ELMWOOD PARK PUBLIC SCHOOLS

OFFICE OF CURRICULUM AND INSTRUCTION

ANATOMY AND PHYSIOLOGY

Grades 11 & 12

5 credits

ABSTRACT

Anatomy and Physiology is a science course designed for students who are considering enrolling in a post-secondary program with emphasis on the life and/or health science fields. The course focuses on important concepts in comparative anatomy and physiology, including the muscular, skeletal, digestive, circulatory, integumentary, respiratory, and nervous systems of the body. The dissection of higher-level mammals is used as a tool for comparative analysis of the major body systems. Major emphasis is placed on science literacy with strong connections to mathematical practices of analyzing and interpreting data. The performance expectations are on current relevant aspects of biological and medical science with an emphasis on using engineering and technological concepts by designing solutions to challenges facing human society.

Born on and BOE approved: August 24, 2021
Aligned to NJSLS 2020

UNIT #: *Unit Title* Number of Days	**Unit 1:** *Levels of Organization* 30 Days	**Unit 2:** *Support and Movement* 30 Days	**Unit 3:** *Integration and Control Systems* 25 Days
STAGE 1: DESIRED RESULTS ***What will students understand as a result of the unit? What are the BIG ideas?***			
ESTABLISHED GOALS: *(NJSLS-Science)*	**Life Science** HS-LS1-1 HS-LS1-2 HS-LS1-3 HS-LS1-4 HS-LS1-6 HS-LS4-1 **Engineering** HS-ETS1-1 HS-ETS1-2 HS-ETS1-3 HS-ETS1-4 **Technology** 8.1.12.A.3 8.1.12.C.1 8.1.12.D.1 8.1.12.D.2 8.1.12.F.1 8.2.12.E.1 **Career Readiness, Life Literacies, and Key Skills** 9.2.12.CAP.3 9.4.12.CI.1 9.4.12.CT.2 9.4.12.IML.2 9.4.12.IML.3	**Life Science** HS-LS1-1 HS-LS1-2 HS-LS1-3 HS-LS1-4 HS-LS4-1 **Engineering** HS-ETS1-1 HS-ETS1-2 HS-ETS1-3 HS-ETS1-4 **Technology** 8.1.12.A.3 8.1.12.C.1 8.1.12.D.1 8.1.12.D.2 8.1.12.F.1 8.2.12.E.1 **Career Readiness, Life Literacies, and Key Skills** 9.2.12.CAP.3 9.4.12.CI.1 9.4.12.CT.2 9.4.12.IML.2 9.4.12.IML.3 9.4.12.IML.4	**Life Science** HS-LS1-1 HS-LS1-2 HS-LS1-3 HS-LS1-4 HS-LS4-1 **Engineering** HS-ETS1-1 HS-ETS1-2 HS-ETS1-3 HS-ETS1-4 **Technology** 8.1.12.A.3 8.1.12.C.1 8.1.12.D.1 8.1.12.D.2 8.1.12.F.1 8.2.12.E.1 **Career Readiness, Life Literacies, and Key Skills** 9.2.12.CAP.3 9.4.12.CI.1 9.4.12.CT.2 9.4.12.IML.2 9.4.12.IML.3 9.4.12.IML.4

	9.4.12.IML.4 9.4.12.IML.7 9.4.12.TL.3	9.4.12.IML.7 9.4.12.TL.3	9.4.12.IML.7 9.4.12.TL.3
ENDURING UNDERSTANDINGS: *(Students will understand that . . .)*	• Systems of specialized cells within organisms help them perform the essential functions of life. • All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. • Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. • Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system.	• Knowledge of membranes is essential to understanding how the body controls interaction between internal and external environments. • Hierarchy and organization of integumentary tissue and structures relate to their functions. • Systems of specialized cells within organisms help them perform the essential functions of life. • The interdependence of the muscular and skeletal systems structure and function in muscle and muscles controls movement in the human body. • Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage positive feedback or discourage negative feedback based on what is	• Systems of specialized cells within organisms help them perform the essential functions of life. • The brain, spinal cord and endocrine system are the three controlling systems of the body. Each system plays a specific role but all systems work together to provide homeostasis. • The endocrine system controls reproduction, growth and development, body defenses, metabolic processes, and blood chemistry. Through the use of hormones, the endocrine system maintains homeostasis. • Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) based on what is going on inside the living system.

		going on inside the living system.	
ESSENTIAL QUESTIONS: *(What provocative questions will foster inquiry, understanding, and transfer of learning?)*	1. How does the structure of an organism enable life's functions? 2. What are body landmarks, cavities, and regions? 3. How do organisms maintain internal stability with ever changing internal and external stimuli? 4. What are the characteristics of organic molecules? 5. What functional abilities do all cells exhibit? 6. How does a multicellular organism develop based on how cells grow and reproduce? 7. How do different body systems depend on one another in order to function?	1. How does the skin help to regulate body temperature? 2. What are the factors that determine skin color and what is the function of melanin? 3. How is the skin affected by disease and external environmental factors? 4. Why is skeletal structure so important to the body? 5. How does the structure of muscle tissue relate to its function? 6. How do muscles control movement? 7. How does the organization of the muscular system promote muscle function?	1. How does the nervous system control all systems of the human body? 2. What are the structural and functional classifications of the nervous system? 3. What happens when the nervous system does not work properly? 4. How do drugs affect the nervous system? 5. What are the general types of sensory receptors and how does sensation occur? 6. What types of stimuli excite pain receptors? 7. What influence does the endocrine system have on growth, development, and sexual maturation?
STAGE 2: ASSESSMENT EVIDENCE ***What evidence will be collected to determine whether or not the understandings have been developed, the knowledge and skills attained, and the state standards met? [Anchor the work in performance tasks that involve application, supplemented as needed by prompted work, quizzes, observations, etc.]***			
PERFORMANCE TASKS: *(Through what authentic performance tasks will students demonstrate the desired understandings?)* *(By what criteria will performances of understanding be judged?)*	• Use a model of a human torso to identify levels of structural hierarchy, anatomical positions, and directional terms. • Conduct a comparative histological microscopy investigation, construct a lab	• Conduct a microscopic anatomy investigation that examines epithelial, muscular, nervous, and connective tissue. Write a lab report based on analysis and justify your conclusions. • Research, plan, and conduct an	• Use a model to illustrate the basic structure of the nervous system and describe the functions of various neural cells. • Compare the human nervous system to other organisms using a virtual lab and/or sheep brain dissection with illustrations and

	report and argue from evidence similarities and difference of tissue types. ● Design a model that would demonstrate the function of kidney dialysis; argue from evidence the concepts of concentration gradient and equilibrium. ● Research a career in health and medical science; deliver a presentation that explores individual and society benefits. ● Research, plan, and design a coating for a drug that would strategically be delivered to the targeted area argue from evidence how chemical reactions in the body are important in the medicine. ● Create a model of one of the organic molecules and argue from evidence how the atomic interactions influence chemical reactions in the body. ● Use animations and interactive programs to explore cellular processes; cell cycle, transcription and translation.	investigation on the relationship between UV radiation and cell damage. ● Use a model to conduct an investigation into the integumentary system. Argue from evidence the protective nature of this system. ● Use a model (paper or online) to conduct an investigation into the structure, features, articulations, and actions of the bones and joints. ● Collaboratively create a model that demonstrates how joints are classified by movement. ● Conduct an investigation into action potential using a virtual physiology lab. Use a model to identify three phases of a muscle twitch. ● Conduct an investigation into the origin, insertion, action, and innervations of major muscle groups, may be virtual interactive or dissection with practical. ● Create a model that would demonstrate knowledge of support and movement such as a working prosthetic limb. Demonstrate how scientific knowledge builds on itself to benefit society.	case studies of the human brain. ● Research brain and nervous system disease case studies and argue from evidence causes, treatment, and impact of cost and benefit of research on society. ● Use a model to illustrate the major regions of the spinal cord and major nerves. ● Conduct a reflex action investigation of the basic properties of neuronal conduction and sensitivity to various stimuli and use class data to construct a report of findings. ● Conduct an investigation on taste/smell and map locations of various taste sensations. Map various sensations of skin for heat, cold, pressure and pain. ● Conduct an investigation to study visual blind spot, dominant eye, accommodation, near vision point, and afterimages. ● Conduct an investigation to explain how mechanical sound vibrations are translated into nerve impulses. Design a hearing test that analyzes class hearing data. ● Engage in an activity on the endocrine system that pairs hormones with their corresponding receptor then perform activity to communicate experience to class.
OTHER EVIDENCE: *(Through what other evidence (e.g.*	● Benchmark assessment ● Research papers	● Benchmark assessment ● Research papers	● Benchmark assessment ● Research papers

quizzes, tests, academic prompts, observations, homework, journals) will students demonstrate achievement of the desired results?) *(How will students self-assess their learning?)*	• Lab reports • Tests/Quizzes • Debates • Media Analysis • Oral presentations • Writing • Rubrics • STEM activities • Lab Practical	• Lab reports • Tests/Quizzes • Debates • Media Analysis • Oral presentations • Writing • Rubrics • STEM activities • Lab Practical	• Lab reports • Tests/Quizzes • Debates • Media Analysis • Oral presentations • Writing • Rubrics • STEM activities • Lab Practical
RESOURCES:	• STEMscopes • Gizmos • Essentials of Human Anatomy & Physiology (Publisher: Benjamin Cummings) • Chromebooks • Student textbook • Supplemental resources • Web media • Current events • Video clips • Animations • Simulations • https://www.teachengineering.org/ • http://anatomyandphysiology.com/ap-levels-of-structural-organization/	• STEMscopes • Gizmos • Essentials of Human Anatomy & Physiology (Publisher: Benjamin Cummings) • Chromebooks • Student textbook • Supplemental resources • Web media • Current events • Video clips • Animations • Simulations • https://www.teachengineering.org/ • http://www.realbodywork.com/articles/anatomy-games/	• STEMscopes • Gizmos • Essentials of Human Anatomy & Physiology (Publisher: Benjamin Cummings) • Chromebooks • Student textbook • Supplemental resources • Web media • Current events • Video clips • Animations • Simulations • https://www.teachengineering.org/ • http://www.realbodywork.com/articles/anatomy-games/
STAGE 3: LEARNING PLAN ***What learning experiences and instruction will enable students to achieve the desired results? Utilize the WHERETO* acronym to consider key design elements.***			
SKILLS AND TOPICS: *(What specific activities will students do and what skills will students know as a result of the unit?)*	• Use scientific instruments to collect data and use a mathematical model to analyze data and refine a hypothesis. • Use models and charts to illustrate levels of structural hierarchy and terms used to	• Use a microscope to collect data on epithelial, muscular, nervous, and connective tissue; analyze data and refine a hypothesis if necessary as it relates to form and function.	• Use a mathematical model to examine structure and function of the nervous system. • Use scientific instruments to collect data and demonstrate knowledge of precision and accuracy

	communicate anatomical structures and positions. ● Properly and effectively use a microscope to identify tissue types. ● Use a model to explain feedback loops in living systems employed to maintain homeostasis. ● Use raw data from investigations on organic molecules to compare and contrast findings select charts, graphs that are appropriate for analyzing data. ● Analyze given data from case studies to make appropriate inferences and justify conclusions based on evidence. ● Plan, conduct, and revise an engineering project based on form and function of the human body using knowledge of chemistry.	● Indicate an understanding of the correlation between UV radiation, cell damage and aging. ● Use mathematical and or computational representations to support the form and function of the skeletal system. ● Use a model/online simulation to show how structure and function of muscles and muscle groups work together. ● Plan, conduct, and revise an engineering project to design a prosthetic leg or similar engineering project that would demonstrate knowledge of form and function. ● Use a model to illustrate how forces such as gravity affect bone and muscles.	when using a 3D model. ● Analyze given data from case studies to make appropriate inferences and justify conclusions based on evidence. ● Collect data, analyze, and map data that demonstrates knowledge of the sense of smell and taste. ● Use a model to examine how physical factors such as light, pH and temperature influence the senses. ● Use mathematical representations to support and revise explanations based on evidence about factors affecting vision, color, and perception. ● Work collaboratively to gather, interpret and communicate information about the complex inner workings of the endocrine system.
CROSS-CURRICULAR / DIFFERENTIATION: *(What cross-curricular (e.g. writing, literacy, math, science, history, career readiness, life literacies, key skills, technology) learning activities are included in this unit that will help achieve the desired results?)*	**Cross-Curricular:** **English Language Arts** (RST.11-12.1-10, WHST.11-12.1-10, W.11-12.7) • Determine the central ideas or conclusions of a text; summarize complex concepts, processes, or information presented in a text by paraphrasing them in simpler but	**Cross-Curricular:** **English Language Arts** (RST.11-12.1-10, WHST.11-12.1-10, W.11-12.7) • Write informative texts, including the narration of historical events, scientific procedures/experiments, or technical processes • Research projects	**Cross-Curricular:** **English Language Arts** (RST.11-12.1-10, WHST.11-12.1-10, W.11-12.7) • Research projects • LAL Skills: plot, theme, setting, and symbolism. • Current Events • R.A.F.T.

(What type of differentiated instruction will be used for Sp.Ed./504, ELL, G&T, At-Risk students?)	still accurate terms. • Research projects • LAL Skills: plot, theme, setting, and symbolism. • Current Events • R.A.F.T. • Open-Ended Writing Responses • Conclusion and analysis of exploratory activities. • Multimedia Presentations **Mathematics** (S-IC.A.1, S-IC.A.2, S-IC.B.3, S-IC.B.4, S-IC.B.5, S-IC.B.6, MP.2, MP.4) • Statistical analysis of data • Applicable career options are discussed as they arise throughout the course. • Career options include, but are not limited to business, education, psychology, research, social work, and the tiered professions within the science industry. **Differentiation** • Tiered Lessons • Learning Style Adaptation • Project Based Learning <u>Special Education/504</u>: • Position students near helping peers or have quick access to teachers. • Hands-on options for assessments (tests/quizzes) that allow students to demonstrate knowledge of movements and terms	• LAL Skills: plot, theme, setting, and symbolism. • Current Events • R.A.F.T. • Open-Ended Writing Responses • Conclusion and analysis of exploratory activities. • Multimedia Presentations **Mathematics** (S-IC.A.1, S-IC.A.2, S-IC.B.3, S-IC.B.4, S-IC.B.5, S-IC.B.6, MP.2, MP.4) • Statistical analysis of data • Applicable career options are discussed as they arise throughout the course. • Career options include, but are not limited to business, education, psychology, research, social work, and the tiered professions within the science industry. **Differentiation** • Tiered Lessons • Visuals to show skeletal system • Learning Style Adaptation • Project Based Learning <u>Special Education/504</u>: • Modifications and accommodations as listed in the student's IEP/504 plan. • Assign peers to help keep students on task. • Word banks of various bones on assessments • Hands on demonstration	• Open-Ended Writing Responses • Conclusion and analysis of exploratory activities. • Multimedia Presentations **Mathematics** (S-IC.A.1, S-IC.A.2, S-IC.B.3, S-IC.B.4, S-IC.B.5, S-IC.B.6, MP.2, MP.4) ● Statistical analysis of data ● Applicable career options are discussed as they arise throughout the course. ● Career options include, but are not limited to business, education, psychology, research, social work, and the tiered professions within the science industry. **Differentiation** • Tiered Lessons • Learning Style Adaptation • Project Based Learning <u>Special Education/504</u>: • Create a neuron using pipe cleaner, represent an action potential and synapse using beads • Create a playlist of songs that represent moods brought on by various neurotransmitters • Demonstrate reflexes in a neural pathway by reacting to stimuli like catching a ball, following

	• Modifications and accommodations as listed in the student's IEP/504 plan. • Assign peers to help keep students on task. • Visual representations of anatomical positions • Prioritize tasks. • NJDOE Resources • Assign peer assisted reading • Assign peer tutoring • Provide individual help to all students <u>ELL</u>: • Get to know student • Set high expectations • Learn/Utilize/Display some words in student's heritage language • Allow electronic translator • Reword, repeat, and clarify directions • Strategy groups • Teacher conferences • Graphic organizers • Vocabulary translation sheets • Diagrams of anatomical positions with labels • Modification plan (Instruction will be based on language proficiency.) <u>At Risk</u>: • Intervention based on I&RS Action Plan (examples: preferential seating, extended time)	of muscular anatomy as assessment • Models of bones (class set) • Lab assessments – labelling bone structures via models, identifying muscle movement based on diagrams • Position students near helping peers or have quick access to teachers. • Visual portions of assessments (microscopic identification of muscle tissues) • Prioritize tasks. • NJDOE Resources <u>ELL</u>: • Microscopic analysis of muscle tissues with lab sketches • Strategy groups • Teacher conferences • Diagrams of bone cell with labels • Graphic organizers • Modification plan (Instruction will be based on language proficiency.) <u>At Risk</u>: • Intervention based on I&RS Action Plan (examples: preferential seating, extended time) • Describe muscles and bones that work together to provide specific movements • Assessment guides (students may use self-created lab sketches during tests/quizzes)	movements, etc. • Modifications and accommodations as listed in the student's IEP/504 plan. • Assign peers to help keep students on task. • Visual representation of brain's anatomy using color coded diagrams • Position students near helping peers or have quick access to teachers. • Break down tests into smaller segments. • Prioritize tasks. • NJDOE Resources <u>ELL</u>: • Strategy groups • Teacher conferences • Diagrams of neurons with labels • Graphic organizers • Modification plan (Instruction will be based on language proficiency.) <u>At Risk</u>: • Intervention based on I&RS Action Plan (examples: preferential seating, extended time) • Analyze modified case study on the relationship between neurotransmitters and depression • Assessment guides (students may use self-created diagrams during tests/quizzes)

	• Compare and contrast functionality of various levels of organization • Assessment guides (students may use self-created diagrams during tests/quizzes) <u>Gifted and Talented</u>: • Enrichment activities available. • Literacy Strategy- enrichment • Case Studies on different types of cancer with analysis of consequences at the systemic level	<u>Gifted and Talented</u>: • Enrichment activities available. • Literacy Strategy- enrichment • Analysis of the relationship between structure of muscular tissue and function • Analysis of human evolution and bone structure in skull, hands, vertebrae	<u>Gifted and Talented</u>: • Enrichment activities available. • Literacy Strategy- enrichment • Analysis of Case Studies of nervous disorders like Alzheimer's, ALS, Schizophrenia and identifying risk factors

UNIT #: *Unit Title* Number of Days	**Unit 4:** *Transport and Immunity* 30 Days	**Unit 5:** *Absorption and Excretion* 30 Days	**Unit 6:** *Reproduction and Development* 25 Days
STAGE 1: DESIRED RESULTS ***What will students understand as a result of the unit? What are the BIG ideas?***			
ESTABLISHED GOALS: *(NJSLS-Science)*	**Life Science** HS-LS1-1 HS-LS1-2 HS-LS1-3 HS-LS1-4 HS-LS4-1 **Engineering** HS-ETS1-1 HS-ETS1-2 HS-ETS1-3 HS-ETS1-4	**Life Science** HS-LS1-1 HS-LS1-2 HS-LS1-3 HS-LS1-4 HS-LS4-1 **Engineering** HS-ETS1-1 HS-ETS1-2 HS-ETS1-3 HS-ETS1-4	**Life Science** HS-LS1-1 HS-LS1-2 HS-LS1-3 HS-LS1-4 HS-LS3-2 HS-LS4-5 **Engineering** HS-ETS1-1 HS-ETS1-2 HS-ETS1-3

	Technology 8.1.12.A.3 8.1.12.C.1 8.1.12.D.1 8.1.12.D.2 8.1.12.F.1 8.2.12.E.1 **Career Readiness, Life Literacies, and Key Skills** 9.2.12.CAP.3 9.4.12.CI.1 9.4.12.CT.2 9.4.12.IML.2 9.4.12.IML.3 9.4.12.IML.4 9.4.12.IML.7 9.4.12.TL.3	**Technology** 8.1.12.A.3 8.1.12.C.1 8.1.12.D.1 8.1.12.D.2 8.1.12.F.1 8.2.12.E.1 **Career Readiness, Life Literacies, and Key Skills** 9.2.12.CAP.3 9.4.12.CI.1 9.4.12.CT.2 9.4.12.IML.2 9.4.12.IML.3 9.4.12.IML.4 9.4.12.IML.7 9.4.12.TL.3	HS-ETS1-4 **Technology** 8.1.12.A.3 8.1.12.C.1 8.1.12.D.1 8.1.12.D.2 8.1.12.F.1 8.2.12.E.1 **Career Readiness, Life Literacies, and Key Skills** 9.2.12.CAP.3 9.4.12.CI.1 9.4.12.CT.2 9.4.12.IML.2 9.4.12.IML.3 9.4.12.IML.4 9.4.12.IML.7 9.4.12.TL.3
ENDURING UNDERSTANDINGS: *(Students will understand that . . .)*	• Blood is a type of connective tissue whose cells are suspended in a liquid intercellular material. It transports substances between body cells and the external environment and helps maintain a stable internal environment. • The cardiovascular system provides oxygen and nutrients to tissues and removes waste. • The lymphatic system is closely associated with the cardiovascular system. It transports excess fluid to the bloodstream,	• Digestion is the process of mechanically and chemically breaking down foods so that they can be absorbed. The digestive system consists of an alimentary canal and several accessory organs. • The respiratory system includes tubes that remove particles from incoming air and transport air to and from the lungs and the air sacs where gases are exchanged. Respiration is the entire process of gas exchange between the	• Reproductive organs produce sex cells and sex hormones, sustain these cells, or transport them from one place to another. • Growth is an increase in size. Development is the process of changing from one life phase to another. • Differentiation of cells many different types of cells arise during the development of the embryo. Activation of specific genes determines what type of cell will develop. • Of all the organ systems of the body, the reproductive system is not

	absorbs fats, and helps defend the body against disease-causing agents. ● Multicellular organisms have a hierarchical structural organization, in which any one system is made up of numerous parts and is itself a component of the next level. ● Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system.	atmosphere and the body cells. ● The urinary system controls the composition of the internal environment and consists of kidneys, urethra, urinary bladder, and urethra. ● Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system.	essential to the life of an individual to ensure survival, but is essential to the survival of the species. ● Systems of specialized cells within organisms help them perform the essential functions of life. ● Feedback mechanisms maintain a living system's internal conditions within certain limits and mediate behaviors, allowing it to remain alive and functional even as external conditions change within some range. Feedback mechanisms can encourage (through positive feedback) or discourage (negative feedback) what is going on inside the living system.
ESSENTIAL QUESTIONS: *(What provocative questions will foster inquiry, understanding, and transfer of learning?)*	1. What are the major components of blood? 2. Which vitamins are necessary for red blood cell production? 3. What is the primary function of white blood cells? 4. How do albumins help maintain water balance between blood and tissues? 5. What causes heart sound? 6. How does blood volume and viscosity affect	1. How is the health of the mouth related to digestion? 2. What role does the stomach play in digestion? 3. What regulates pancreatic secretion? 4. Where does absorption take place? 5. What are the functions of the mucous membranes in the nasal cavity? 6. How do the vocal cords produce sound?	1. What is the anatomy of a sperm cell? 2. Which cells produce male sex hormones? 3. What is the function of the prostate? 4. What hormones initiate changes in sexual maturity? 5. What are the primary sex organs of the female? 6. What is the purpose of the female menstrual cycle? 7. What changes do ovarian hormones cause in the mammary

	pressure? 7. What are the general functions of the lymphatic system? 8. What is the major function of the thymus and the spleen? 9. Explain six non-specific defense mechanisms? 10. How does the immune system function?	7. How are gasses exchanged in the alveoli? 8. What forces move oxygen and carbon dioxide across the respiratory membrane? 9. How does the hypothalamus regulate urine concentration and volume?	glands? 8. What are some common symptoms of sexually transmitted diseases? 9. What are some changes that women may notice during pregnancy? 10. Describe the major events in the embryonic stage of development? 11. What major changes occur during the fetal stage of development?

STAGE 2: ASSESSMENT EVIDENCE

What evidence will be collected to determine whether or not the understandings have been developed, the knowledge and skills attained, and the state standards met?
[Anchor the work in performance tasks that involve application, supplemented as needed by prompted work, quizzes, observations, etc.]

PERFORMANCE TASKS: *(Through what authentic performance tasks will students demonstrate the desired understandings?)* *(By what criteria will performances of understanding be judged?)*	• Conduct an investigation that illustrates the job of a clinical blood technician and demonstrate knowledge of the ABO and rh blood types argue from evidence the relationship of the antigen/antibody interactions and the importance of safe blood handling. • Collaboratively plan, design, and revise a model that would demonstrate blood flow through a closed –loop circulatory system to demonstrate knowledge of how vessels, heart valves, and contracting chambers work together. • Use a sphygmomanometer to acquire blood pressure data to argue from evidence the relationship between genetics, diet, and exercise and cardiovascular health. • Use a 3D model of a heart	• Conduct a microscopic anatomy investigation that compares normal and smoker's lung tissue from evidence and case studies the dangers of toxins in cigarettes. • Research, plan, and conduct an investigation that measures breathing rate, volume capacity, respiratory sounds, and flow and resistance. • Research, plan, and conduct an investigation that would describe the physiological differences between a person in shape and one who is out of shape. Calculate the personal fitness index of a person. • Use an animal dissection or a virtual dissection to compare the digestive, respiratory, and urinary system of an animal to a human system. Demonstrate knowledge through practical examination.	• Use a model to illustrate the basic structures and differences between the female and male reproductive systems. • Conduct a webquest on the reproductive system and growth and development of the fetus to gain understanding of the mechanisms of the system by using illustrations and animations. • Research the epidemiology of reproductive system diseases and argue from evidence of causes, treatments and impacts on society. • Research the biotechnology of assisted reproductive technologies and argue from evidence ethical issues such as risk assessment and welfare issues. • Conduct a microscopic anatomy investigation using prepared slides of different stages of

	(dissection) or virtual dissection to examine the structure of the heart and circulatory system. ● Use a model/video simulator to illustrate the way the lymphatic system works against virus and bacterial infections. ● Examine case studies of diseases and disorders of the immune system argue from evidence the future prospects of using the immune system to fight diseases.	● Collaboratively plan, conduct, and revise an investigation that demonstrates the role enzymes play in digestion of starch, sugar, lipids and proteins. ● Conduct a simulated urinalysis test to determine the presence of nitrates. Diagnose patients and recommend treatment.	embryonic development comparing various organisms. ● Collaboratively review current research of environmental factors that affect the unborn child such as drugs, alcohol, carcinogens, and viruses communicate findings for peer review. ● Student teams learn about and devise technical presentations on four reproductive technology topics—pregnancy ultrasound, amniocentesis, in-vitro fertilization or labor anesthetics. Each team acts as a panel of engineers asked to make a presentation to a group of students unfamiliar with reproductive technology. ● Students find and maximize the productive value of existing and new technology to accomplish workplace tasks and solve workplace problems. They are flexible and adaptive in acquiring new technology. They are proficient with ubiquitous technology applications. They understand the inherent risks-personal and organizational-of technology applications, and they take actions to prevent or mitigate these risks.
OTHER EVIDENCE: *(Through what other evidence (e.g. quizzes, tests, academic prompts, observations, homework, journals) will students demonstrate achievement of*	● Benchmark assessment ● Research papers ● Lab reports ● Tests/Quizzes ● Debates ● Media Analysis	● Benchmark assessment ● Research papers ● Lab reports ● Tests/Quizzes ● Debates ● Media Analysis	● Benchmark assessment ● Research papers ● Lab reports ● Tests/Quizzes ● Debates ● Media Analysis

the desired results?) *(How will students self-assess their learning?)*	• Oral presentations • Writing • Rubrics • STEM activities • Lab Practical	• Oral presentations • Writing • Rubrics • STEM activities • Lab Practical	• Oral presentations • Writing • Rubrics • STEM activities • Lab Practical
RESOURCES:	• STEMscopes • Gizmos • Essentials of Human Anatomy & Physiology (Publisher: Benjamin Cummings) • Chromebooks • Student textbook • Supplemental resources • Web media • Current events • Video clips • Animations • Simulations • https://www.teachengineering.org/ • http://www.hhmi.org/biointeractive/cells-immune-system	• STEMscopes • Gizmos • Essentials of Human Anatomy & Physiology (Publisher: Benjamin Cummings) • Chromebooks • Student textbook • Supplemental resources • Web media • Current events • Video clips • Animations • Simulations • https://www.teachengineering.org/ • https://www.brainpop.com/games/buildabodydigestivesystem/	• STEMscopes • Gizmos • Essentials of Human Anatomy & Physiology (Publisher: Benjamin Cummings) • Chromebooks • Student textbook • Supplemental resources • Web media • Current events • Video clips • Animations • Simulations • https://www.teachengineering.org/ • http://www.canyonisd.net/cms/lib/TX01000615/Centricity/Domain/108/Reproduction%20Web%20Quest.pdf
STAGE 3: LEARNING PLAN ***What learning experiences and instruction will enable students to achieve the desired results? Utilize the WHERETO* acronym to consider key design elements.***			
SKILLS AND TOPICS: *(What specific activities will students do and what skills will students know as a result of the unit?)*	• Use scientific instruments to demonstrate knowledge of blood typing techniques and safe biological material handling. • Plan, conduct, and revise an engineering project based on form and function of the human body using knowledge of a closed loop circulatory system.	• Use a microscope to collect data that compares normal lung tissue to abnormal lung tissue; analyze data and communicate inferences to peers based on evidence. • Research and design an investigation that analyzes lung capacity data and demonstrates knowledge of tools used	• Construct a model that illustrates the hierarchical organization of the reproductive system and how this system interacts with other systems within the organism. • Use technology to collect information about the structure and function of the reproductive system and compare the organization of different

	• Use medical tools to acquire blood pressure data and make inferences based on data that demonstrates the correlation between genetics/environment and the health of an organism. • Use scientific instruments to collect data and demonstrate knowledge of precision and accuracy when using a 3D model. • Use a model/simulation to explain how the lymphatic system functions in organisms to maintain homeostasis. • Work collaboratively to gather, interpret and communicate information about the complex inner workings of the lymphatic system.	to acquire lung function information. • Use scientific instruments to collect data and demonstrate knowledge of precision and accuracy when dissecting an animal to understand the organization of digestive, respiratory and urinary systems compared to human anatomy using models using charts and diagrams. • Use mathematical and or computational representations to support the form and function of the skeletal system. • Plan, conduct, and revise an investigation that demonstrates the role of human and bacterial enzymes in the process of digestion. Make inferences about the importance of enzymes and the normal function of the organism.	organisms. • Use a microscope to collect and analyze data about the developmental stages of embryonic development. • Evaluate a solution to a complex real-world problem in biotechnology and reproduction based on prioritized criteria and tradeoffs that account for a range of constraints, including cost, safety, reliability, and aesthetics as well as possible social, cultural, and environmental impacts. • Analyze the major global challenge of diseases and disorders of the reproductive system to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.
CROSS-CURRICULAR / DIFFERENTIATION: *(What cross-curricular (e.g. writing, literacy, math, science, history, career readiness, life literacies, key skills, technology) learning activities are included in this unit that will help*	**Cross-Curricular:** **English Language Arts** (RST.11-12.1-10, WHST.11-12.1-10, W.11-12.7) • Research projects • LAL Skills: plot, theme, setting, and symbolism.	**Cross-Curricular:** **English Language Arts** (RST.11-12.1-10, WHST.11-12.1-10, W.11-12.7) • Research projects • LAL Skills: plot, theme, setting, and symbolism.	**Cross-Curricular:** **English Language Arts** (RST.11-12.1-10, WHST.11-12.1-10, W.11-12.7) • Research projects • LAL Skills: plot, theme, setting, and symbolism.

achieve the desired results?) *(What type of differentiated instruction will be used for Sp.Ed./504, ELL, G&T, At-Risk students?)*	• Current Events • R.A.F.T. • Open-Ended Writing Responses • Conclusion and analysis of exploratory activities. • Multimedia Presentations **Mathematics** (S-IC.A.1, S-IC.A.2, S-IC.B.3, S-IC.B.4, S-IC.B.5, S-IC.B.6, MP.2, MP.4) • Statistical analysis of data Applicable career options are discussed as they arise throughout the course. Career options include, but are not limited to business, education, psychology, research, social work, and the tiered professions within the science industry. **Differentiation** • Tiered Lessons • Learning Style Adaptation • Project Based Learning <u>Special Education/504</u>: • Modifications and accommodations as listed in the student's IEP/504 plan. • Assign peers to help keep students on task. • Visual aids representing antigens and antibodies on red blood cells • Color coded	• Current Events • R.A.F.T. • Open-Ended Writing Responses • Conclusion and analysis of exploratory activities. • Multimedia Presentations **Mathematics** (S-IC.A.1, S-IC.A.2, S-IC.B.3, S-IC.B.4, S-IC.B.5, S-IC.B.6, MP.2, MP.4) • Statistical analysis of data Applicable career options are discussed as they arise throughout the course. Career options include, but are not limited to business, education, psychology, research, social work, and the tiered professions within the science industry. **Differentiation** • Tiered Lessons • Learning Style Adaptation • Project Based Learning <u>Special Education/504</u>: • Modifications and accommodations as listed in the student's IEP/504 plan. • Assign peers to help keep students on task. • Relate the role of mucosa lining the digestive tract to the effective	• Current Events • R.A.F.T. • Open-Ended Writing Responses • Conclusion and analysis of exploratory activities. • Multimedia Presentations **Mathematics** (S-IC.A.1, S-IC.A.2, S-IC.B.3, S-IC.B.4, S-IC.B.5, S-IC.B.6, MP.2, MP.4) • Statistical analysis of data Applicable career options are discussed as they arise throughout the course. Career options include, but are not limited to business, education, psychology, research, social work, and the tiered professions within the science industry. **Differentiation** • Tiered Lessons • Learning Style Adaptation • Project Based Learning <u>Special Education/504</u>: • Relate the role of the reproductive system to the importance of long term survival of the species • Modifications and accommodations as listed in the student's IEP/504 plan. • Assign peers to help keep students on task. • Reiterate the process of

	diagrams of the circulatory system showing the pathway of blood and when it becomes oxygenated • Position students near helping peers or have quick access to teachers. • Break down tests into smaller segments. • NJDOE Resources <u>ELL</u>: • Strategy groups • Teacher conferences • Graphic organizers • Vocabulary translation sheets • Association of different types of White Blood Cells with their autoimmune function • Modification plan (Instruction will be based on language proficiency.) <u>At Risk</u>: • Intervention based on I&RS Action Plan (examples: preferential seating, extended time) • Analyze modified case study of the relationship leukocyte count and alcohol usage • Assessment Guides (use of heart/blood diagrams during assessments)	breakdown of food • Relate the role of enzymes in various aspects of the digestive tract to the functions of the organs involved • Demonstrate lung capacity using balloons • Position students near helping peers or have quick access to teachers. • Break down tests into smaller segments. • Prioritize tasks. • NJDOE Resources <u>ELL</u>: • Strategy groups • Teacher conferences • Vocabulary translation sheets • Visual representations of the digestive tract (model/diagram) • Graphic organizers • Modification plan (Instruction will be based on language proficiency.) <u>At Risk</u>: • Intervention based on I&RS Action Plan (examples: preferential seating, extended time) • Relate the role of respiration and oxygen exchange to circumstances like people living in higher elevations where oxygen is scarcer to	meiosis and how oogenesis differs from spermatogenesis • Modified or reduced assignments. • Position students near helping peers or have quick access to teachers. • Break down tests into smaller segments. • Prioritize tasks. • NJDOE Resources <u>ELL</u>: • Strategy groups • Teacher conferences • Vocabulary translation sheets • Visual representation of the reproductive system organs and cell formation process • Demonstrate the process of puberty and development by comparing images of bone size and structure, facial and body hair, voice pitch, and body structure of various individuals • Graphic organizers • Modification plan (Instruction will be based on language proficiency.) <u>At Risk</u>: • Intervention based on I&RS Action Plan (examples: preferential seating, extended time) • Analyze modified case study on the effects of heavy weight-lifting in pre-pubescents

	Gifted and Talented: • Enrichment activities available. • Literacy Strategy- enrichment • Read and analyze published case studies on leukemia and risk factors leading to the disease • Cow Heart dissection, comparative analysis to the human heart	demonstrate the importance of capillary exchange Gifted and Talented: • Enrichment activities available. • Literacy Strategy- enrichment • Diabetes Testing Kit with artificial blood, analysis of Pancreatic function and hormone secretion in Diabetics and non-diabetics. • Case Study of the effects of smoking in casual/social smokers • Fetal Pig Dissection tracing the pathway of the digestive tract and comparative analysis of the fetal pig structure to human anatomy	• Outlined notes • Assessment guides Gifted and Talented: • Enrichment activities available. • Literacy Strategy- enrichment • Fetal Pig dissection with comparative analysis of the Fetal Pig and human reproductive system • Presentation on genetic mutations that form as a result of meiosis and how they affect the offspring.