Madison County Schools
Human A & P Pacing Guide

Unit topic	Objective covered	Time length
1st Nine Weeks		
Physiological Functions/Anatomical Structure **-Terminology** **-Location of Cavities and Systems**	HAP.1 Students will demonstrate an understanding of how anatomical structures and physiological functions are organized and described using anatomical position. HAP.1.1 Apply appropriate anatomical terminology when explaining the orientation of regions, directions, and body planes or sections. HAP.1.2 Locate organs and their applicable body cavities and systems. HAP.1.3 Investigate the interdependence of the various body systems to each other and to the body as a whole.	5 blocks
Cells and Tissues **-Chemistry, Cells**	Review basics from Biology- Conceptual Understanding: The smallest structural and functional unit of the human body is the cell. The cell is composed of organelles that perform varied but specific functions. Cells within the human body can metabolize, digest foods, dispose of waste, reproduce, grow, move, and respond to stimuli.	3 blocks
Cells and Tissues **-Name, function, location and be able to identify pictures of tissues**	HAP.2 Students will demonstrate an understanding of the relationship of cells and tissues that form complex structures of the body. HAP.2.1 Analyze the characteristics of the four main tissue types: epithelial, connective, muscle, and nervous. Examine tissues using microscopes and other various technologies. HAP.2.2 Construct a model to demonstrate how the structural organization of cells in a tissue relates to the specialized function of that tissue.	6 blocks

	HAP.2.3 Enrichment: Use an engineering design process to research and develop medications (i.e., targeted cancer therapy drugs) that target uncontrolled cancer cell reproduction. *	
Integumentary System **-External /Internal Structures** **-Layers of the Skin** **-Accessories of the Integument**	HAP.3 Students will investigate the structures and functions of the integumentary system, including the cause and effect of diseases and disorders. HAP.3.1 Identify structures and explain the functions of the integumentary system, including layers of skin, accessory structures, and types of membranes. HAP.3.2 Investigate specific mechanisms (e.g., feedback and temperature regulation) through which the skin maintains homeostasis. HAP.3.3 Research and analyze the causes and effects of various pathological conditions (e.g., burns, skin cancer, bacterial/viral infections, and chemical dermatitis). HAP.3.4 Enrichment: Use an engineering design process to design and model/simulate effective treatments for skin disorders (e.g., tissue grafts).*	5-6 blocks
2nd nine weeks		
Skeletal System **-Types of bone (short, long, flat, irregular)** **-Appendicular/Axial skeleton** **-Joints** **-Growth & development** **-Pathology**	HAP.4 Students will investigate the structures and functions of the skeletal system including the cause and effect of diseases and disorders. HAP.4.1 Use models to compare the structure and function of the skeletal system. HAP.4.2 Develop and use models to identify and classify major bones as part of the appendicular or axial skeleton. HAP.4.3 Identify and classify types of joints and their movement. HAP.4.4 Demonstrate an understanding of the growth and development of the skeletal system, differentiating between endochondral and intramembranous ossification.	7 blocks

	HAP.4.5 Construct explanations detailing how mechanisms (e.g., Ca2+ regulation) are used by the skeletal system to maintain homeostasis. HAP.4.6 Research and analyze various pathological conditions (e.g., bone fractures, osteoporosis, bone cancers, various types of arthritis, and carpal tunnel syndrome). HAP.4.7 Enrichment: Use an engineering design process to develop, model, and test effective treatments for bone disorders (i.e., prosthetics).*	
Muscular System **-Types of muscle** **-Insertion & Origin** **-Skeletal muscle fiber & motor unit** **-Contraction & relaxation** **-Fatigue** **-Pathology**	HAP.5 Students will investigate the structures and functions of the muscular system, including the cause and effect of diseases and disorders. HAP.5.1 Develop and use models to illustrate muscle structure, muscle locations and groups, actions, origins, and insertions. HAP.5.2 Describe the structure and function of the skeletal muscle fiber and the motor unit. HAP.5.3 Explain the molecular mechanism of muscle contraction and relaxation. HAP.5.4 Use models to locate the major muscles and investigate the movements controlled by each muscle. HAP.5.5 Compare and contrast the anatomy and physiology of the three types of muscle tissue. HAP.5.6 Use technology to plan and conduct an investigation that demonstrates the physiology of muscle contraction, muscle fatigue, or muscle tone. Collect and analyze data to interpret results, then explain and communicate conclusions. HAP.5.7 Research and analyze the causes and effects of various pathological conditions, (e.g., fibromyalgia, muscular dystrophy, cerebral palsy, muscle cramps/strains, and tendonitis). HAP.5.8 Enrichment: Use an engineering design process to develop effective ergonomic devices to prevent muscle fatigue and strain (e.g., carpal tunnel, exoskeletons for paralysis, or training plans to prevent strains/sprains/cramps).	7 blocks

Nervous System **-Central and Peripheral Systems** **-S/F of CNS/PNS** **-S/F of the Neuron** **-Functions of the brain parts** **-Control of the sympathetic/ parasympathetic** **-Disorders of the CNS/PNS**	HAP. 6 Students will investigate the structures and functions of the nervous system, including the cause and effect of diseases and disorders. HAP.6.1 Describe and evaluate how the nervous system functions and interconnects with all other body systems. HAP.6.2 Analyze the structure and function of neurons and their supporting neuroglia cells (e.g. astrocytes, oligodendrocytes, Schwann cells, microglial). HAP.6.3 Discuss the structure and function of the brain and spinal cord. HAP.6.4 Compare and contrast the structures and functions of the central and peripheral nervous systems. Investigate how the systems interact to maintain homeostasis (e.g., reflex responses, sensory responses). HAP.6.5 Enrichment: Plan and conduct an experiment to test reflex response rates under varying conditions. Using technology, construct graphs in order to analyze and interpret data to explain and communicate conclusions. HAP.6.6 Describe the major characteristics of the autonomic nervous system. Contrast the roles of the sympathetic and parasympathetic nervous systems in maintaining homeostasis. HAP.6.8 Research and analyze the causes and effects of various pathological conditions (e.g., addiction, depression, schizophrenia, Alzheimer's, sports-related chronic traumatic encephalopathy [CTE], dementia, chronic migraine, stroke, and epilepsy). HAP.6.9 Enrichment: Use an engineering design process to develop, model, and test preventative devices for neurological injuries and/or disorders (e.g., concussion-proof helmets or possible medications for addiction and depression).*	7 blocks

3rd nine weeks		
Nervous System **-Special Senses** **-S/F of the sense organs**	Continuation of: HAP. 6 Students will investigate the structures and functions of the nervous system, including the cause and effect of diseases and disorders. HAP.6.7 Describe the structure and function of the special senses (i.e., vision, hearing, taste, and olfaction)	4 blocks
Blood **-Blood types** **-Pathology**	HAP.9 Students will analyze the structure and functions of blood and its role in maintaining homeostasis. HAP.9.1 Describe the structure, function, and origin of the cellular components and plasma components of blood. HAP.9.2 Distinguish the cellular difference between the ABO blood groups and investigate blood type differences utilizing antibodies to determine compatible donors and recipients. HAP.9.3 Research and analyze the causes and effects of various pathological conditions (e.g., anemia, malaria, leukemia, hemophilia, and blood doping). HAP.9.4 Enrichment: Use an engineering design process to develop effective treatments for blood disorders (e.g., methods to regulate blood cell counts or blood doping tests).*	5 blocks
Cardiovascular system -Circulation -Blood vessels/Valves -Heart rate & blood pressure -Pathology	HAP.10 Students will investigate the structures and functions of the cardiovascular system, including the cause and effect of diseases and disorders. HAP.10.1 Design and use models to investigate the functions of the organs of the cardiovascular system. HAP.10.2 Describe the flow of blood through the pulmonary system and systemic circulation. HAP.10.3 Investigate the structure and function of different types of blood vessels (e.g., arteries, capillaries, veins). Identify the role each plays in the transport and exchange of materials. HAP.10.4 Demonstrate the role of valves in regulating blood flow.	7 blocks

	HAP.10.5 Plan and conduct an investigation to test the effects of various stimuli on heart rate and/or blood pressure. Construct graphs to analyze data and communicate conclusions. HAP.10.6 Research and analyze the effects of various pathological conditions (e.g., hypertension, myocardial infarction, mitral valve prolapse, varicose veins, and arrhythmia). HAP.10.7 Enrichment: Use an engineering design process to develop, model, and test effective treatments for cardiovascular diseases (e.g., methods to regulate heart rate, artificial replacement valves, open blood vessels, or strengthening leaky valves).*	
Respiratory system **-Respiratory tract** **-Gas exchange** **Pathology**	HAP. 12 Students will investigate the structures and functions of the respiratory system, including the cause and effect of diseases and disorders. HAP.12.1 Design and use models to illustrate the functions of the organs of the respiratory system. HAP.12.2 Describe structural adaptations of the respiratory tract and relate these structural features to the function of preparing incoming air for gas exchange at the alveolus. HAP.12.3 Identify the five mechanics of gas exchange: pulmonary ventilation, external respiration, transport gases, internal respiration, and cellular respiration. HAP.12.4 Enrichment: Use an engineering design process to develop a model of the mechanisms that support breathing, and illustrate the inverse relationship between volume and pressure in the thoracic cavity.* HAP.12.5 Research and analyze the causes and effects of various pathological conditions (e.g., asthma, bronchitis, pneumonia, and COPD). HAP.12.6 Research and discuss new environmental causes of respiratory distress (e.g., e-cigarettes, environmental pollutants, and changes in inhaled gas composition).	6 blocks

4th Nine Weeks		
Digestion and nutrition **-Food processing** **-Accessory organs, enzymes, hormones** **-Pathology**	HAP.13 Students will investigate the structures and functions of the digestive system, including the cause and effect of diseases and disorders. HAP.13.1 Analyze the structure-function relationship in organs of the digestive system. HAP.13.2 Use models to describe structural adaptations present in each organ of the tract and correlate the structures to specific processing of food at each stage (e.g., types of teeth; muscular, elastic wall and mucous lining of the stomach; villi and microvilli of the small intestine; and sphincters along the digestive tract). HAP.13.3 Identify the accessory organs (i.e., salivary glands, liver, gallbladder, and pancreas) for digestion and describe their function. HAP.13.4 Plan and conduct an experiment to illustrate the necessity of mechanical digestion for efficient chemical digestion. HAP.13.5 Research and analyze the activity of digestive enzymes within different organs of the digestive tract, connecting enzyme function to environmental factors such as pH. HAP.13.6 Evaluate the role of hormones (i.e., gastrin, leptin, and insulin) in the regulation of hunger and satiety/fullness. HAP.13.7 Research and analyze the causes and effects of various pathological conditions (e.g., GERD/acid reflux, stomach ulcers, lactose intolerance, irritable bowel syndrome, gallstones, appendicitis, and hormonal imbalances and obesity). HAP.13.8 Enrichment: Use an engineering design process to develop effective treatments for gastrointestinal diseases (e.g., methods to regulate stomach acids or soothe ulcers, treat food intolerance, and dietary requirements/modifications).	5 blocks

Urinary system **-Filtration** **-Homeostasis** **-Path** **-Pathology**	HAP.14 Students will investigate the structures and functions of the urinary system, including the cause and effect of diseases and disorders. HAP.14.1 Understand the structure and function of the urinary system in relation to maintenance of homeostasis. HAP.14.2 Describe the processes of filtration and selective reabsorption within the nephrons as it relates to the formation of urine and excretion of excess materials in the blood. HAP.14.3 Investigate relationship between urine composition and the maintenance of blood sugar, blood pressure, and blood volume. HAP.14.4 Enrichment: Conduct a urinalysis to compare the composition of urine from various "patients." HAP.14.5 Develop and use models to illustrate the path of urine through the urinary tract. HAP.14.6 Research and analyze the causes and effects of various pathological conditions and other kidney abnormalities (e.g., kidney stones, urinary tract infections, gout, dialysis, and incontinence).	5 Blocks
Reproductive system **-Male & Female rep. Systems** **-Hormones** **-Contraception** **-Development (fertilization to adulthood)** **-Pathology**	HAP. 8 Students will investigate the structures and functions of the male and female reproductive system, including the cause and effect of diseases and disorders. HAP.8.1 Compare and contrast the structure and function of the male and female reproductive systems. HAP.8.2 Describe the male reproductive anatomy and relate structure to sperm production and release. HAP.8.3 Describe the female reproductive anatomy and relate structure to egg production and release. HAP.8.4 Construct explanations detailing the role of hormones in the regulation of sperm and egg development. Analyze the role of negative feedback in regulation of the female menstrual cycle and pregnancy.	5 blocks

	HAP.8.5 Evaluate and communicate information about various contraceptive methods to prevent fertilization and/or implantation. HAP.8.6 Describe the changes that occur during embryonic/fetal development, birth, and the growth and development from infancy, childhood, and adolescence to adult. HAP.8.7 Research and analyze the causes and effects of various pathological conditions (e.g., infertility, ovarian cysts, endometriosis, sexually transmitted diseases, and ectopic pregnancy). Research current treatments for infertility.	
Dissection	Students should draw similarities and differences between the dissection specimen and human anatomy.	To be done during 4th nine weeks where seen fit after systems have been covered.
Lymphatic **-Structure/function of lymphatic system** **-Discuss immunity and history of vaccination**	HAP. 11 Students will investigate the structures and functions of the lymphatic system, including the cause and effect of diseases and disorders. HAP.11.1 Analyze the functions of leukocytes, lymph, and lymphatic organs in the immune system. HAP.11.2 Compare the primary functions of the lymphatic system and its relationship to the cardiovascular system. HAP.11.3 Compare and contrast the body's non-specific and specific lines of defense, including an analysis of the roles of various leukocytes: basophils, eosinophils, neutrophils, monocytes, and lymphocytes. HAP.11.4 Correlate the functions of the spleen, thymus, lymph nodes, and lymphocytes to the development of immunity. HAP.11.5 Differentiate the role of B-lymphocytes and T-lymphocytes in the development of humoral and cell-mediated immunity and primary and secondary immune responses. HAP.11.6 Investigate various forms of acquired and passive immunity (e.g., fetal immunity, breastfed babies, vaccinations, and plasma donations).	To be dispersed throughout the second semester where see fit. (Lymphatic can be covered in conjunction with blood)

	HAP.11.7 Research and analyze the causes and effects of various pathological conditions (e.g., viral infections, auto-immune disorders, immunodeficiency disorders, and lymphomas).	
Endocrine **-Structure function of major organ of the endocrine system.** **-Major hormones and their roles in the body.**	HAP.7 Students will demonstrate an understanding of the major organs of the endocrine system and the associated hormonal production and regulation. HAP.7.1 Obtain, evaluate, and communicate information to illustrate that the endocrine glands secrete hormones that help the body maintain homeostasis through feedback mechanisms. HAP.7.2 Discuss the function of each endocrine gland and the various hormones secreted. HAP.7.3 Model specific mechanisms through which the endocrine system maintains homeostasis (e.g., insulin/glucagon and glucose regulation; T3 / T4 and metabolic rates; calcitonin/parathyroid and calcium regulation; antidiuretic hormone and water balance; growth hormone; and cortisol and stress). HAP.7.4 Research and analyze the effects of various pathological conditions (e.g., diabetes mellitus, pituitary dwarfism, Graves' disease, Cushing's syndrome, hypothyroidism, and obesity). HAP.7.5 Enrichment: Use an engineering design process to develop effective treatments for endocrine disorders (e.g., methods to regulate hormonal imbalance).*	To be dispersed throughout the second semester where see fit. (Endocrine can be covered in conjunction with reproductive system)