The Mission of the Chardon Local Schools is High Achievement for All Students, Where Learning is Our Most Important Work.

Science Course of Study:

ANATOMY & BIOTECHNOLOGY

Revised February 2022

Introductory Anatomy and Biotechnology COURSE OF STUDY

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Description: Human Anatomy and Physiology is a high school level course, which satisfies the Ohio Core science graduation requirements of Ohio Revised Code Section 3313.603. This section of Ohio law requires three units of science. Each course should include inquiry-based laboratory experience that engages students in asking valid scientific questions and gathering and analyzing information. Human Anatomy and Physiology comprises a systematic study in which students will examine human anatomy and physical functions. They will analyze descriptive results of abnormal physiology and evaluate clinical consequences. A workable knowledge of medical terminology will be demonstrated.
Source

Strand: LEVELS OF ORGANIZATION

Learning Standards:	**How Taught?** **Teaching activities may include, but are not limited to:**
AP.LO.1: Hierarchy of organization- Building on knowledge about cell structures and processes from middle school and Biology, this topic focuses on the increasing complexity of cells as they are organized into tissues. Several tissue types make up an organ. Several organs working together make up an organ system. All the organ systems interact and form the human body.	~Research various species of organisms that have been studied in order to understand fundamental physiological processes in humans. ~Explain the considerations in determining what species is the best to study for a particular process. ~ Analyze data about various human cell types and hypothesize the relationships between structure and function. ~Identify the levels of organization from cellular to organism.
AP.LO.2: Types of tissues The human body comprises four types of tissues: epithelial, connective, muscle and nervous. This topic includes a broad overview of the structure, function and location of each tissue type. Tissues can be studied as an independent unit or as they are encountered within each organ system. Investigations are used to understand and explain types of tissues in a variety of inquiry and design scenarios that can incorporate evolutionary concepts, scientific reasoning, comparative analysis, communication skills and real-world applications.	~Simulate tissue engineering using a variety of materials (e.g., gelatin, agar, yeast). Critique the characteristics of each tissue simulation to rate its possible use in tissue grafting. ~Use microscopes or virtual images to examine various tissues. Compare a range of epithelial (e.g., squamous, columnar, cuboidal), connective (e.g., cartilage, bone, blood), muscular (e.g., skeletal, cardiac, smooth) and nervous tissues. Interpret how the function of each tissue type relates to its structure. ~Create labeled illustrations or models of the four types of human tissues.
AP.LO.3: Homeostasis Homeostasis is a theme that is explored throughout the course. Homeostasis involves positive and negative feedback mechanisms that continuously monitor and adjust the body's internal conditions (e.g., temperature regulation, pH, hormone regulation, blood pressure, hemostasis). At times, there can be a disruption (or disruptions) in the feedback loops, creating an imbalance. This homeostatic imbalance can result in a variety of conditions.	~Design or critique a device used to maintain or monitor homeostasis for a human body process (e.g., heart rate, glucose, oxygen level). ~Investigate homeostasis by measuring changes in heart rate. ~Compare resting heart rate to the rate after changing a variable. ~Present data and hypothesize ways to improve heart rates in stressed individuals (e.g., yoga, deep breathing) ~After using a simulation or another data source, discuss how the data are similar to and different from the self regulation that goes on in an actual human body. ~Research the chronic changes in the muscular, circulatory, and respiratory systems in response to starting an exercise

	program. ~Distinguish which kinds of changes result from which kinds of exercise (e.g., aerobic, anaerobic). ~Investigate ways that prions, viruses, bacteria, protozoans and multicellular parasites disturb homeostasis. Give examples of diseases caused by each category. ~Identify examples of how the body uses homeostasis to maintain balance. ~Differentiate between positive and negative feedback mechanisms.
AP.LO.4: Anatomical terminology Standard anatomical position is to be used as a reference point. Each area of the human body is identified by region. The features and structures of the body, relative to each other, are described by directional terms. The body and its organs can be divided by planes. The organs are located in cavities.	~Demonstrate knowledge of anatomical directional terminology through the dissection of a three dimensional object, such as a clay model, doll or gummy bear. ~Label a diagram of a human body with directional terms, planes and cavities.
Materials (may include but not limited to): ● **Textbook** ● **Microscopes** ● **Gel electrophoresis apparatus** ● **Basic Biology Lab Supplies** ● **On-line Simulations i.e. Gizmos** ● **Poster paper** ● **Glue** ● **Scissors** ● **Markers** ● **Colored Pencils** ● **Tape** ● **Misc craft supplies** ● **Models** ● **Specimens** ● **Chromebook** ● **Videos related to topics** ● **Gradecam** ● **Applicable Chromebooks apps**	**How Assessed?** **Assessments may include, but are not limited to:** ● Pre-Assessments (pre-tests, observation, questioning, diagnostics) ● Formative Assessments (entry/exit slips, mini analysis assignments, group work, discussions, homework/classwork, self and peer evaluations, checklists, guided notes, observations,quizzes, conferences, rubrics, lesson review questions, lab reports) ● Summative Assessments (formal essays, using rubrics; tests/exams, project, evaluation, demonstration, lab practicals) **How Re-Taught?** **Re-teaching activities may include, but are not limited to:** ● descriptive feedback on original task/assessment ● student examples of expectations ● modeling ● student self assessments ● manipulatives ● presenting the information again in a different way ● review sessions ● graphic organizers ● small-group instruction ● practice activities ● computer tutorials / programs ● peer tutoring ● breaking down concept into smaller components ● games and hands-on activities ● cooperative learning

	● Universal Design for Learning principles offering students opportunities to experience and engage material in new and different ways

Strand: SUPPORT AND MOTION

Learning Standards:	**How Taught?** **Teaching activities may include, but are not limited to:**
AP.SM.1: Integumentary system The integumentary system consists of skin and accessory structures. The skin is composed of three layers: the epidermis, the dermis and the hypodermis (subcutaneous layer). The accessory structures can include sweat glands, sebaceous glands, arrector pili muscles, hair follicles and nails. Skin functions include protection, temperature regulation, excretion and sensory perception. These occur through the processes of perspiration, skin production and shedding, vitamin D synthesis and repair. Homeostatic imbalances are explored. These include, but are not limited to, burns, skin cancer, anhidrosis, acne, eczema or scleroderma. Investigations are used to understand and explain the integumentary system in a variety of inquiry and design scenarios that can incorporate evolutionary concepts, scientific reasoning, comparative analysis, communication skills and real-world applications.	~Create labeled illustrations or models of skin cells and accessory structures. ~Compare the structure and function of the integument of the major classes of vertebrates. ~Explore the connection between types of cells, accessory structures, and the ability to sense temperature and pressure. ~Use microscopes, micrographs, models or illustrations to identify types of skin cells and accessory structures. ~Describe the process of tissue engineering and tissue donation. ~Describe what attributes need to be considered in order to be a tissue donor. ~List sensory structures in the integumentary system. ~Design a sunscreen that does not kill aquatic wildlife (e.g. corals). ~Design an investigation to compare various sunscreens and homeopathic methods using UV sensitive paper or UV sensitive yeast strains. ~Investigate and present data on the connection between UV/sun exposure and increased incidence of skin cancer. ~Create a presentation or infographic to inform an audience about the risks of, and dispel common myths about, UV exposure. ~Propose a plan to lower the incidence of skin cancer. ~Explore the safety of tanning salons and alternative tanning methods (e.g., spray tanning). ~Explain how UV light from sun or tanning salon exposure increases the risks of skin cancer.
AP.SM.2: Skeletal system The skeletal system is composed of bones, cartilage, joints and ligaments. Bones make up most of the skeleton. There are four main cell types that compose bone tissue, each with a specific function: osteogenic cells, osteocytes, osteoblasts and osteoclasts. The microscopic anatomy of compact bone includes osteons. Bones are classified by their shape. The structure of a typical long bone can be explored. Specific bones of the skeleton can be studied by their subdivisions: the axial skeleton and the appendicular skeleton. Cartilage is found in areas of the nose, ears, ribs and joints. Joints can be classified by structure or by function. The general structure of synovial joints may be explored. Ligaments connect bone to bone, stabilizing joints. The skeletal system provides support for the human body, protects soft organs, allows for movement due to attachment of muscles, stores minerals and fat and forms blood cells. Processes of the skeletal system include hematopoiesis, ossification and bone growth and remodeling. A comparison of male to female, juvenile to adult or human to other vertebrate skeletons may be explored. Homeostatic imbalances are	~Design and create a model of a prosthetic limb that can perform a task (e.g., lift or carry an object). ~Design a bone model with cardstock and tape to meet specific parameters (e.g., strength). ~Compare bone structures in various vertebrates. ~Associate the structure of bones with their function (e.g., hollow bones in birds, fused radio-ulna in frogs). ~Dissection (e.g., chicken legs, pigs, cats) can be used as a point of comparison. ~Measure femur length and perform associated calculations to find height. ~Graph results to compare genders and ages. Create an illustration of a long bone and label all structures. ~Use models or illustrations to identify and name bones and important bony features of the human skeleton. ~Design a better cast for fractures, identifying the materials, type of fixation, etc. ~Create a model of each type of bone and identify features. ~Research gender and age data for common fractures. ~Discuss patterns that emerge. ~Develop explanations for common injuries for given age/gender classifications.

explored. These include, but are not limited to, osteoporosis, malnutrition, fractures, anterior cruciate ligament (ACL) injuries and arthritis. Investigations are used to understand and explain the skeletal system in a variety of inquiry and design scenarios that can incorporate evolutionary concepts, scientific reasoning, comparative analysis, communication skills and real-world applications.	~Develop an action plan to help the elderly prevent bone density loss. Identify, label and describe the types of bones using graphics, images, ~Xray images or lab bone specimens. ~Create an illustration of different stages of bone development and destruction, including fracture repair. ~List and describe factors that affect bone density. ~Design a system to analyze movement/joint stability in specified movements. ~Record (e.g., drawings, video) common athletic movements and identify bones and joints involved and anatomical movement represented. ~Identify the movement involve
AP.SM.3: Muscular system The muscular system consists of three types of muscle cells: skeletal, smooth and cardiac. The primary function of the muscular system is to contract, thereby, moving the body and internal fluids, maintaining posture, generating heat and stabilizing joints. Muscles are controlled voluntarily and/or involuntarily. Heart muscle cells are mononucleated, branched and striated. Intercalated disks are characteristic of cardiac muscle and aid in communication between cardiac muscle cells. Smooth muscle cells, found in the hollow organs and blood vessels, are mononucleated, spindle-shaped and nonstriated. Skeletal muscle cells, found attached to bones and skin, are multinucleated, cylindrical and striated. The muscles of the body can be studied by group, which include the muscles of the head, face and neck, the trunk and the upper and lower limbs. Processes of the muscular system include gross body movements produced by skeletal muscles as they interact with the skeletal system, and muscle contraction. The connection between the nervous system and the skeletal system should be explored through the study of action potentials and the resulting contraction of sarcomeres, as described by the sliding filament theory. Energy processing and muscle responses to stimuli can be studied along with building muscle tissue through exercise. The effects of steroids can also be investigated. Homeostatic imbalances are explored. These include, but are not limited to, muscular dystrophy and atrophy. Investigations are used to understand and explain the muscular system in a variety of inquiry and design scenarios that can incorporate evolutionary concepts, scientific reasoning, comparative analysis, communication skills and real-world applications.	~Design, plan, and conduct an investigation on muscle fatigue using basic exercise equipment (e.g., tennis ball, clothespin, textbook). ~Collect data and analyze. ~Explore muscle fatigue in relation to handedness, gender, height and other factors. ~Provide an example of muscle fatigue and describe the physiology behind it. ~Design and construct an artificial hand from common household items where the fingers flex and extend to perform a task. ~Choose opposing major muscle groups and design an investigation to compare contraction length and/or force. ~Create a presentation describing and differentiating between muscle tissue types. ~Build a model using household items to demonstrate the steps of the sliding filament theory. ~Use microscopes, micrographs, models or illustrations to identify muscle tissue types. ~Define and describe the types of connective tissue. ~Research and present findings over the uses for steroids, risks of use and alternative treatment options. ~Create a presentation to inform the public about the risks of anabolic steroid abuse. ~Research anabolic steroids, their effects on the body, medical applications and risk factors of their use. ~Create a product which describes symptoms, treatments and prognosis for varying muscle disorders. ~Develop a plan to reduce risks and prevent muscle atrophy associated with the disorder. ~Identify common muscle disorders and give common symptoms and treatments.
Materials (may include but not limited to): ● **Textbook** ● **Microscopes** ● **Gel electrophoresis apparatus** ● **Basic Biology Lab Supplies** ● **On-line Simulations i.e. Gizmos** ● **Poster paper** ● **Glue** ● **Scissors** ● **Markers** ● **Colored Pencils**	**How Assessed?** **Assessments may include, but are not limited to:** ● Pre-Assessments (pre-tests, observation, questioning, diagnostics) ● Formative Assessments (entry/exit slips, mini analysis assignments, group work, discussions, homework/classwork, self and peer evaluations, checklists, guided notes, observations,quizzes, conferences, rubrics, lesson review questions, lab reports)

• **Tape** • **Misc craft supplies** • **Models** • **Specimens** • **Chromebook** • **Videos related to topics** • **Gradecam** • **Applicable Chromebooks apps**	• Summative Assessments (formal essays, using rubrics; tests/exams, project, evaluation, demonstration, lab practicals) **How Re-Taught?** **Re-teaching activities may include, but are not limited to:** • descriptive feedback on original task/assessment • student examples of expectations • modeling • student self assessments • manipulatives • presenting the information again in a different way • review sessions • graphic organizers • small-group instruction • practice activities • computer tutorials / programs • peer tutoring • breaking down concept into smaller components • games and hands-on activities • cooperative learning • Universal Design for Learning principles offering students opportunities to experience and engage material in new and different ways

Strand: INTEGRATION AND COORDINATION

Learning Standard:	**How Taught?** **Teaching activities may include, but are not limited to:**
AP.IC.1: Nervous system The nervous system consists of neurons and supporting cells that combine to form nerves, the spinal cord and the brain. The primary functions of the nervous system are sensation, integration and response. A comparison of the structures and functions of the central and peripheral nervous systems should be explored. The central nervous system is composed of the brain and spinal cord. The peripheral nervous system includes the remaining nervous tissue. A neuron consists of dendrites, a cell body and an axon. Neurons conduct electrical impulses along their membranes and at synapses. Brain cells can detect and sometimes respond to these impulses. Neuroglial cells help to support neural function. The brain consists of three major parts: the cerebrum, cerebellum and brainstem. The cerebrum is divided into lobes and hemispheres. Functions of the cerebrum that may be explored include voluntary muscle control, memory, sensory perception, emotions and speech. The cerebellum is primarily responsible for balance and coordination. The brainstem, a part of the autonomic nervous system, includes structural divisions that perform basic life functions such as breathing and heart rate. The spinal cord is a continuation of the brainstem. The spinal cord is a bundle of nerve tracts that transmits nerve signals between the brain and the body through electrical impulses. Nerves are bundles	~Examine the basic design of artificial limbs that integrate with the nervous system to provide the recipient control of the device. ~Design and implement an investigation to measure muscular response to stimuli. ~Compare the structures and functions of the central nervous system with the structures and functions of the peripheral nervous system. ~Identify the main structures and functions of the central nervous system and the peripheral nervous system. ~Construct a 3D model of a neuron that can be used to illustrate anatomy, action potential propagation, simple nerve pathways (reflex arc) and neurotransmitter function. ~Using microscopes, micrographs, models or illustrations, identify the cells of the nervous tissue. ~High school athletes are reported to be more susceptible to brain damage than their peers. Use scientific evidence to support or refute this claim. If this claim is accurate, suggest a possible way to reduce Chronic Traumatic Encephalopathy (CTE) injuries in high school athletes. Use correlations of symptoms caused by brain injuries to critique personal protective equipment (e.g., bicycle helmet, hard hats) and suggest modifications to improve their design. ~Predict the outcome of tumor growth in different regions of the brain. ~Relate the development of the brain to decision-making skills. ~Correlate the relationship between a brain injury occurring in a specific region and the expressed symptoms. ~Determine the validity of left brain/right brain dominance.

of neurons that transmit impulses between the peripheral and central nervous systems. The study of nerves can include sciatic, cranial and spinal nerves. Supporting structures of the central nervous system include the meninges and cerebrospinal fluid which protect the central nervous system. Processes of the nervous system are action potential propagation, simple nerve pathways (reflex arc) and neurotransmitter function. Homeostatic imbalances are explored. These include, but are not limited to, the effects of drugs, mental illnesses, spinal injuries, concussions, meningitis and multiple sclerosis (MS). Investigations are used to understand and explain the nervous system in a variety of inquiry and design scenarios that can incorporate evolutionary concepts, scientific reasoning, comparative analysis, communication skills and real-world applications.	~Determine if the structure and function of the nervous system are similar to the operating system of a computer. Compare the structure of another vertebrate brain (e.g., sheep) to the human brain. ~Use microscopes, micrographs, models or illustrations to identify the main structures of the brain. ~List the functions of the cerebrum, cerebellum and brainstem. ~ Create labeled illustrations or models of the human brain that include structure and function. ~Design an investigation to compare reaction times and reflex times. Measure reaction and reflex times and explain the differences in your recorded data. ~Explain the symptoms of a chosen neurologic disorder based upon the physiology of the disorder. ~Describe how opioids interfere with chemical communication in the brain. ~Predict how a change in membrane potential would impact action potential propagation in an axon. ~Create a model of action potential propagation and/or neurotransmitter function. ~Use graphs of membrane potential vs. time; distinguish between depolarization, repolarization and hyperpolarization
AP.IC.2: Special senses Sense of sight The eye provides visual environmental feedback and includes primary and accessory structures. Light enters through the pupil and is then focused by the lens onto the retina at the visual axis. The optic nerve transmits the electrical impulses to the brain where they are translated. The accessory structures provide lubrication, protection and support to the eye. Processes include stimulation of the photoreceptors (rods and cones) by light. Homeostatic imbalances are explored. These include, but are not limited to, certain types of blindness, conjunctivitis, glaucoma, astigmatism, hyperopia, myopia and cataracts. Investigations are used to understand and explain the sense of sight in a variety of inquiry and design scenarios that can incorporate evolutionary concepts, scientific reasoning, comparative analysis (e.g., squid, falcon, hawks) communication skills and real-world applications.	~Choose a disease causing a homeostatic imbalance to vision. ~Use a picture as a control, and modify the picture to show how the picture would be seen by an individual with the chosen visual disease. ~Design a possible medical device that could alleviate the symptom. ~Examine binocular vision by performing various eye tests. ~Identify common defects of the eye (e.g., astigmatism, color blindness) and their common treatments. ~Investigate a specific neurological effect of aging and explain how this leads to a homeostatic imbalance (e.g., glaucoma, hyperopic). ~Trace the pathway of light through the eye. ~Use microscopes, micrographs, models or illustrations to identify the main structures of the eye, and their functions.
Senses of hearing and balance The ears respond to a range of sounds and provide a sense of equilibrium. The structures include those of the outer, middle and inner ear. Processes of hearing and balance should be explored including the perception of sound and spatial awareness. Homeostatic imbalances are explored. These include, but are not limited to, certain types of hearing loss, otitis media, lack of balance (e.g., vertigo), tinnitus, auditory processing, motion sickness and Meniere's syndrome. Investigations are used to understand and explain the senses of hearing and balance in a variety of inquiry and design scenarios that can incorporate evolutionary concepts, scientific reasoning, comparative analysis, communication skills and real-world applications.	~Choose a disease causing a homeostatic imbalance to the sense of hearing. ~Modify a sound file to illustrate the effects of the damage and suggest possible medical devices that could alleviate the symptoms. ~Use the mechanism by which bats capture prey in darkness to design an assistive technology for visual impairment. ~Examine the evolutionary origin of the bones involved in hearing in mammals from the earliest chordates. ~Explain how the inner ear maintains equilibrium and balance. Investigate a specific neurological effect of aging and explain how this leads to a homeostatic imbalance (e.g., tinnitus). ~Use models or illustrations to identify the main structures in the inner, outer, and middle ear. ~Listen to different tones and identify patterns of hearing ability. ~Describe sensorineural and conductive hearing pathways.
Senses of taste and smell The senses of taste and smell occur primarily in the oral and nasal cavities. The structure of taste buds and olfactory cells are the foundation of taste and smell. The location, structure and afferent pathways of taste and smell receptors should be addressed. Processes include activation of chemoreceptors and transmission of electrical impulses to the brain, where they are integrated. Homeostatic imbalances are explored. These include, but are not limited to, age-related sensitivities, taste preferences, anosmia and	~Design and carry out an investigation to determine how smell and taste are related in the body and how sensory messages to the brain contribute to flavor perception. ~Propose one or more hypotheses to explain why a dog's sense of smell is much more sensitive than a human's. ~Explain how chemoreceptor function is blocked by a chemical such as miraculin or by Gymnema sylvestre tea. ~Use models, illustrations or slides to identify the anatomical structures related to taste and smell (e.g., taste buds, gustatory cells, papillae, cilia).

olfactory auras. Investigations are used to understand and explain the senses of taste and smell in a variety of inquiry and design scenarios that can incorporate evolutionary concepts, scientific reasoning, comparative analysis, communication skills and real-world applications. AP.IC.3: Endocrine system The endocrine system is comprised of glands that secrete hormones resulting in a response in target cells or organs. Glands with their associated hormones may include pituitary, hypothalamus, thyroid, thymus, parathyroid, pineal, pancreas, adrenal, ovaries and testes. The endocrine system results in regulating metabolism, maintaining homeostasis, regulating growth and development, and controlling reproduction through hormonal release. The processes involved in the endocrine system should include a comparison of negative and positive feedback systems. Negative feedback examples can include regulation of blood glucose levels, calcium levels, blood pressure and temperature. Positive feedback examples can include oxytocin in childbirth and hemostasis. Homeostatic imbalances are explored. These include, but are not limited to, hyper- and hypo- functions of glands, diabetes (type I and type II), gigantism and dwarfism. Investigations are used to understand and explain the endocrine system in a variety of inquiry and design scenarios that can incorporate evolutionary concepts, scientific reasoning, comparative analysis, communication skills and real-world applications.	~Examine endocrine system stress responses. ~Analyze the physiological reactions that were experienced during a situation of threat or stress. ~Identify which aspects of the endocrine system created those reactions. ~Use models and/or illustrations to identify the main structures associated with glands and their associated target cells/organs. ~Critique the medical devices used by diabetics to monitor and treat blood sugar and propose solutions to address any identified flaws. ~Analyze patient data to diagnose a hormone imbalance and provide suggestions for treatment. ~Draw examples of negative and positive feedback loops. ~Predict the effect of changes in hormone levels. ~Propose one or more technological or engineering solution(s) to control broad-leafed “weeds” without using potential environmental endocrine disruptors. ~Explain how environmental endocrine disruptors can lead to an increase in the incidence rate of breast cancer in women in developed countries but not in developing countries. ~Research and prepare a poster for peers identifying where they are exposed to environmental endocrine disruptors in their daily lives.
Materials (may include but not limited to): ● **Textbook** ● **Microscopes** ● **Gel electrophoresis apparatus** ● **Basic Biology Lab Supplies** ● **On-line Simulations i.e. Gizmos** ● **Poster paper** ● **Glue** ● **Scissors** ● **Markers** ● **Colored Pencils** ● **Tape** ● **Misc craft supplies** ● **Models** ● **Specimens** ● **Chromebook** ● **Videos related to topics** ● **Gradecam** ● **Applicable Chromebooks apps**	**How Assessed?** **Assessments may include, but are not limited to:** ● Pre-Assessments (pre-tests, observation, questioning, diagnostics) ● Formative Assessments (entry/exit slips, mini analysis assignments, group work, discussions, homework/classwork, self and peer evaluations, checklists, guided notes, observations,quizzes, conferences, rubrics, lesson review questions, lab reports) ● Summative Assessments (formal essays, using rubrics; tests/exams, project, evaluation, demonstration, lab practicals) **How Re-Taught?** **Re-teaching activities may include, but are not limited to:** ● descriptive feedback on original task/assessment ● student examples of expectations ● modeling ● student self assessments ● manipulatives ● presenting the information again in a different way ● review sessions ● graphic organizers ● small-group instruction ● practice activities ● computer tutorials / programs ● peer tutoring

	● breaking down concept into smaller components ● games and hands-on activities ● cooperative learning ● Universal Design for Learning principles offering students opportunities to experience and engage material in new and different ways

Strand: TRANSPORT

Learning Standard:	**How Taught?** **Teaching activities may include, but are not limited to:**
AP.T.1: Blood Blood is composed of plasma and the formed elements: red blood cells (erythrocytes), white blood cells (leukocytes), and platelets (thrombocytes). The primary functions of blood are transportation, protection and regulation. Plasma, the most abundant component of blood, is the liquid portion that transports dissolved nutrients, waste, hormones, antibodies and proteins throughout the body. Red blood cells carry oxygen used during cellular processes throughout the body. White blood cells identify and protect the body against infectious disease and foreign cells. Platelets bind together when a blood vessel is damaged resulting in blood clot formation.	~Create a graphic organizer to illustrate the differentiation of stem cells into white blood cells, red blood cells and lymphocytes. ~Compare and contrast the genes that code for hemoglobin in humans and mice. ~Create labeled illustrations or models of the components of whole blood. Identify the structure and function of red blood cells (erythrocytes). ~Describe the process of hemostasis. ~Explain the function of blood and each of the components of whole blood. ~Design a process to identify unknown blood types to determine transfusion compatibility or paternity.
The major ABO blood types, A, B, AB and O, are determined by the presence or absence of antigens on the surface of red blood cells. An additional antigen is present or absent on the surface of red blood cells determining Rh factor. Blood type antibodies are found in plasma. Processes related to blood include the production of blood cells and platelets, and hemostasis. Homeostatic imbalances are explored. These include, but are not limited to, sickle cell anemia, hemophilia,	~Propose one or more hypotheses to explain the global distribution of the ABO blood groups in humans. ~Investigate the process of agglutination and describe its consequences. ~Create a global distribution map of the frequency of the ABO blood groups among native, human populations. ~Prepare blood transfusion guidelines that a medical assistant can use to understand which patients can receive which type(s) of blood and why blood typing is important for blood transfusions. ~Include the concepts of “universal donor” and “universal recipient”. ~Identify ABO phenotypes and genotypes. ~Identify Rh phenotypes and genotypes. Use Punnett squares to explain the inheritance of blood types. ~Create a labeled illustration or model of blood to explain the relationship between antigens, antibodies and blood type (e.g., ABO/Rh).

deep vein thrombosis, leukemia and lymphoma. Investigations are used to understand and explain blood in a variety of inquiry and design scenarios that can incorporate evolutionary concepts, scientific reasoning, comparative analysis, communication skills and real-world applications.	~Compare the original distribution of sickle-cell anemia in human populations with the global distribution of malaria. ~Propose one or more hypotheses to explain the distributions and make predictions based on your hypotheses. Note: Sickle-cell anemia is a disease found among the descendants of people originally from areas where malaria is or has been common. Avoid the misconception that sickle cell anemia is linked to one particular race. ~Diagnose homeostatic imbalances (e.g., anemia, sickle-cell anemia, leukemia, sepsis) by analyzing laboratory data (e.g., blood sample, patient symptoms, family history). ~Construct a pedigree of a family history and create a genetic counseling plan to advise the patient and family. ~Explain the role of hemoglobin.
AP.T.2: Cardiovascular system The cardiovascular system consists of the heart and blood vessels. The heart is mostly comprised of cardiac muscle which is supplied with oxygenated blood by coronary arteries. The structure of the heart includes four chambers, four valves and major vessels leading to and from the heart. The flow of blood through the heart, pulmonary and systemic circuits should be explored. Blood flows from arteries, to arterioles, to capillaries, to venules, then to veins. In the capillaries, oxygen, nutrients, and chemical messengers diffuse out (leave) and carbon dioxide and other waste products diffuse in (enter). Veins have valves that keep the blood flowing toward the heart. The primary function of the cardiovascular system is the transport of oxygen, carbon dioxide, hormones, nutrients, waste products and chemical messengers. Processes involved in the cardiovascular system include the cardiac cycle and cardiac and conductive pathway which is measured by electrocardiograms and blood pressure. Homeostatic imbalances are explored. These include, but are not limited to, a variety of cardiovascular diseases and structural imperfections of the heart, valves and vessels. Examples include, but are not limited to, myocardial infarction, aneurysm, atherosclerosis, hypertrophic cardiomyopathy, hypo/hypertension and arrhythmias. Investigations are used to understand and explain the cardiovascular system in a variety of inquiry and design scenarios that can incorporate evolutionary concepts, scientific reasoning, comparative analysis, communication skills and real-world applications.	~Critique available artificial heart and valve products. ~Investigate the structures and function of the human heart by dissecting a sheep heart, which is similar in structure and function. ~Trace the flow of blood through the vessels, valves, and chambers of the heart and explore the role the organ plays in the propulsion of blood through the pulmonary and systemic circuits. ~Dissect various vertebrate hearts to compare mammalian hearts with those of birds (4-chambered), amphibians (3-chambered) and fish (2-chambered). ~Use findings to develop an understanding of the function of the 4-chambered heart to support endothermic organisms. ~Based on labeled illustrations, explain the components needed for an artificial heart and/or its components. ~Create labeled illustrations or models to describe the pathway of blood through the valves, chambers and major vessels of the heart. Create labeled illustrations or models to describe the pathway of blood through the pulmonary and systemic circuits. ~Identify the functions of the cardiovascular system. ~Describe the relationship between the structure and specialized function of cardiac muscle cells. ~Create labeled illustrations, models, or written descriptions to differentiate between arteries, arterioles, capillaries, venules and veins in terms of structure and function. ~Identify the cells and tissues of the cardiovascular system. ~Manipulate and measure cardiac output to investigate the relationship between heart rate, volume and cardiac output. ~Diagnose homeostatic imbalances by analyzing signs and symptoms, laboratory data, ECG/EKGs and imaging studies. ~Diagnose an individual by analyzing an electrocardiogram. ~Create labeled illustrations or models of congenital cardiovascular defects and explain how they disrupt normal cardiac function. ~Identify the components of cardiac output. ~Explain the relationship between heart rate, volume and cardiac output. ~Match electrocardiogram (ECG/EKG) waves to events in the cardiac cycle. ~Describe the features of an electrocardiogram (ECG/EKG) used to identify homeostatic imbalances. ~Identify homeostatic imbalances of the cardiovascular system.
AP.T.3: Lymphatic and immune system The lymphatic system includes lymph, lymphatic vessels, lymph nodes and the immune system. The lymphatic system has multiple, interrelated functions. They include the removal of fluid from tissues, absorption of large fatty acids in small intestines and transport of white blood cells to the lymph nodes. The immune system consists of white blood cells that destroy foreign antigens. Tissue fluid that has entered into lymphatic capillaries becomes lymph. Multiple lymphatic capillaries form lymphatic vessels. As lymph circulates through the body, it passes through multiple lymph nodes. These lymph nodes contain lymphocytes which destroy foreign antigens. Processes of the	~Explain how antibiotic resistance arises in a microbial population using insights from an understanding of evolution through natural selection. ~Create a public service announcement highlighting the benefits of vaccinations for children, including risks to the population at large. ~Compare the treatment of bacterial and viral infections. Include concepts of nonspecific and specific resistance. ~Create labeled illustrations or models of the cells of the immune system. ~Explain how the immune system works. ~Describe the uses for Enzyme-Linked Immunosorbent Assay

lymphatic system include defense through nonspecific and specific resistance. Examples of nonspecific resistance include mechanical barriers such as the skin, enzymes, species resistance and mucous membranes. In specific resistance, antibodies are produced that defend the body against foreign antigens. Memory cells are produced following an infection that allow for possible immunity against a specific antigen upon re-exposure. A comparison of primary versus secondary immune responses can be explored. Homeostatic imbalances are explored. These include, but are not limited to, autoimmune disorders, parasitic diseases, allergies, bacterial versus viral infections and ringworm. Vaccinations provide the body with either long-term protection or short-term protection against many pathogens. Investigations are used to understand and explain the lymphatic system in a variety of inquiry and design scenarios that can incorporate evolutionary concepts, scientific reasoning, comparative analysis, communication skills and real-world applications	(ELISA). Identify and describe the structures and functions of the lymphatic system. ~Create a flowchart to demonstrate the circulation of lymph throughout the body. ~Design an experiment to test the effectiveness of antibacterial products. ~Create a community education campaign to increase awareness about the transmission of insect transmitted diseases, their causes and prevention. ~Critique the effectiveness of tonsil removal on infection rates. ~Design a model to demonstrate the spread of a pathogen throughout a population. ~Describe the mechanisms of autoimmune responses.
Materials (may include but not limited to): ● **Textbook** ● **Microscopes** ● **Gel electrophoresis apparatus** ● **Basic Biology Lab Supplies** ● **On-line Simulations i.e. Gizmos** ● **Poster paper** ● **Glue** ● **Scissors** ● **Markers** ● **Colored Pencils** ● **Tape** ● **Misc craft supplies** ● **Models** ● **Specimens** ● **Chromebook** ● **Videos related to topics** ● **Gradecam** ● **Applicable Chromebooks apps**	**How Assessed?** **Assessments may include, but are not limited to:** ● Pre-Assessments (pre-tests, observation, questioning, diagnostics) ● Formative Assessments (entry/exit slips, mini analysis assignments, group work, discussions, homework/classwork, self and peer evaluations, checklists, guided notes, observations,quizzes, conferences, rubrics, lesson review questions, lab reports) ● Summative Assessments (formal essays, using rubrics; tests/exams, project, evaluation, demonstration, lab practicals) **How Re-Taught?** **Re-teaching activities may include, but are not limited to:** ● descriptive feedback on original task/assessment ● student examples of expectations ● modeling ● student self assessments ● manipulatives ● presenting the information again in a different way ● review sessions ● graphic organizers ● small-group instruction ● practice activities ● computer tutorials / programs ● peer tutoring ● breaking down concept into smaller components ● games and hands-on activities ● cooperative learning ● Universal Design for Learning principles offering students opportunities to experience and engage material in new and different ways

Strand: ABSORPTION AND EXCRETION

Learning Standard:	**How Taught?** **Teaching activities may include, but are not limited to:**
AP.AE.1: Digestive system The digestive system consists of the gastrointestinal tract (alimentary canal) as well as various accessory organs including the teeth, tongue, salivary glands, liver, gallbladder and pancreas. The digestive system processes and supplies the molecules needed to sustain the living tissues within the body through the absorption of nutrients. Six major functions of the digestive system include secretion, ingestion, mechanical processing, enzymatic digestion, absorption and excretion. The lining of the digestive system protects surrounding tissues from the mechanical and enzymatic stresses of the digestive process. Processes of the digestive system include the mechanical and chemical breakdown of food into small molecules which are then absorbed by the digestive tract. Specific actions within the digestive system include mastication, peristalsis, segmentation and the release of hormones and enzymes necessary for digestion. The metabolic functions of the accessory organs play strategic roles in the breakdown of food products, the maintenance of glucose levels within the blood and the regulation of homeostasis in the body. Indigestible material is excreted as waste. Homeostatic imbalances are explored. These include, but are not limited to, conditions such as gallstones, heartburn, ulcers, dehydration, diarrhea, cirrhosis and cancers of the digestive system. Investigations are used to understand and explain the digestive system in a variety of inquiry and design scenarios that can incorporate evolutionary concepts, scientific reasoning, comparative analysis, communication skills and real-world applications.	~Propose a procedure as a potential cure for cirrhosis or ulcers using tissue engineering techniques. ~Explore the types of bariatric surgeries and compare their safety and effectiveness to determine whether this is an effective weight loss solution. Explain the advantages and disadvantages. ~Investigate the relative lengths of the alimentary canal of various vertebrates with differing diets. ~Propose hypotheses to explain the relationship between relative length and diet. ~Design models of mechanical and chemical digestion using varied materials. ~Compare the efficiency of human digestion and ruminant digestion. ~Assess the claim that probiotic foods are healthy. Provide evidence to support or refute this claim. ~Journal daily food choices and relate it to the current USDA Choose My Plate recommendations. ~Explain how bariatric surgery impacts the digestive system. ~Explain how hydrochloric acid (HCl) in the stomach aids in digestion and provides protection from pathogens. ~Trace food from the mouth to the anus and describe what happens in each region. ~Describe the structure and function of accessory digestive organs. ~Explain the role of a specific enzyme in the digestive process. Include where it is produced, where it enters the alimentary canal, the pH range in which it works best, the types of molecules it chemically digests and what products the chemical breakdown forms. ~Distinguish mechanical from chemical digestion. ~Identify the regions of the stomach and their functions. ~Identify tissue and cell types in digestive and accessory organs using microscopes, slides, micrographs, models or illustrations. ~Trace food from the mouth to the anus and describe what happens in each region. ~Describe the structure and function of accessory digestive organs. ~Explain the role of a specific enzyme in the digestive process. ~Include where it is produced, where it enters the alimentary canal, the pH range in which it works best, the types of molecules it chemically digests and what products the chemical breakdown forms. ~Distinguish mechanical from chemical digestion. ~Identify the regions of the stomach and their functions.
AP.AE.2: Respiratory system The respiratory system is comprised of the airways, lungs and diaphragm. The airways include the nasal and oral cavities, pharynx, larynx, trachea, bronchi, bronchioles and alveoli. The respiratory system transports and exchanges gasses including oxygen and carbon dioxide. Processes involved in the respiratory system include respiration mechanics and gas exchange. Respiration mechanics is the process by which humans breathe and includes the movement of the diaphragm and pressure-volume relationships. Gas exchange refers to the diffusion of gas across the alveolar epithelium in the respiratory system and capillary endothelium of the cardiovascular system. Lung volumes and capacities can be measured using spirometry. Homeostatic imbalances are explored. These include, but are not limited to, asthma, chronic obstructive pulmonary disease (COPD), tuberculosis, cystic fibrosis and the effects of smoking and pollution. Investigations are used to understand and explain the respiratory system in a variety of inquiry and design scenarios	~Explain mammalian (including human) respiration by comparing it to the respiratory anatomy and physiology of the other major vertebrate groups (e.g., cephalochordates/urochordates, fish, amphibians, amniotes). ~Identify sections of the respiratory tree by histological slides/images. ~Explain how the structure in each portion of the respiratory tree supports its function. ~List the normal respiratory volumes. Explain what factors alter respiratory volumes. ~Name muscles used for inspiration and expiration. ~Investigate factors which alter respiratory volumes. ~Compare breathing in obstructive and restrictive diseases (e.g., simulate obstructive disease by wrapping a belt around the chest and tightening appropriately, simulate restrictive disease by pursing lips around a straw). ~Collect data on respiratory volumes during obstructive and restrictive respiratory disorders (e.g., use a tape measure to measure the thoracic cavity as an estimate of volume). ~Interpret spirometry data and match it to the appropriate “patients”; normal, asthmatic, smoker, athlete. Provide evidence to support your claim.

that can incorporate evolutionary concepts, scientific reasoning, comparative analysis, communication skills and real-world applications. **AP.AE.3: Urinary system** The urinary system is a regulatory system that helps maintain homeostasis. The structures of the urinary system include the kidneys, ureters, bladder and urethra. Each kidney consists of the renal cortex, medulla and renal pyramids. The functional unit of the kidney is the nephron. The renal pelvis is a funnel-shaped chamber that is connected to the ureter. The primary functions of the urinary system are excretion, elimination and regulation of blood volume and pressure. Processes of the urinary system include filtration, reabsorption and secretion, which occurs in the nephrons. Urine is normally a clear, yellow, sterile solution but the composition can vary slightly between individuals. Urinalysis is a diagnostic tool for detecting substances and conditions in the body. Antidiuretic hormone (ADH) and aldosterone hormones influence the volume and concentration of urine. Caffeine and alcohol act as diuretics and can lead to short or long-term kidney issues. Homeostatic imbalances are explored. These include, but are not limited to, urinary tract infections, kidney stones, nephritis and acute and chronic kidney disease. Investigations are used to understand and explain the urinary system in a variety of inquiry and design scenarios that can incorporate evolutionary concepts, scientific reasoning, comparative analysis, communication skills and real-world applications.	~Investigate local air quality and asthma or other pulmonary disease rates. Formulate an argument for how the air quality in an area impacts local respiratory health. ~Explain the physiological effects and damages caused by PM 2.5 particles generated by the combustion of fossil fuels. ~Design a device to improve the respiratory function in athletes. ~Perform an investigation to compare pre- and post- exercise data (e.g., breathing rate, depth, tidal volume) ~Differentiate between tidal volume and breathing rate. Explain how to determine breathing rate and depth. ~Design a device that serves as a “mini dialysis” machine to be used in patients with renal failure. List and discuss the limitations. ~Design a model using dialysis tubing and some common solute to demonstrate the movement of wastes from interstitial fluid to the renal tube. Match representative urine lab values (concentrations) with mock patient scenarios for a condition (e.g., high ADH, dehydration, excess coffee, urinary tract infection, diuretics). Create a treatment plan for the patient. ~Illustrate filtration, secretion and reabsorption of ions/molecules in the kidney. ~Explain the relationship between the renal system and other organ systems (e.g., vascular). Include complications of renal failure. ~Interpret lab values to determine what ions/proteins need to be altered during dialysis. ~Create a pamphlet that explains the impact of diet on blood chemistry and how that affects kidney function, especially in those on dialysis. Compare the functions of current hemodialysis machines with the actual kidneys. ~Illustrate or describe the roles of osmosis and diffusion in the process of urine formation. ~Trace the formation of urine through the processes of osmosis and diffusion. ~Describe the basic physiological processes accomplished by the nephron (filtration, reabsorption, secretion). ~Describe the process by which the body eliminates excess fluids. Identify normal urine concentrations. ~Illustrate or describe the roles of osmosis and diffusion in the process of urine formation. ~Explain how molecules/hormones influence the body’s hydration status. Identify the impacts of drinking too much water (i.e., hyperhydration). ~Describe the gross and histological structure of the urinary bladder. ~Relate the structure of the urinary bladder to its function.
Materials (may include but not limited to): ● **Textbook** ● **Microscopes** ● **Gel electrophoresis apparatus** ● **Basic Biology Lab Supplies** ● **On-line Simulations i.e. Gizmos** ● **Poster paper** ● **Glue** ● **Scissors** ● **Markers** ● **Colored Pencils** ● **Tape** ● **Misc craft supplies** ● **Models** ● **Specimens** ● **Chromebook** ● **Videos related to topics**	**How Assessed?** **Assessments may include, but are not limited to:** ● Pre-Assessments (pre-tests, observation, questioning, diagnostics) ● Formative Assessments (entry/exit slips, mini analysis assignments, group work, discussions, homework/classwork, self and peer evaluations, checklists, guided notes, observations,quizzes, conferences, rubrics, lesson review questions, lab reports) ● Summative Assessments (formal essays, using rubrics; tests/exams, project, evaluation, demonstration, lab practicals)

● **Gradecam** ● **Applicable Chromebooks apps**	**How Re-Taught?** **Re-teaching activities may include, but are not limited to:** ● descriptive feedback on original task/assessment ● student examples of expectations ● modeling ● student self assessments ● manipulatives ● presenting the information again in a different way ● review sessions ● graphic organizers ● small-group instruction ● practice activities ● computer tutorials / programs ● peer tutoring ● breaking down concept into smaller components ● games and hands-on activities ● cooperative learning ● Universal Design for Learning principles offering students opportunities to experience and engage material in new and different ways

Strand: REPRODUCTION

Learning Standard:

AP.R.1: Reproductive system The reproductive system is comprised of internal and external organs and hormones. The ovaries and testes produce gametes that fuse to form a zygote, a single cell that develops into an embryo and eventually an adult. A comparison of male and female anatomy should be explored. The female body has the function of providing protection and nourishment for the developing fetus until birth. If all is successful, a new generation of offspring will occur. The processes of the reproductive system include oogenesis, spermatogenesis and fertilization. Additional processes can include lactation and menstruation. Homeostatic imbalances are explored. These include, but are not limited to, infertility, chromosomal disorders, endometriosis, cancer, Human Papillomavirus (HPV), and sexually transmitted diseases (STD's). Investigations are used to understand and explain the reproductive system in a variety of inquiry and design scenarios that can incorporate evolutionary concepts, scientific reasoning, comparative analysis, communication skills and real-world applications.

How Taught?
Teaching activities may include, but are not limited to:

~Design an artificial womb (ectogenesis) that could support embryonic life.
~Examine how environmental variables can impact sea urchin fertilization.
~Interpret information from a case study to discuss the misconception that all menstrual cycles last 28 days.
~Design a poster or similar graphic to inform peers of the global, human population over the last 5,000 years.
~Identify the structures of the male reproductive system and the functions of each structure.
~Identify the structures of the female reproductive system and the functions of each structure.
~Explain the pathway of a gamete through each reproductive system.
~Compare the processes of oogenesis and spermatogenesis.
~Design an artificial womb (ectogenesis) that could support embryonic life.
~Examine how environmental variables can impact sea urchin fertilization.
~Interpret information from a case study to discuss the misconception that all menstrual cycles last 28 days.
~Identify the structures of the male reproductive system and the functions of each structure.
~Identify the structures of the female reproductive system and the functions of each structure.
~Explain the pathway of a gamete through each reproductive system.
~Compare the processes of oogenesis and spermatogenesis.

Materials (may include but not limited to):

- **Textbook**
- **Microscopes**
- **Gel electrophoresis apparatus**
- **Basic Biology Lab Supplies**
- **On-line Simulations i.e. Gizmos**
- **Poster paper**
- **Glue**
- **Scissors**
- **Markers**
- **Colored Pencils**
- **Tape**
- **Misc craft supplies**
- **Models**
- **Specimens**
- **Chromebook**
- **Videos related to topics**
- **Gradecam**
- **Applicable Chromebooks apps**

How Assessed?
Assessments may include, but are not limited to:

- Pre-Assessments (pre-tests, observation, questioning, diagnostics)
- Formative Assessments (entry/exit slips, mini analysis assignments, group work, discussions, homework/classwork, self and peer evaluations, checklists, guided notes, observations,quizzes, conferences, rubrics, lesson review questions, lab reports)
- Summative Assessments (formal essays, using rubrics; tests/exams, project, evaluation, demonstration, lab practicals)

How Re-Taught?
Re-teaching activities may include, but are not limited to:

- descriptive feedback on original task/assessment
- student examples of expectations
- modeling
- student self assessments
- manipulatives
- presenting the information again in a different way
- review sessions
- graphic organizers
- small-group instruction

	• practice activities • computer tutorials / programs • peer tutoring • breaking down concept into smaller components • games and hands-on activities • cooperative learning • Universal Design for Learning principles offering students opportunities to experience and engage material in new and different ways

Strand: DNA Biotechnology

Learning Standards:	**How Taught?** **Teaching activities may include, but are not limited to:**
B.H.1: Cellular genetics Life is specified by genomes. Each organism has a genome that contains all the biological information needed to develop and maintain that organism. The biological information contained in a genome is encoded in its deoxyribonucleic acid (DNA) and is divided into discrete units called genes. Genes code for proteins. Different parts of the genetic instructions are used in different types of cells, influenced by the cell's environment and history. The many body cells in an individual can be very different from one another, even though they are all descended from a single cell and thus have essentially identical genetic instructions. (AAAS)	~Discuss ways that human genetic information can be used (e.g., ancestry, health) and the ethical implications of using this information. ~Using information from the Human Genome Project, show how DNA testing companies have developed and what information is used to show how people are related. ~Explain how all cells, except gametes, in a specific organism have identical genetic information (DNA) but have different functions. ~Compare the information that is provided by various commercial genetic testing companies and determine how it can be used. ~Describe the central dogma (DNA to RNA to protein) and its relationship to heredity
B.H.5: Modern genetics Technological developments that lead to the current knowledge of heredity are introduced for study. The development of the model for DNA structure was the result of experimentation, hypothesis, testing, statistical analysis and technology as well as the studies and ideas of many scientists. James Watson and Francis Crick developed the current model based on the work of Rosalind Franklin and others. Scientists continue to extend the model and use it to devise technologies to further our understanding and application of genetics. The emphasis is not on the memorization of specific steps of gene technologies, but rather on the interpretation and application of the results.	~Research current genetic engineering practices (e.g., Clustered Regularly Interspaced Short Palindromic Repeats [CRISPR], GMO, specially modified bacteria, cloning, epigenetic technology). ~Evaluate the implications of implementing genetic engineering practices. ~Using knowledge of genetic technology, create a proposal for the design of a product to solve a current world problem (e.g., golden rice, oil eating bacteria, insulin-producing bacteria, pigs for producing human organs). ~Given a problem (e.g., diseases, hunger, pests, water concerns), propose a solution that uses genetic technology (e.g., specially modified bacteria, GMO, CRISPR, epigenetic technology) and defend your reasoning. ~Use electrophoresis (actual or virtual) technology to evaluate DNA results (e.g., crime scene analysis, paternity, phylogenetic relationships). ~Explain how electrophoresis is used to evaluate DNA results (e.g., crime scene analysis, paternity, phylogenetic relationships). ~Create a timeline of the significant discoveries in genetics. ~Explain what a transgenic organism is and it's benefit to society (pGLO lab)

Materials (may include but not limited to):

- **Textbook**
- **Microscopes**
- **Gel electrophoresis apparatus**
- **Basic Biology Lab Supplies**
- **On-line Simulations i.e. Gizmos**
- **Poster paper**
- **Glue**
- **Scissors**
- **Markers**
- **Colored Pencils**
- **Tape**
- **Misc craft supplies**
- **Models**
- **Specimens**
- **Chromebook**
- **Videos related to topics**
- **Gradecam**
- **Applicable Chromebooks apps**

How Assessed?
Assessments may include, but are not limited to:

- Pre-Assessments (pre-tests, observation, questioning, diagnostics)
- Formative Assessments (entry/exit slips, mini analysis assignments, group work, discussions, homework/classwork, self and peer evaluations, checklists, guided notes, observations,quizzes, conferences, rubrics, lesson review questions, lab reports)
- Summative Assessments (formal essays, using rubrics; tests/exams, project, evaluation, demonstration, lab practicals)

How Re-Taught?
Re-teaching activities may include, but are not limited to:

- descriptive feedback on original task/assessment
- student examples of expectations
- modeling
- student self assessments
- manipulatives
- presenting the information again in a different way
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- Universal Design for Learning principles offering students opportunities to experience and engage material in new and different ways