



SPRING GROVE AREA SCHOOL DISTRICT



PLANNED COURSE OVERVIEW

Course Title: Anatomy and Physiology I Grade Level(s): 11 - 12 Units of Credit: 1 Classification: Core or Elective		Length of Course: Full Year Periods Per Cycle: 6 Length of Period: 40 Minutes Total Instructional Time: 120 Hours	
Course Description			
<p>This advanced level course will examine human anatomy and physiology, and it is designed for students wishing to pursue a medical career. This course will study the following (but not limited to) body systems: Intro to Anatomy, Cells and Tissues, Skeletal System, Muscular System, Blood and Cardiovascular System, Immune System, Respiratory System, and Integumentary System which are essential to understanding human physiology. Human anatomy and physiology will offer a variety of laboratory experiences, which will include specimen dissections. Prerequisite: Successful completion of Chemistry or Chemistry Honors, with a 75% or higher.</p>			
Instructional Strategies, Learning Practices, Activities, and Experiences			
Teacher Demonstration Detailed Laboratory Experiments Inquiry Laboratory Experiments Textbook Reading Homework	Posted Objectives and Agenda Formal Assessments Guided Practice Online Tutorials/Resources Critical Thinking	Bell Ringers Class Discussion Flexible Groups APL Strategies	
Assessments			
Chapter Examinations Laboratory Write-ups/Reports	Mid Term and Final Exam Unit Projects	Inquiry and Discovery Learning Study Guides	
Materials/Resources			
Anatomy and Physiology Textbook LMS	PowerPoint Lectures Note Packets Online Resources	Laboratory Resources and Equipment Laboratory Experiments	

Adopted: 5/19/14

Revised: 5/22/23

Language of Anatomy	
CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<ol style="list-style-type: none"> 1. Overview of Anatomy and Physiology 2. Levels of Organization 3. Homeostasis and Maintaining Life 4. Language of Anatomy 	<p>Objectives:</p> <ol style="list-style-type: none"> 1. Define anatomy and physiology. 2. Explain how anatomy and physiology are related. 3. Name the levels of structural organization that make up the human body and explain how they are related. 4. Name the organ systems of the body and briefly state the major functions of each system. 5. Classify by organ system all organs discussed. 6. Identify the organs shown on a diagram or a dissectible torso. 7. List functions that humans must perform to maintain life. 8. List the survival needs of the human body. 9. Define homeostasis and explain its importance. 10. Define negative feedback and describe its role in maintaining homeostasis and normal body function. 11. Differentiate between negative and positive feedback mechanisms and explain examples. 12. Describe the anatomical position verbally or demonstrate it. 13. Use proper anatomical terminology to describe body directions, surfaces, and body planes. 14. Locate the major body cavities and list the chief organs in each cavity. <p>Standards: HS-LS1-2 and 3.1.9-12B: Develop and use a model to illustrate the hierarchical organization of interactive systems that provide specific functions within multicellular organisms. HS-LS1-3 and 3.1.9-12C: Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.</p>

Cells/Tissues	
CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<ol style="list-style-type: none"> 1. Cell Physiology 2. Body Tissues 	<p>Objectives:</p> <ol style="list-style-type: none"> 1. Define selective permeability, diffusion (including simple and facilitated diffusion and osmosis), active transport, passive transport, solute pumping, exocytosis, endocytosis, and phagocytosis, bulk-phase endocytosis, hypertonic, hypotonic, and isotonic. 2. Describe the structure of the plasma membrane and explain how the various transport processes account for the directional movements of specific substances across the plasma membrane. 3. Name the four major tissue types and their chief subcategories. Explain how the four major tissue types differ structurally and functionally. 4. Give the chief locations of the various tissue types in the body. 5. Explain the significance of the fact that some tissue types (muscle and nerve) are largely amitotic after the growth stages are over. <p>Standards: HS-LS1-2 and 3.1.9-12B: Develop and use a model to illustrate the hierarchical organization of interactive systems that provide specific functions within multicellular organisms.</p>

Skeletal System	
CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<ol style="list-style-type: none"> 1. Bones: An Overview 2. Axial Skeleton 3. Appendicular Skeleton 4. Joints/Articulations 	<p>Objectives:</p> <ol style="list-style-type: none"> 1. Identify the subdivisions of the skeleton as axial or appendicular. 2. List at least three functions of the skeletal system. 3. Name the four main kinds of bones. 4. Identify the major anatomical areas of a long bone. 5. Explain the role of bone salts and the organic matrix in making bone both hard and flexible. 6. Describe briefly the process of bone formation in the fetus and summarize the events of bone remodeling. 7. Name and describe the various types of fractures. 8. On a skull or diagram, identify and name the bones of the skull. 9. Describe how the skull of a newborn infant (or fetus) differs from that of an adult. 10. Name the parts of a typical vertebra and explain in general how the cervical, thoracic, and lumbar vertebrae differ from one another. 11. Discuss the importance of the intervertebral discs and spinal curvatures. 12. Explain how the abnormal spinal curvatures (scoliosis, lordosis, and kyphosis) differ from one another. 13. Identify on a skeleton or diagram the bones of the shoulder and pelvic girdles and their attached limbs. 14. Describe important differences between a male and female pelvis. 15. Name the three major categories of joints and compare the amount of movement allowed by each. 16. Discuss differences between the types of synovial joints. 17. Identify some of the causes of bone and joint problems throughout life. <p>Standards: HS-LS1-2 and 3.1.9-12B: Develop and use a model to illustrate the hierarchical organization of interactive systems that provide specific functions within multicellular organisms.</p>

Muscular System	
CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<ol style="list-style-type: none"> 1. Types of Muscles and Functions 2. Microscopic Anatomy of Muscles 3. Skeletal Muscle Activity 4. Muscle Movements, Types, Names 5. Gross Anatomy of Skeletal Muscles 	<p>Objectives</p> <ol style="list-style-type: none"> 1. Name and locate the major muscles of the human body (on a torso model, muscle chart, or diagram). 2. Define origin, insertion, prime mover, antagonist, synergist, and fixator as they relate to muscles. 3. Demonstrate or identify the different types of body movements. 4. List some criteria used in naming muscles. 5. Describe similarities and differences in the structure and function of the three types of muscle tissue and indicate where they are found in the body. 6. Define muscular system. 7. Define and explain the role of the following: endomysium, perimysium, epimysium, tendon, and aponeurosis. 8. Describe the microscopic structure of skeletal muscle and explain the role of actin- and myosin-containing myofilaments. 9. Describe how an action potential is initiated in a muscle cell. 10. Describe the events of muscle cell contraction. 11. Define graded response, tetanus, isotonic and isometric contractions, and muscle tone as these terms apply to a skeletal muscle. 12. Define oxygen debt and muscle fatigue and list possible causes of muscle fatigue. <p>Standards: HS-LS1-2 and 3.1.9-12B: Develop and use a model to illustrate the hierarchical organization of interactive systems that provide specific functions within multicellular organisms.</p>

Cardiovascular System with Blood	
CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<ol style="list-style-type: none"> 1. Composition and Functions of Blood 2. Hemostasis 3. Blood Groups 4. Transfusion 5. The Heart 6. Physiology of the Heart 7. Microscopic Anatomy of Blood Vessels 8. Gross Anatomy of Blood Vessels 9. Physiology of Circulation 10. Homeostatic Imbalances of Blood 11. Homeostatic Imbalances of the Heart 12. Homeostatic Imbalances of the Cardiovascular System 	<p>Objectives:</p> <ol style="list-style-type: none"> 1. Describe the composition and volume of whole blood. 2. Describe the composition of plasma and discuss its importance in the body. 3. List the cell types making up the formed elements and describe the major functions of each type. 4. Define anemia, polycythemia, leukopenia, and leukocytosis, and list possible causes for each condition. 5. Explain the role of the hemocytoblast. 6. Describe the blood-clotting process. 7. Name some factors that may inhibit or enhance the blood-clotting process. 8. Describe the ABO and Rh blood groups. 9. Explain the basis for a transfusion reaction. 10. Describe the location of the heart in the body and identify its major anatomical areas on an appropriate model. 11. Trace the pathway of blood through the heart. 12. Compare the pulmonary and systemic circuits. 13. Explain the operation of the heart valves. 14. Name the functional blood supply of the heart. 15. Name the elements of the intrinsic conduction system of the heart and describe the pathway of impulses. 16. Explain what information can be gained from an electrocardiogram. 17. Compare and contrast the structure and function of arteries, veins, and capillaries. 18. Identify the body's major arteries and veins and name the body region supplied by each. 19. Define blood pressure and pulse and name several pulse points. 20. List factors affecting and/or determining blood pressure. 21. Define hypertension and atherosclerosis and describe possible health consequences of these conditions. 22. Describe the exchanges that occur across capillary walls. <p>Standards: HS-LS1-2 and 3.1.9-12B: Develop and use a model to illustrate the hierarchical organization of interactive systems that provide specific functions within multicellular organisms. HS-LS1-3 and 3.1.9-12C: Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.</p>

<p>Lymphatic (Immune) System</p>	
<p>CONTENT/KEY CONCEPTS</p>	<p>OBJECTIVES/STANDARDS</p>
<ol style="list-style-type: none"> 1. Lymphatic Vessels 2. Lymph Nodes 3. Other Lymphoid Organs 4. Nonspecific Body Defenses 5. Specific Body Defenses 6. Autoimmune Diseases 7. Homeostatic Imbalances 	<p>Objectives:</p> <ol style="list-style-type: none"> 1. Name the two major types of structures composing the lymphatic system. 2. Describe the source of lymph and explain its formation and transport. 3. Describe the function(s) of lymphatic vessels, lymph nodes, tonsils, the thymus, Peyer’s patches, and the spleen. 4. Explain how the lymphatic system is functionally related to the cardiovascular and immune systems. 5. Describe the protective functions of skin and mucous membranes. 6. Explain the importance of phagocytes and natural killer cells. 7. Describe the inflammatory process. 8. Name several antimicrobial substances produced by the body that act in innate body defense. 9. Describe how fever helps protect the body. 10. Define antigen and hapten, and name substances that act as complete antigens. 11. Name the two arms of the adaptive defense system and relate each to a specific lymphocyte type. 12. Compare and contrast the development of B and T cells. 13. State the roles of B cells, T cells, and plasma cells. 14. Explain the importance of macrophages in immunity. 15. List the five antibody classes and describe their specific roles in immunity. 16. Describe several ways in which antibodies act against antigens. 17. Distinguish between active and passive immunity. 18. Describe immunodeficiencies, allergies, and autoimmune diseases. <p>Standards: HS-LS1-2 and 3.1.9-12B: Develop and use a model to illustrate the hierarchical organization of interactive systems that provide specific functions within multicellular organisms. HS-LS1-3 and 3.1.9-12C: Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.</p>

Body Systems	
CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<p>1. Respiratory System</p> <ul style="list-style-type: none"> a. Functional Anatomy b. Respiratory Physiology c. Homeostatic Imbalances 	<p>Objectives:</p> <ul style="list-style-type: none"> 2. Name the organs forming the respiratory passageway from the nasal cavity to the alveoli of the lungs and describe the function of each. 3. Describe several protective mechanisms of the respiratory system. 4. Describe the structure and function of the lungs and the pleural coverings. 5. Define cellular respiration, external respiration, internal respiration, pulmonary ventilation, expiration, and inspiration. 6. Explain how the respiratory muscles cause volume changes that lead to air flow into and out of the lungs (breathing). 7. Define the following respiratory volumes: tidal volume, vital capacity, expiratory reserve volume, inspiratory reserve volume, and residual air. 8. Name several non-respiratory air movements and explain how they differ from normal respiratory air movements. 9. Describe the process of gas exchanges in the lungs and tissues. 10. Describe how oxygen and carbon dioxide are transported in the blood. 11. Explain the relative importance of oxygen and carbon dioxide in modifying breathing rate and depth. 12. Explain why it is not possible to stop breathing voluntarily. 13. Define apnea, dyspnea, hyperventilation, hypoventilation, and chronic obstructive pulmonary disease. <p>Standards:</p> <p>HS-LS1-2 and 3.1.9-12B: Develop and use a model to illustrate the hierarchical organization of interactive systems that provide specific functions within multicellular organisms.</p> <p>HS-LS1-3 and 3.1.9-12C: Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.</p>

Integumentary System	
CONTENT/KEY CONCEPTS	OBJECTIVES/STANDARDS
<ol style="list-style-type: none"> 1. Classification of Body Membranes 2. Anatomy of the Skin 3. Functions of the Skin 4. Developmental Aspects 	<p>Objectives:</p> <ol style="list-style-type: none"> 1. List the general functions of each membrane type-cutaneous, mucous, serous, and synovial-and give its location in the body. 2. List several important functions of the integumentary system and explain how these functions are accomplished. 3. When provided with a model or diagram of the skin, recognize, and name the following skin structures: epidermis, dermis (papillary and reticular layers), hair and hair follicle, sebaceous gland, sweat gland, and other components. 4. Name the layers of the epidermis and describe the characteristics of each. 5. Describe the function of the epidermal derivatives-sebaceous glands, sweat glands, and hair. 6. Name the factors that determine skin color and describe the function of melanin. 7. Differentiate between first-, second-, and third-degree burns. 8. Explain the importance of the "rule of nines." 9. Summarize the characteristics of basal cell carcinoma, squamous cell carcinoma, and malignant melanoma. 10. List two examples of integumentary system aging. <p>Standards: HS-LS1-2 and 3.1.9-12B: Develop and use a model to illustrate the hierarchical organization of interactive systems that provide specific functions within multicellular organisms.</p>