding-left: 20px;">4. Safety</p> <p style="padding-left: 20px;">5. MSDS Sheets</p> <p>IV Experimental Design</p> <p>Experimental Design</p> <p>A. Ask a question</p> <p>B. Plan investigation</p> <p style="padding-left: 20px;">1. Identify independent variable (test variable)</p> <p style="padding-left: 20px;">2. Determine the dependent variable (outcome variable)</p> <p style="padding-left: 20px;">3. Identify constants</p> <p style="padding-left: 20px;">4. Ensure you have a control group</p> <p>C. Research background information on topic</p> <p style="padding-left: 20px;">1. Address appropriate research materials</p> <p style="padding-left: 20px;">2. Address how to cite sources accurately</p> <p style="padding-left: 20px;">3. Address plagiarism</p> <p>D. Collect and record data</p> <p style="padding-left: 20px;">1. Graphs</p> <p style="padding-left: 20px;">2. Charts</p> <p style="padding-left: 20px;">3. Visual representations</p> <p>E. Share findings</p> <p style="padding-left: 20px;">1. Draw conclusions using data</p> <p style="padding-left: 20px;">2. Uses repeated trials</p>	<ul style="list-style-type: none"> • Recognize the importance of the lab safety contract and explain why parent and student signatures are required. (III) • Develop a hypothesis with one independent variable (tested variable). (IV) • Distinguish between dependent variables (outcome variable), independent variables (tested variable), controls, and variables that are held constant in a variety of activities. (IV) • Develop hypotheses and determine what data should be collected to test the hypothesis. (IV) • Determine tools and methods that should be used to collect valid data. • Determine how data will be collected to analyze the data. (IV) • Determine appropriate and consistent standards of measurement for the data to be collected in a survey or experiment. (IV) • Collect, organize, and analyze data sets, determine the best format for the data and present visual summaries from the following: bar graphs, line graphs, scatter plots, cumulative frequency graphs. (IV) • Explain why models are used in science to observe processes that happen too slowly, too quickly, or are too small or vast for direct observation. (V) • Give examples of visual/physical and conceptual models as used in anatomy and physiology. (V) • Explain and evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues. (VI) • Explain and evaluate environmental and heredity on personal health. (VII)
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<p>circle graphs histograms box and whisker plots scatter plots and cumulative frequency (ogive) graphs. Cognitive Complexity: High</p>	<ol style="list-style-type: none"> 3. Discuss, compare and negotiate methods used, results obtained, and explanations among groups of students conducting the same investigation. 4. Ask new questions and develop new investigations <p>TEACHER NOTE: Refer to ISEF (International Science and Engineering Fair) forms on resource page.</p> <p>V Learning through use of models</p> <ol style="list-style-type: none"> 1. Visual/Physical 2. Conceptual <p>VI Impact of Biotechnology</p> <p>VII Personal Health Impacted by</p> <ol style="list-style-type: none"> 1. Heredity and family history 2. Environment 	
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Course: Anatomy and Physiology Honors

Course Code: 2000360

Quarter: 1B

Topic(s) of Study: Understanding Anatomy and Physiology

Bodies of Knowledge: Nature of Science and Life Science

Standard(s): 1: Practice of Science, 14: Organization and Development of Living Organisms, 16: Heredity and Reproduction, 18: Matter and Energy Transformation

Essential Questions: How is the body organized and how does it maintain life? How do the basic molecules that makeup the human body and chemical reactions controlled in the human body work? How are structure and function related for each of the types of body tissue and for cell production? How do scientists design an investigation to answer a scientific question and communicate their findings?

[Concept Map\(s\): Click here](#)

[Syllabus: Click here](#)

[Resources: Click here](#)

[CCSS Literacy Standards: Click here](#)

NGSSS

OUTLINE OF CONTENT
(CONCEPT/SKILLS)

TARGETS

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<p>SC.912.L.18.2: Describe the important structural characteristics of monosaccharides, disaccharides, and polysaccharides and explain the functions of carbohydrates in living things. Cognitive Complexity: Moderate</p> <p>SC.912.L.18.3: Describe the structures of fatty acids, triglycerides, phospholipids, and steroids. Explain the functions of lipids in living organisms. Identify some reactions that fatty acids undergo. Relate the structure and function of cell membranes. Cognitive Complexity: Moderate</p> <p>SC.912.L.18.4: Describe the structures of proteins and amino acids. Explain the functions of proteins in living organisms. Identify some reactions that amino acids undergo. Relate the structure and function of enzymes. Cognitive Complexity: Moderate</p> <p>SC.912.L.18.11: Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity. Cognitive Complexity: Moderate</p> <p>SC.912.L.14.2: Relate structure to function for the components of plant and animal cells. Explain</p>	<p>I Overview:</p> <p>A. What is anatomy? B. What is physiology?</p> <p>II Levels of Structural Organization</p> <p>A. Chemical Level B. Cellular Level C. Tissue Level D. Organ Level E. Organ System Level F. Organismal Level</p> <p>III Maintaining Life</p> <p>A. Essential Life Functions</p> <ol style="list-style-type: none"> 1. Maintaining boundaries 2. Movement 3. Responsiveness 4. Digestion 5. Metabolism 6. Excretion 7. Reproduction 8. Growth <p>B. Survival Needs</p> <p>IV Homeostasis</p> <p>A. What is it? B. Homeostatic Control Mechanisms</p> <p>V Terminology of Anatomy</p> <p>A. Anatomical Position B. Directional Terms C. Regional Terms D. Body Planes and Sections E. Body Cavities and Membranes F. Body Quadrants and Regions</p> <p>VI Basic Chemistry</p> <p>A. What is matter?</p>	<ul style="list-style-type: none"> • Define a scientific problem or question based on the specific body of knowledge correlated to the anatomy and physiology honors science course. (I) • Define what anatomy and physiology is and how they are related. (I) • Define and describe the levels of structural organization. (II) • List the functional characteristics necessary to maintain life. (III) • List the survival needs of the body. (III) • Define homeostasis and explain why it is significant. (IV) • Define and describe negative feedback and its role in maintaining homeostasis and normal body function. (IV) • Describe the anatomical position verbally or demonstrate it. (V) • Use proper anatomical terminology to describe body directions. (V) • Locate the major body cavities and list the chief organs in each cavity. (V) • Differentiate between matter and energy. (VI) • List the major energy forms and provide an example of how each energy form is used in the body. (VI) • Define chemical element and list the four elements that form the bulk of the body. (VI) • Explain how elements and atoms are related. (VI) • Differentiate between ionic, covalent, and hydrogen bonds. (VI) • Contrast synthesis, decomposition, and exchange reactions. (VI) • Distinguish between organic and inorganic compounds. (VII) • Differentiate clearly between a salt, an acid, and a base. (VII) • List and describe several salts that are vitally important to body functioning. (VII)
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<p>the role of cell membranes as a highly selective barrier (passive and active transport). Cognitive Complexity: Moderate</p> <p>SC.912.L.14.11: Classify and state the defining characteristics of epithelial tissue, connective tissue, muscle tissue, and nervous tissue. Cognitive Complexity: Moderate</p> <p>SC.912.L.14.6: Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health. Cognitive Complexity: High</p> <p>SC.912.L.16.8: Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer. Cognitive Complexity: Moderate</p> <p>SC.912.N.1.1: Define a problem based on a specific body of knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:</p> <ol style="list-style-type: none"> 1.pose questions about the natural world, 2.conduct systematic observations, 3.examine books and other sources of information to see what is already known, 	<ol style="list-style-type: none"> B. What is energy? C. Composition of Matter (Atoms and Elements) D. Combining Matter (Molecules and Mixtures) E. Chemical Bonds (Ionic, Covalent, and Hydrogen) F. Chemical Reactions <p>VII Biochemistry</p> <ol style="list-style-type: none"> A. Inorganic Compounds <ol style="list-style-type: none"> 1. Water 2. Salts 3. Acids and Bases B. Organic Compounds <ol style="list-style-type: none"> 1. Carbohydrates 2. Lipids 3. Proteins 4. Nucleic Acids C. ATP <p>VIII Cells and Tissues</p> <ol style="list-style-type: none"> A. Cells <ol style="list-style-type: none"> 1. Four Concepts of Cell Theory 2. Microscopic View of Cells and Organelles 3. Characteristics of Cells 4. Plant and Animal Cells' Structures and Functions 5. The Plasma Membrane <ol style="list-style-type: none"> a. The Structure b. Transport c. Resting Membrane Potential d. Cell-Environment 	<ul style="list-style-type: none"> • Explain the importance of water to body homeostasis and provide several examples of the roles of water. (VII) • Explain the concept of pH and state the pH of blood. (VII) • Compare and contrast carbohydrates, lipids, proteins, and nucleic acids in terms of their building blocks, structures, and functions in the body. (VII) • Explain the role of dehydration synthesis and hydrolysis in the formation and breakdown of organic molecules. (VII) • Describe the four levels of protein structure. (VII) • Describe enzyme action. (VII) • Compare and contrast DNA and RNA. (VII) • Explain the role of ATP in cell metabolism. (VII) • Explain the four concepts of cell theory. (VIII) • List and describe the three major regions of a generalized cell and indicate the function of each. (VIII) • Compare and contrast plant and animal cells. (VIII) • Describe the chemical composition of the plasma membrane and relate it to membrane functions. (VIII) • Relate plasma structure to active and passive transport. (VIII) • Define membrane potential and explain how the resting membrane potential is established and maintained. (VIII) • Describe the role of the glycocalyx when cells interact with their environment. (VIII) • List several roles of membrane receptors and that of voltage-sensitive membrane channel proteins. (VIII) • Describe and explain the functions of
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<p>4.review what is known in light of empirical evidence, 5.plan investigations, 6.use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), 7.pose answers, explanations, or descriptions of events, 8.generate explanations that explicate or describe natural phenomena (inferences), 9.use appropriate evidence and reasoning to justify these explanations to others, 10.communicate results of scientific investigations, and 11.evaluate the merits of the explanations produced by others. Cognitive Complexity: High</p> <p>SC.912.L.16.10: Evaluate the impact of biotechnology on the individual, society and the environment, including medical and ethical issues. Cognitive Complexity : High</p> <p>HE.912.C.1.3: Evaluate how environment and personal health are interrelated.</p> <p>HE.912.C.1.4: Analyze how heredity and family history can</p>	<p style="text-align: center;">Interactions</p> <p>6. The Cytoplasm 7. Cytoplasmic Organelles a. Mitochondria b. Ribosomes c. Endoplasmic Reticulum (rough and smooth) d. Golgi Apparatus e. Lysosomes f. Peroxisomes g. Cytoskeleton h. Centrosome and Centrioles i. Cellular Extensions (cilia, flagella, and microvilli)</p> <p>8. The Nucleus a. Basic Characteristics b. Nuclear Envelope c. Nucleoli d. Chromatin</p> <p>9. Cell Growth and Reproduction a. Cell Life Cycle b. Protein Synthesis</p> <p>10. Extracellular Materials</p> <p>11. Developmental Aspects of Cells a. Embryonic and Fetal Development of Cells b. Development of Cells Through Adolescent c. Effect of Aging on Cells</p>	<p>the cytoplasmic organelles. (VIII)</p> <ul style="list-style-type: none"> • Outline the structure and function of the nuclear envelope, nucleolus, and chromatin. (VIII) • List the phases of the cell life cycle and describe the events at each phase. (VIII) • Describe the process of DNA replication. (VIII) • Explain the two phases of protein synthesis and describe the roles of DNA, mRNA, tRNA, and rRNA in each phase. (VIII) • Name and describe the composition of extracellular materials. (VIII) • Discuss some theories of cell differentiation and aging. (VIII) • List the steps involved in preparing animal tissue for microscopic viewing. (VIII) • List several structural and functional characteristics of epithelial tissue. (VIII) • Name, classify, and describe the various types of epithelia, and indicate their chief function(s) and location(s). (VIII) • Identify common characteristics of connective tissues, and list and describe its structural elements. (VIII) • Describe the types of connective tissue found in the body, and indicate their characteristics. (VIII) • Identify the general characteristics of nervous tissue. (VIII) • Compare and contrast the structure and body locations of the three types of muscle tissue. (VIII) • Describe the structure and function of cutaneous, mucous, and serous membranes. (VIII) • Explain the process of tissue repair involved in normal healing of a superficial wound. (VIII) • Describe the embryonic origin of each
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<p>impact personal health</p> <p>MA.912.S.3.2: Collect, organize, and analyze data sets, determine the best format for the data and present visual summaries from the following:</p> <p>bar graphs line graphs stem and leaf plots circle graphs histograms box and whisker plots scatter plots and cumulative frequency (ogive) graphs. Cognitive Complexity: High</p>	<p>B. Tissues</p> <ol style="list-style-type: none"> 1. Characteristics of Human Body Tissues 2. Microscopic View of Tissues 3. Epithelial Tissues 4. Connective Tissues 5. Nervous Tissues 6. Muscle Tissue 7. Covering and Lining Membranes 8. Tissue Repair 9. Developmental Aspects of Tissues <p>C. Genetic and Environmental Factors impact on cells and tissues</p> <p>D. Pathogenic Agents including cancer impact on cells and tissues</p>	<p>tissue class. (VIII)</p> <ul style="list-style-type: none"> • Describe the tissue changes that occur with aging. (VIII) • Describe the changes to tissue when affected by cancer. (VIII)
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Course: Anatomy and Physiology Honors

Course Code: 2000360

Quarter: 1C

Topic(s) of Study: Integumentary System and Body Membranes

Bodies of Knowledge: Nature of Science and Life Science

Standard(s): 1: Practice of Science, 14: Organization and Development of Living Organisms, 16: Heredity and Reproduction

Essential Questions: What is the purpose of the integumentary system? What are various diseases associated with the integumentary system? What are the factors that can affect personal and public health? How do scientists design an investigation to answer a scientific question and communicate their findings?

[Concept Map\(s\): Click here](#)

[Syllabus: Click here](#)

[Resources: Click here](#)

[CCSS Literacy Standards: Click here](#)

NGSSS	OUTLINE OF CONTENT (CONCEPT/SKILLS)	TARGETS
SC.912.L.14.51: Describe the function of the vertebrate integumentary system. Cognitive Complexity: Low	I Classification of Body Membranes A. Cutaneous B. Mucous C. Serous D. Synovial	<ul style="list-style-type: none"> Define a scientific problem or question based on the specific body of knowledge correlated to the anatomy and physiology honors science course. (II)
SC.912.L.14.11: Classify and state the defining characteristics of epithelial tissue, connective tissue, muscle tissue, and nervous tissue. Cognitive Complexity: Moderate	II The Integumentary System A. The Skin 1. Hypodermis 2. Epidermis 3. Dermis 4. Skin Color B. The Appendages of the Skin 1. Sudoriferous Glands (sweat) 2. Sebaceous Glands (oil) 3. Hairs and Hair Follicles 4. Nails C. Functions of the Integumentary System 1. Protection 2. Body Temperature Regulation 3. Cutaneous	<ul style="list-style-type: none"> List the general functions of each membrane type and give its location in the body. (I) Compare the structure (tissue makeup) of the major membrane types. (I) Name the tissue types composing the epidermis and dermis. (II) List the major layers of each (epidermis and dermis) and describe the functions of each layer. (II) Describe the factors that normally contribute to skin color. (II) Describe how changes in skin color may be used as clinical signs of certain disease states. (II) Compare the structure and locations of the sweat and oil glands. (II) Compare the composition and functions of the sweat and oil glands secretions. (II) List the parts of a hair follicle and explain the function of each part. (II) Name the region of a hair and explain the basis for hair color. (II)
SC.912.L.16.8: Explain the relationship between mutation, cell cycle, and uncontrolled cell growth potentially resulting in cancer. Cognitive Complexity: Moderate		
SC.912.L.14.6: Explain the significance of genetic factors, environmental factors, and pathogenic agents to health from the perspectives of both individual and public health. Cognitive Complexity: High		
SC.912.N.1.1: Define a problem based on a specific body of		

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<p>knowledge, for example: biology, chemistry, physics, and earth/space science, and do the following:</p> <ol style="list-style-type: none"> 1.pose questions about the natural world, 2.conduct systematic observations, 3.examine books and other sources of information to see what is already known, 4.review what is known in light of empirical evidence, 5.plan investigations, 6.use tools to gather, analyze, and interpret data (this includes the use of measurement in metric and other systems, and also the generation and interpretation of graphical representations of data, including data tables and graphs), 7.pose answers, explanations, or descriptions of events, 8.generate explanations that explicate or describe natural phenomena (inferences), 9.use appropriate evidence and reasoning to justify these explanations to others, 10.communicate results of scientific investigations, and 11.evaluate the merits of the explanations produced by others. <p>Cognitive Complexity: High</p> <p>HE.912.C.1.3: Evaluate how environment and personal health are interrelated.</p> <p>HE.912.C.1.4: Analyze how heredity and family history can impact personal health.</p>	<p>Sensation</p> <ol style="list-style-type: none"> 4. Metabolic Functions 5. Blood Reservoir 6. Nitrogenous Waste Excretion Control D. Homeostatic Balances of Skin <ol style="list-style-type: none"> 1. Burns 2. Skin Cancer E. Developmental Aspects of the Integumentary System <ol style="list-style-type: none"> 1. During Embryonic Development 2. During Infancy and Childhood 3. During Adolescent 4. During Adulthood 5. During Old Age 	<ul style="list-style-type: none"> • Describe the structure of nails. (II) • Describe how the skin accomplishes at least five functions. (II) • Explain why serious burns are life threatening. (II) • Summarizes the characteristics of the three major types of skin cancer. (II) • Describe the causes of changes that occur in the skin from birth to old age. (II)
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