Middle/Senior High School Curriculum Map

Course Title: Anatomy and Physiology		**Academic Year:** 2022-2023

Essentials

Science Process and Engineering Skills					
Unit/Time Frame	Standards	Content	Skills	Assessment	Resources
ALL UNITS	Standard 1: Levels of Organization in **the Human Body: Cellular** Standard 2: Levels of Organization in the Human Body: **Tissue and Organs** Standard 3: Movement and Support in the Human Body: **The Integumentary System** Standard 4: Movement and Support in the Human Body: **The Skeletal System** Standard 5: Movement and Support in the Human Body: **The Muscular System**	-Make inferences -Pose questions, develop hypothesis, experiments to test them, collect analyze data and form conclusions -Document scientific investigations using appropriate writing methods -Use evidence to support reasoning -Develop arguments based on evidence -Communicate reasoning based on evidence -Identify different types of variables -Express distance in SI units -Differentiate distance, volume, mass, and density measurements. -Perform dimension analysis -Construct appropriate graphs from data correctly and identify different types of graphs -Identify the characteristics of living things	SCIENCE PROCESS SKILLS 1. Pose and refine questions that lead to descriptions and explanations of how the natural and designed world 2. Utilize measurements and observations used to revise and improve models and designs. 3. Identify and correctly use tools to construct, obtain, and evaluate questions and problems. 4. Develop questions, predictions and explanations; analyze and identify flaws in systems; build and revise scientific explanations and proposed engineered systems; and communicate ideas. 5. Constructing investigations systematically encompasses identified variables and parameters generating quality data working collaboratively as well as individually 6. Use argumentation, the process by which evidence-based conclusions and solutions are reached, to listen to, compare, and evaluate competing ideas and methods based on merits 7. Critiquing and communicating ideas individually and in groups is a critical professional activity.	40% Tests & Quizzes, 20% Projects 20% Labs 10% Assignments 10% Participation	Pearson's Essentials of Human Anatomy & Physiology 13th edition online text

	Standard 6: Integration and Coordination in the Human Body: **The Nervous System** Standard 7: Integration and Coordination in the Human Body: **Somatic and Special Senses** Standard 8: Integration and Coordination in the Human Body: **The Endocrine System** Standard 9: Transport in the Human Body: **The Blood** Standard 10: Transport in the Human Body: **The Cardiovascular System** Standard 11: Transport in the Human Body: **The Lymphatic System and Immune Mechanisms** Standard 12: Absorption and Excretion in the Human Body: **The Digestive System**	-Compare and classify organisms into groups based on similar characteristics	8. Write arguments focused on discipline-specific content. 9. Write informative texts, including scientific procedures/experiments or technical processes that include precise descriptions and conclusions drawn from data and research. 10. Recognize organisms are classified into taxonomic levels according to shared characteristics. Explain how an organism's scientific name correlates to these shared characteristics. 11. Investigate how viruses and bacteria affect the human body.		

	Standard 13: Absorption and Excretion in the Human Body: **The Respiratory System** Standard 14: Absorption and Excretion in the Human Body: **The Urinary System** Standard 15: Life Cycle in the Human Body: **The Reproductive System**				

Curriculum Map

Course Title: Anatomy and Physiology	**Quarter:** 1	**Academic Year:** 2022-2023

Essentials:

Human body orientation, Cells & tissues, Skin and body membranes, Skeleton and muscles					
Unit/Time Frame	Standards	Content	Skills	Assessment	Resources
Chapter 1 Human Body Orientation **Chapter 3 Cells and Tissues**	Standard 1: Levels of Organization in **the Human Body: Cellular**	<u>CELLULAR, TISSUES & ORGANS</u> -Define and explain how anatomy and physiology are related	**Cellular** 1. Investigate the forms of cellular transport within and across cell membranes. (active transport, simple & facilitated diffusion, vascular transport)	40% Tests & Quizzes, 20% Projects 20% Labs	Pearson's Essentials of Human Anatomy & Physiology 13th edition online text

Chapter 4 Skin and Body Membranes **Chapter 5 Skeletal System**	Standard 2: Levels of Organization in the Human Body: **Tissue and Organs** Standard 3: Movement and Support in the Human Body: **The Integumentary System** Standard 4: Movement and Support in the Human Body: **The Skeletal System**	-Name the six levels of structural organization that make up the human body; name and classify the organ systems -Understand the functions that humans must perform to maintain life -Describe and identify proper anatomical terminology for body direction, surfaces, planes, cavities -Define homeostasis and explain its importance; define negative and positive feedback and provide examples -Define selective permeability, diffusion, active transport, passive transport, solute pumping, exocytosis, endocytosis, phagocytosis, pinocytosis, hypertonic, hypotonic, and isotonic -Describe the plasma membrane structure and explain how various transport processes -Briefly describe the process of DNA replication and protein synthesis <u>INTEGUMENTARY</u> -Name, explain and identify the four major tissue types and their subcategories -Describe the process of tissue repair	2. Model mitosis, homeostasis, cell differentiation 3. Introduce basic steps and mechanisms of protein synthesis **Tissues & Organs** 1. Explore protein structure, metabolism, defense of the body and their shape 2. Analyze hierarchical level of life cells, tissues, etc. 3. Describe the histological structure and functional characteristics of four basic tissue types 4. Identify the body cavities, their membranes & organs 5. Investigate the major organ systems and describe their basic functional importance 6. Identify anatomical terms on a diagram, model and discussion **Integumentary System** 1. Analyze structural characteristics and functional importance 2. Investigate injuries, diseases and causes including evaluating the consequences **Skeletal System** 1. Model the structure, development, growth and function of compact and spongy bone 2. Evaluate the general macroscopic characteristics of long bone then locate and identify individual bones and bone features	10% Assignments 10% Participation	

		-List the general functions of each membrane type and give its location in the body -Compare the structure of major membrane types -Explain the important functions of the integumentary system -Identify parts and function of the skin in a model or diagram including epidermis (layers), dermis, hair & hair follicle, sebaceous gland and sweat gland -Differentiate the types of burns and understand the "rule of nines" -Summarize the characteristics of basal cell carcinoma, squamous cell carcinoma, and malignant melanoma <u>SKELETAL</u> -Know the functions of the skeletal system and the four main classifications of bones -Describe the process of bone formation and remodeling of bone. -Identify the major sets of bones in a diagram and understand their features -Name the parts of the typical vertebra, thoracic cage, shoulder, pelvic girdles and attached limbs including structure and function	3. Identify and describe the structure of the major types of joints and how influence functional mobility and stability		

		-Identify the major structural categories of joints and compare the amount of movement allowed by each			

Curriculum Map

Course Title: Anatomy and Physiology	**Quarter:** 2	**Academic Year:** 2022-2023

Essentials

Muscular, Nervous, Special Senses and Endocrine Systems

Unit/Time Frame	Standards	Content	Skills	Assessment	Resources
Chapter 6 Muscular System **Chapter 7 Nervous System** **Chapter 8 Special Senses** **Chapter 9 Endocrine System**	Standard 5: Movement and Support in the Human Body: **The Muscular System** Standard 6: Integration and Coordination in the Human Body: **The Nervous System** Standard 7: Integration and Coordination in the Human Body: **Somatic and Special Senses**	<u>MUSCULAR</u> -Describe similarities and differences in structure and function of the types of muscles -Describe the microscopic structure of skeletal muscle -Describe the events of muscle contraction, fatigue and the effects of aerobic resistance -Demonstrate or identify the different types of body movements -Name and locate major muscles of the body	**Muscular System** 1. Compare and contrast structural and functional similarities and differences between skeletal, cardiac, and smooth muscle 2. Investigate molecular components of skeletal muscle fiber and how bring about contraction and relaxation 3. Explain molecular processes in sliding filament model and biochemical mechanisms provide energy for muscle contraction and relaxation 4. Describe how neuromuscular junction functions and how motor units influence force and velocity of contractions 5. Identify the major muscles on a diagram, mode and through discussion	40% Tests & Quizzes, 20% Projects 20% Labs 10% Assignments 10% Participation	Pearson's Essentials of Human Anatomy & Physiology 13th edition online text

	Standard 8: Integration and Coordination in the Human Body: **The Endocrine System**	-Understand nerve supply and changes that occur in aging muscles <u>NERVOUS</u> -Explain the structural and functional classifications of the nervous system -Describe the structure and function of neurons, neuroglia, gray matter and white matter -Describe the events leading to the generation of nerve impulse and its conduction from neuron to neuron, including reflex arc -Identify location and function of major regions of the brain -Describe the spinal cord structure and function -Describe the general structure of a nerve -Identify the site of origin, and explain the function of the sympathetic and parasympathetic divisions of the ANS -Contrast the effect of the parasympathetic and sympathetic divisions on organs -List several factors that may have a harmful effect on brain and nervous system including disorders <u>SOMATIC & SPECIAL SENSES</u>	6. Distinguish between isotonic and isometric contractions on skeletal muscle. 7. Examine muscular hypertrophy and atrophy and discuss their cause. **Nervous System** 1. Model the structural components and functional subdivisions of the nervous system 2. Describe and diagram the structures of neurons, supporting neuroglia cells and functions 3. Compare and contrast actions, origins and pathways of nerve fibers in parasympathetic and sympathetic divisions 4. Identify and model how action potentials are generated, the ions and channel protein involved and structure and function aspects allow for synaptic connection. **Somatic & Special Senses** 1. Distinguish between somatic senses and special senses, the prominent sensory receptor types and their functional operation 2. Explore the anatomy and functions of the eye, layers and fovea 3. Investigate how the eye accommodates for near and distance vision and light 4. Investigate the structural components and functions of the ear and model how equilibrium and sound are detected **Endocrine System** 1. Investigate structure and function of the endocrine system and develop models to		

		-Identify the eye structures and functions including layers of wall, rods, cones. -Trace the pathway of light through the eye to retina -Identify issues or disorders associated with the eye including blind spot, cataract, glaucoma, astigmatism, emmetropia, hyperopia, myopia. -Identify the structures and functions of the external, middle and internal ear -Explain how a person is able to localize the source of sound -Describe how equilibrium organs help balance and distinguish static and dynamic equilibrium -Identify location, structure and function of olfactory and taste receptors <u>ENDOCRINE</u> -Describe how hormones bring about their effects in the body -Explain how various endocrine glands are stimulated and release their hormonal products -Define negative and positive feedback and roles regulating blood levels of hormones -Describe the difference between endocrine and exocrine glands	show how changes in prominent hormone levels impact homeostasis 2. Discuss the structural and functional differences between and endocrine gland and exocrine gland 3. Distinguish between amino acid, peptide and lipid based hormones and how they differ in activity 4. Investigate the hormones of the hypothalamus-pituitary complex, function in controlling the thyroid, gonads, and adrenal cortex and their feedback signals. 5. Evaluate how the HP complex, the sympathetic nervous system and adrenal medulla are influenced by stress. 6. Investigate the endocrine and exocrine functions of the pancreas and involvement in digestion and blood sugar regulation.		

		-Locate, identify and describe functions of endocrine glands including major pathological consequences of hyper or hypo secretion -Describe the relationship between glands and organs <u>DISSECTION – frog</u> -Apply knowledge of systems to the frog anatomy -Compare and distinguish frog anatomy and human anatomy -Understand and apply dissection techniques			

Curriculum Map

Course Title: Anatomy and Physiology	**Quarter:** 3	**Academic Year:** 2022-2023

Essentials

Blood and Cardiovascular and Lymphatic Systems					
Unit/Time Frame	Standards	Content	Skills	Assessment	Resources
Chapter 10 Blood **Chapter 11 Cardiovascular** **Chapter 12 Lymphatic**	Standard 9: Transport in the Human Body: **The Blood** Standard 10: Transport in the Human Body: **The Cardiovascular System**	<u>BLOOD</u> -Describe the composition and volume of whole blood and plasma and its importance -List the cell types making up the formed elements and describe the major functions of each	**Blood** 1. Analyze and model the functions of blood: hemostasis, nutrient, gas, and waste exchange; and inflammatory response. 2. Evaluate the composition and functions of whole blood, plasma and regulation and production of blood cells	40% Tests & Quizzes, 20% Projects 20% Labs 10% Assignments 10% Participation	Pearson's Essentials of Human Anatomy & Physiology 13th edition online text

	Standard 11: Transport in the Human Body: **The Lymphatic System and Immune Mechanisms**	-Define anemia, polycythemia, leukopenia and leukocytosis and causes -Explain the role of hemocytoblast -Describe the blood clotting process and factors that inhibit or enhance it -Describe the ABO and Rh blood groups and basis for transfusion <u>CARDIOVASCULAR</u> -Describe the location and identify the major anatomical parts of the heart -Trace the pathway of blood through the heart and body -Compare pulmonary and systemic circuits -Explain and identify the operation of the heart valves -Name the elements of the intrinsic conduction system of the heart and the pathway of impulses -Explain what information can be gained from an electrocardiogram -Describe the effect of each of the following on heart rate: vagus nerve, exercise, epinephrine, and various ions -Compare and contrast the structure and function of arteries, veins and capillaries -Identify the major arteries and veins in body	3. Investigate the ABO blood types, antigens and antibodies and their significance in blood transfusion. **Cardiovascular** 1. Investigate the primary structures of the cardiovascular system and explore their function in maintaining homeostasis 2. Investigate the stages, control, and regulation of the cardiac cycle 3. Compare and contrast the structural and functional difference between the different blood vessel types 4. Model the vasoconstriction and vasodilation are and how impact homeostasis 5. Diagram/model to illustrate the external and internal structures and layers of the heart, the vessels entering and leaving the heart, and one-way blood flow. 6. Discuss the regulation of blood pressure and analyze the effect of abnormal pressure on health. 7. Investigate how cardiovascular system and other systems respond to changes in blood volume as well as changes in physical activity allow body to maintain homeostasis. **Lymphatic and Immune** 1. Identify the primary structural components and functions of the lymphatic system and analyze the relationship with activities of bone marrow, thymus gland. 2. Investigate the difference between innate and acquired immunity.		

		-Discuss arterial and hepatic portal circulation -Define blood pressure and list factors affecting it including hypertension and atherosclerosis -Describe the exchanges that occur across capillary walls <u>LYMPHATIC & BODY DEFENSES</u> -Explain how the lymphatic system function in relation to cardiovascular and the immune defenses -Name the major structures of the lymphatic system -Describe the source of lymph and explain its formation and transport -Identify and describe the functions of lymph nodes, tonsil, thymus, Peyer's patches and spleen -Describe the protective functions of skin and mucous membranes -Describe the inflammatory process -Explain phagocytes and how a fever helps the body -Discuss the adaptive defense system and relate to specific lymphocyte types (B or T cells) -Compare and contrast the function of B & T cells	3. Examine how cellular and non-cellular components work collectively to defend the body against foreign pathogens.		

		-Explain the importance of antigen-presenting cells in immunity -Define humoral immunity and state the roles of plasma cells -Explain the function of antibodies and use of monoclonal antibodies. -Distinguish between active and passive immunity -Identify and describe the roles of cellular mediated response parts -Describe allergies, autoimmune diseases and immunodeficiency			

Curriculum Map

Course Title: Anatomy and Physiology	**Quarter:** 4	**Academic Year:** 2022-2023

Essentials

Respiratory, Digestive, Urinary and Reproductive Systems					
Unit/Time Frame	Standards	Content	Skills	Assessment	Resources
Chapter 13 Respiratory **Chapter 14 Digestive** **Chapter 15 Urinary** **Chapter 16 Reproductive**	Standard 12: Absorption and Excretion in the Human Body: **The Digestive System** Standard 13: Absorption and Excretion in the	<u>RESPIRATORY</u> -Identify the parts of the respiratory system -Describe the protective mechanisms of the respiratory system -Describe the structure and function of lungs and pleural coverings	**Respiratory** 1. Identify and locate major organs and functions of the respiratory system. 2. Investigate the anatomical structures and physiological processes involved in inspiration & expiration.	40% Tests & Quizzes, 20% Projects 20% Labs 10% Assignments 10% Participation	Pearson's Essentials of Human Anatomy & Physiology 13th edition online text

Dissection of Pig resources	Human Body: **The Respiratory System** Standard 14: Absorption and Excretion in the Human Body: **The Urinary System** Standard 15: Life Cycle in the Human Body: **The Reproductive System**	-Describe the structure of the respiratory membrane -Define cellular respiration, external respiration, internal respiration, pulmonary ventilation, expiration and inspiration -Explain how the respiratory muscles cause volume changes and air flow -Explain respiratory volumes and capacities -Describe the process of gas exchange in lungs, tissues and blood -Explain the control of respiration including factors influence rate, hypo and hyper ventilation -Describe causes and symptoms of COPD and lung cancer <u>DIGESTIVE</u> -Identify and discuss the function of the organs of the alimentary canal and accessory digestive organs -Identify the overall function of the digestive system as digestion and absorption of the foodstuffs -List the accessory digestive organs and describe their function including teeth and salvia -Identify the structure and function of the main digestive organs -Describe the six main activities of the digestive system -Describe the role of local hormones	3. Investigate how percentages and partial pressure gradients of oxygen and carbon dioxide impact net gas exchange. 4. Describe how the body monitors changes in blood pH and carbon dioxide using specialized receptors. **Digestive** 1. Identify and locate major and accessory organs and functions of the digestive system 2. Investigate the enzymes of the gastrointestinal tract and accessory organs in relation to processing, digesting, and absorbing of the three major biomolecules. 3. Explain the different between metabolic and respiratory acidosis and alkalosis. **Urinary** 1. Identify and locate major organs and functions of the urinary system. 2. Understand the function of the kidneys in relation to homeostatic control of bodily fluids, blood pressure, and erythrocyte production. 3. Develop a model of the nephron which explores its structural components and functional processes of filtration, secretion, and reabsorption. 4. Explain the neural basis of micturition including the function of the sphincters associated with the male and female urethra. 5. Investigate how the kidneys respond to excess water intake and to dehydration as well as the role of antidiuretic hormone (ADH) and sodium in the		

		-List the major enzymes involved in digestive system -Describe the mechanisms of swallowing, vomiting and defecation -Name the end products of protein, fat and carbohydrates -Define and understand microbiota, microbiome, and colitis -Define metabolism, anabolism and catabolism -Describe the metabolic roles of the liver and explain the importance of energy balance -List the factors that influence metabolic rate <u>URINARY</u> -Describe the location and function of the kidneys -Recognize that the nephron is the structural and functional unit of the kidney -Describe the process of urine formation and areas of filtration, reabsorption and secretion -Describe the function of the kidneys in excretion of nitrogen-containing wastes -Describe the composition of normal urine and list abnormal components -Describe the structure and function of ureters, bladder and urethra -Describe the difference in control of the external and internal urethral sphincters -Explain the role of ADH in water balance and aldosterone in	regulation of water absorption and excretion. **Reproductive** 1. Identify and locate major and accessory organs and functions of the female and male reproductive system. 2. Discuss the role of hormones. 3. Create a model showing how fluctuating hormonal changes associated with reproductive system impact both the uterine and ovarian cycles. 4. Describe how spermatozoa move through the female reproductive tract and describe fertilization. 5. Investigate and develop a model of early development from changes of fertilized cell (zygote) through blastocyst level then gastrulation process resulting in three primary germ layers.		

		sodium and potassium ion balance -Define diuresis and polyuria -Compare and contrast the relative speed of buffers, the respiratory and the kidneys in maintaining the acid-base balance in the blood <u>REPRODUCTIVE</u> -Identify the organs of the male reproductive system -Trace the pathway followed by sperm from testis to the body exterior -Discuss the composition of semen and the glands that produce it -Describe spermatogenesis and structure of sperm -Identify the organs of the female reproductive system -Describe the functions of the vesicular follicle and corpus luteum of the ovary -Indicate the location of female uterus, cervix, fundus, body -Define oogenesis - Describe the effect of FSH and LH on reproductive system -Describe the phases and controls of the menstrual cycle -Describe the structure and function of the mammary glands -Describe the process of pregnancy and embryonic development -Describe how labor is initiated and stages of labor <u>DISSECTION – pig</u> -Review all the body systems and compare to pig anatomy			

		-Refine dissection techniques			