

# **Pascack Valley Regional High School District**

**Pascack Hills High School, Montvale, New Jersey  
Pascack Valley High School, Hillsdale, New Jersey**

**Course Name: Introduction to Anatomy and Physiology**

Born On: August, 2020  
Previous Revision: August, 2022  
Current Revision: August, 2023  
Board Approval: 8/28/2023

## New Jersey Curricular Mandates for Science Instruction

### Disabled & LGBT:

18A:35-4.35 - History of disabled and LGBT persons included in middle and high school curriculum. A board of education shall include instruction on the political, economic, and social contributions of persons with disabilities and lesbian, gay, bisexual, and transgender people, in an appropriate place in the curriculum of middle school and high school students as part of the district's implementation of the New Jersey Student Learning Standards.

### Diversity, Equity, and Inclusion (DEI):

C.18A:35-4.36a - Curriculum to include instruction on diversity and inclusion. 1. a. Beginning in the 2021-2022 school year, each school district shall incorporate instruction on diversity and inclusion in an appropriate place in the curriculum of students in grades kindergarten through 12 as part of the district's implementation of the New Jersey Student Learning Standards. b. The instruction shall: (1) highlight and promote diversity, including economic diversity, equity, inclusion, tolerance, and belonging in connection with gender and sexual orientation, race and ethnicity, disabilities, and religious tolerance; (2) examine the impact that unconscious bias and economic disparities have at both an individual level and on society as a whole; and (3) encourage safe, welcoming, and inclusive environments for all students regardless of race or ethnicity, sexual and gender identities, mental and physical disabilities, and religious beliefs. c. The Commissioner of Education shall provide school districts with sample learning activities and resources designed to promote diversity and inclusion.

### Amistad Law:

N.J.S.A. 18A 52:16A-88 Every board of education shall incorporate the information regarding the contributions of African Americans to our country in an appropriate place in the curriculum of elementary and secondary school students.

### Climate Change:

2020 NJSLS-Science: Earth's climate is now changing faster than at any point in the history of modern civilization, primarily as a result of human activities. Global climate change has already resulted in a wide range of impacts across New Jersey and in many sectors of its economy. The addition of academic standards that focus on climate change is important so that all students will have a basic understanding of the climate system, including the natural and human-caused factors that affect it. The underpinnings of climate change span across physical, life, as well as Earth and space sciences. The goal is for students to understand climate science as a way to inform decisions that improve quality of life for themselves, their community, and globally and to know how engineering solutions can allow us to mitigate impacts, adapt practices, and build resilient systems.

### Dissection Law

N.J.S.A. 18A:35-4.25 and N.J.S.A. 18A:35-4.24 authorizes parents or guardians to assert the right of their children to refuse to dissect, vivisection, incubate, capture or otherwise harm or destroy animals or any parts thereof as part of a course of instruction.

**Introduction to Anatomy and Physiology**

**Unit 1: The Body as a Whole**

**Time Allotted: 4 weeks**

**New Jersey Student Learning Standards (NJSLS)**

**HS-LS1-1.** Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins, which carry out the essential functions of life through systems of specialized cells.

**HS-LS1-2** Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

**HS-LS1-3** Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
<p><b>Constructing Explanations and Designing Solutions</b></p> <ul style="list-style-type: none"> <li>Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.</li> </ul> <p><b>Developing and Using Models Modeling</b></p> <ul style="list-style-type: none"> <li>Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> </ul> <p><b>Planning and Carrying Out Investigations</b></p> <ul style="list-style-type: none"> <li>Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.</li> </ul> <p>----- <i>Connections to Nature of Science</i></p> <p><b>Scientific Investigations</b></p> <ul style="list-style-type: none"> <li>Use a Variety of Methods Scientific inquiry is characterized by a common set of values that include: logical thinking, precision, open-mindedness, objectivity, skepticism, replicability of results, and honest and ethical reporting of findings.</li> </ul>	<p><b>LS1.A: Structure and Function</b></p> <ul style="list-style-type: none"> <li>Systems of specialized cells within organisms help them perform the essential functions of life.</li> <li>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. <i>(Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)</i></li> <li>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.</li> <li>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.</li> </ul>	<p><b>Structure and Function</b></p> <ul style="list-style-type: none"> <li>Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.</li> </ul> <p><b>Stability and Change</b></p> <ul style="list-style-type: none"> <li>Feedback (negative or positive) can stabilize or destabilize a system.</li> </ul> <p><b>Systems and System Models</b></p> <ul style="list-style-type: none"> <li>Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows— within and between systems at different scales</li> </ul>

Essential Questions	Student Learning Objectives	Suggested Tasks/Activities	Evidence of Learning (Assessment)
<ul style="list-style-type: none"> <li><i>Why is homeostasis important to survival?</i></li> <li><i>How does the anatomy of a structure dictate its physiology, i.e., does form always follow function?</i></li> </ul>	<p>Students will be able to:</p> <ul style="list-style-type: none"> <li>Research academic requirements, job descriptions, scope of practice, work settings, salary, etc. for various health professions.</li> </ul>	<p>Labs and Activities:</p> <ul style="list-style-type: none"> <li>"Simon Says" or similar game to review anatomical positions</li> <li>"Picasso Anatomy"- create an 'anatomically correct' mosaic portrait using newly learned</li> </ul>	<ul style="list-style-type: none"> <li>Assessment of written and verbal mastery of unit-specific vocabulary, on a performance or practical</li> <li>Assessment of skills such as asking questions, defining</li> </ul>

<ul style="list-style-type: none"> <li>• <i>Are all parts of the body equally important?</i></li> </ul>	<ul style="list-style-type: none"> <li>• Explain how anatomy and physiology are related</li> <li>• Define and use anatomical terms and medical prefixes/suffixes that are used by medical professionals.</li> <li>• Compare and contrast signs vs symptoms of anatomical and physiological conditions</li> <li>• Explain the importance of homeostasis to survival</li> <li>• Communicate usage of common anatomical language used throughout medicine orally and written to describe patients disorders or disease</li> </ul>	<p>anatomical language</p> <ul style="list-style-type: none"> <li>• Dissect Tortilla Sandwich or Dill Pickle to demonstrate an understanding of the planes and sections of the body, and to reinforce the relationship of planes to sections and directional terminology.</li> <li>• Use models of a positive and negative feedback loop and identify examples of each system during an Explore Learning Animation. <i>“Human Homeostasis” Gizmo</i></li> <li>• <i>Using models, identify systems of the body that are found inside of the body versus outside of the body “Inside Outside”</i></li> <li>• HASPI Using Anatomical Language <ul style="list-style-type: none"> <li>○ Explain directional terminology, relative position, and body sections while examining patients in certain positions</li> <li>○ Identify regions of the body</li> <li>○ Use anatomical language when describing a patient’s disease or disorder</li> </ul> </li> <li>• PROJECT: Health profession careers research and survey</li> </ul>	<p>problems, and/or constructing explanations when completing the case study.</p> <ul style="list-style-type: none"> <li>• Assessment of modeling skills by drawing and labeling diagrams, making analogies, and/or making observational sketches.</li> <li>• Assessment of lab skills (Experimental Design, Data Analysis, and/or Arguing a Scientific Claim) by submitting Lab Reports for each lab conducted</li> <li>• Assessment of skills such as Problem Solving, Creating and Interpreting Graphs, and/or Creating Scientific Explanations by taking quizzes as well as the Unit Test.</li> </ul>
<b>Resources/Materials</b>	<p><a href="https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf">https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf</a>  <a href="https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY_Tortora_14th_Ed">https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY Tortora 14th Ed</a>  <a href="https://www.explorelearning.com/">https://www.explorelearning.com/</a>  <a href="http://www.haspi.org/">http://www.haspi.org/</a></p>		
<b>ELA Companion Standards</b>	<p><b>RST.11-12.7</b> Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.</p> <p><b>RST.11-12.8</b> Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.</p>		

	<p><b>WHST.9-12.2</b> Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.</p>
<p><b>Interdisciplinary Connections</b></p>	<p><i>English Language Arts/Literacy</i></p> <p><b>SL.11-12.1.</b> Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with peers on grades 11–12 topics, texts, and issues, building on others’ ideas and expressing their own clearly and persuasively.</p> <p><b>SL.11-12.4</b> Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.</p> <p><i>Math</i></p> <p><b>MP.4</b> Model with mathematics.</p> <p><b>MP.2</b> Reason abstractly and quantitatively.</p>
<p><b>Career Readiness, Life Literacies and Key Skills</b></p>	<p><b>9.2.12.CAP.4:</b> Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them including educational training requirements, costs, loans, and debt repayment</p> <p><b>9.2.12.CAP.5:</b> Assess and modify a personal plan to support current interests and postsecondary plans.</p> <p><b>9.2.12.CAP.6:</b> Identify transferable skills in career choices and design alternative career plans based on those skills.</p> <p><b>9.2.12.CAP.7:</b> Use online resources to examine licensing, certification, and credentialing requirements at the local, state, and national levels to maintain compliance with industry requirements in areas of career interest.</p> <p><b>9.2.12.CAP.8:</b> Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.</p> <p><b>Career Readiness, Life Literacies, and Key Skills Practices</b></p> <p>Act as a responsible and contributing community member and employee</p> <p>Demonstrate creativity and innovation.</p> <p>Utilize critical thinking to make sense of problems and persevere in solving them.</p> <p>Model integrity, ethical leadership, and effective management.</p> <p>Plan education and career paths aligned to personal goals.</p> <p>Use technology to enhance productivity, increase collaboration, and communicate effectively.</p> <p>Work productively in teams while using cultural/global competence.</p>
<p><b>Computer Science &amp; Design Thinking</b></p>	<p><b>8.1.12.DA.5:</b> Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.</p> <p><b>8.1.12.DA.6:</b> Create and refine computational models to better represent relationships among different elements of data collected from a phenomena or process.</p>

<b>Modifications</b>			
<b>Multi-Lingual Learners</b>	<b>Special Education</b>	<b>At-Risk</b>	<b>Gifted and Talented</b>
<ul style="list-style-type: none"> <li>● Display labeled images of designs and parts.</li> <li>● Use body movement and gestures to further explain concepts to students.</li> <li>● Restate design steps aloud before project activity.</li> <li>● Assign a native language partner.</li> </ul>	<ul style="list-style-type: none"> <li>● Reinforce safety rules when using equipment</li> <li>● Provide adequate scaffolds for the design process.</li> <li>● Provide alternative choices (i.e. verbal or visual) to demonstrate proficiency.</li> <li>● Provide an outline of lessons</li> <li>● Get a written list of instructions</li> <li>● Work or take a test in a different setting, such as a quiet room with few distractions</li> <li>● Sit where they learn best (for example, near the teacher)</li> </ul>	<ul style="list-style-type: none"> <li>● Incorporate student choice</li> <li>● Invite parents, neighbors, friends, the school principal and other community members to support classroom activities.</li> <li>● Provide peer mentoring to improve techniques.</li> </ul>	<ul style="list-style-type: none"> <li>● Lead the class in the deciphering of new learning.</li> <li>● Create a more detailed report which includes additional research outside of project requirements.</li> </ul>

## Introduction to Anatomy and Physiology

## Unit 2: Tissue Level of Organization

Time Allotted: 3 weeks

## New Jersey Student Learning Standards (NJSLS)

**HS-LS1-1.** Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.

**HS-LS1-2** Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

**HS-LS1-3** Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

**HS-LS1-4.** Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

**HS-LS3-2.** Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.

**HS-LS4-2** Construct an explanation based on evidence that the process of evolution primarily results from four factors: (1) the potential for a species to increase in number, (2) the heritable genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for limited resources, and (4) the proliferation of those organisms that are better able to survive and reproduce in the environment.

Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
<p><b>Constructing Explanations and Designing Solutions</b></p> <ul style="list-style-type: none"> <li>Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.</li> </ul> <p><b>Developing and Using Models Modeling</b></p> <ul style="list-style-type: none"> <li>Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> <li>Use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> </ul> <p><b>Planning and Carrying Out Investigations</b></p> <ul style="list-style-type: none"> <li>Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.</li> </ul>	<p><b>LS1.A: Structure and Function</b></p> <ul style="list-style-type: none"> <li>Systems of specialized cells within organisms help them perform the essential functions of life.</li> <li>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. (<i>Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.</i>)</li> <li>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.</li> <li>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.</li> </ul> <p><b>LS1.B: Growth and Development of Organisms</b></p> <ul style="list-style-type: none"> <li>In multicellular organisms individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. The organism begins as a single cell (fertilized egg) that divides successively to produce many cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both daughter cells. Cellular division and differentiation produce and maintain a complex organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism.</li> </ul> <p><b>LS3.B: Variation of Traits</b></p>	<p><b>Structure and Function</b></p> <ul style="list-style-type: none"> <li>Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.</li> </ul> <p><b>Stability and Change</b></p> <ul style="list-style-type: none"> <li>Feedback (negative or positive) can stabilize or destabilize a system.</li> </ul> <p><b>Systems and System Models</b></p> <ul style="list-style-type: none"> <li>Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows— within and between systems at different scales</li> </ul>

<p><b>Engaging in Argument from Evidence</b></p> <ul style="list-style-type: none"> <li>Make and defend a claim based on evidence about the natural world that reflects scientific knowledge, and student-generated evidence.</li> </ul> <p>-----</p> <p style="text-align: center;"><i>Connections to Nature of Science</i></p> <p><b>Scientific Investigations</b></p> <ul style="list-style-type: none"> <li>Use a Variety of Methods Scientific inquiry is characterized by a common set of values that include: logical thinking, precision, open-mindedness, objectivity, skepticism, replicability of results, and honest and ethical reporting of findings.</li> </ul>	<ul style="list-style-type: none"> <li>In sexual reproduction, chromosomes can sometimes swap sections during the process of meiosis (cell division), thereby creating new genetic combinations and thus more genetic variation. Although DNA replication is tightly regulated and remarkably accurate, errors do occur and result in mutations, which are also a source of genetic variation. Environmental factors can also cause mutations in genes, and viable mutations are inherited.</li> <li>Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus the variation and distribution of traits observed depends on both genetic and environmental factors.</li> </ul> <p><b>LS4.B: Natural Selection</b></p> <ul style="list-style-type: none"> <li>Natural selection occurs only if there is both (1) variation in the genetic information between organisms in a population and (2) variation in the expression of that genetic information—that is, trait variation—that leads to differences in performance among individuals.</li> </ul> <p><b>LS4.C: Adaptation</b></p> <ul style="list-style-type: none"> <li>Evolution is a consequence of the interaction of four factors: (1) the potential for a species to increase in number, (2) the genetic variation of individuals in a species due to mutation and sexual reproduction, (3) competition for an environment’s limited supply of the resources that individuals need in order to survive and reproduce, and (4) the ensuing proliferation of those organisms that are better able to survive and reproduce in that environment.</li> </ul>	<p><b>Cause and Effect</b></p> <ul style="list-style-type: none"> <li>Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.</li> </ul>
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Essential Questions	Student Learning Objectives	Suggested Tasks/Activities	Evidence of Learning (Assessment)
<ul style="list-style-type: none"> <li><i>How are cells and tissues related and how do they relate to body systems?</i></li> <li><i>How does aging affect the tissues of the body?</i></li> <li><i>How does injury affect the tissues of the body?</i></li> </ul>	<ul style="list-style-type: none"> <li>List the four major tissue types and indicate structure, function and location of each tissue type</li> <li>Describe the general characteristics and functions of epithelial tissue and identify organs in which each is found and the relationship between structure and function</li> <li>Explain how glands are classified</li> </ul>	<p>Labs/Activities:</p> <ul style="list-style-type: none"> <li>Carry out the investigation of a “<i>Chicken Wing Dissection</i>” to observe and feel the various types of tissue that exist within the wing</li> <li>Use microscopes to observe tissues</li> <li>Complete a case study on epithelial tissue</li> <li>Describe images of normal bone and bone with osteoporosis</li> </ul>	<ul style="list-style-type: none"> <li>Assessment of written and verbal mastery of unit-specific vocabulary, on a performance or practical</li> <li>Assessment of skills such as asking questions, defining problems, and/or constructing explanations when completing the case study.</li> <li>Assessment of modeling skills by drawing and labeling diagrams, making</li> </ul>



	<ul style="list-style-type: none"> <li>● Describe characteristics common to all connective tissue</li> <li>● Describe the major functions of each type of connective tissue</li> <li>● Compare and contrast the three types of cartilage</li> <li>● Examine the structure and function of spongy and compact bone</li> <li>● Describe the general characteristics and functions of nervous tissue</li> <li>● Describe the general structure of a neuron</li> <li>● Compare and contrast the three types of muscle</li> <li>● Healthcare Skill-use microscopes to identify normal and abnormal tissue</li> </ul>		<p>analogies, and/or making observational sketches.</p> <ul style="list-style-type: none"> <li>● Assessment of lab skills (Experimental Design, Data Analysis, and/or Arguing a Scientific Claim) by submitting Lab Reports for each lab conducted</li> <li>● Dissection- Identify relationships of structure and function of various types of tissue through dissection of a chicken wing</li> <li>● Assessment of skills such as Problem Solving, Creating and Interpreting Graphs, and/or Creating Scientific Explanations by taking quizzes as well as the Unit Test.</li> </ul>
<b>Resources/Materials</b>	<p><a href="https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf">https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf</a></p> <p><a href="https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY_Tortora_14th_Ed">https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY_Tortora_14th_Ed</a></p> <p><a href="http://www2.mbusd.org/staff/pware/labs/ChickenWingDissection.pdf">http://www2.mbusd.org/staff/pware/labs/ChickenWingDissection.pdf</a></p> <p><a href="https://opentextbc.ca/anatomyandphysiology/chapter/4-2-epithelial-tissue/">https://opentextbc.ca/anatomyandphysiology/chapter/4-2-epithelial-tissue/</a></p>		
<b>ELA Companion Standards</b>	<p><b>RST.11-12.7</b> Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.</p> <p><b>RST.11-12.8</b> Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.</p> <p><b>WHST.9-12.2</b> Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.</p>		
<b>Interdisciplinary Connections</b>	<p><u><i>English Language Arts/Literacy</i></u></p> <p><b>SL.11-12.1.</b> Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with peers on grades 11–12 topics, texts, and issues, building on others’ ideas and expressing their own clearly and persuasively.</p> <p><b>SL.11-12.4</b> Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.</p>		

	<p><i>Math</i></p> <p><b>MP.4</b> Model with mathematics.  <b>MP.2</b> Reason abstractly and quantitatively.  <b>HSN.Q.A.3</b> Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.</p>		
<p><b>Career Readiness, Life Literacies and Key Skills</b></p>	<p><b>9.2.12.CAP.4:</b> Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them including educational training requirements, costs, loans, and debt repayment  <b>9.2.12.CAP.5:</b> Assess and modify a personal plan to support current interests and postsecondary plans.  <b>9.2.12.CAP.6:</b> Identify transferable skills in career choices and design alternative career plans based on those skills. •  <b>9.2.12.CAP.7:</b> Use online resources to examine licensing, certification, and credentialing requirements at the local, state, and national levels to maintain compliance with industry requirements in areas of career interest.  <b>9.2.12.CAP.8:</b> Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.  <b>9.4.12.CI.1:</b> Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).  <b>9.4.12.CI.2:</b> Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).  <b>9.4.12.CI.3:</b> Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).</p> <p><b>Career Readiness, Life Literacies, and Key Skills Practices</b>  Act as a responsible and contributing community member and employee  Demonstrate creativity and innovation.  Utilize critical thinking to make sense of problems and persevere in solving them.  Model integrity, ethical leadership, and effective management.  Plan education and career paths aligned to personal goals.  Use technology to enhance productivity, increase collaboration, and communicate effectively.  Work productively in teams while using cultural/global competence.</p>		
<p><b>Computer Science &amp; Design Thinking</b></p>	<p><b>8.1.12.DA.5:</b> Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.  <b>8.2.12.ED.1:</b> Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.</p>		
<p><b>Modifications</b></p>			
<p><b>Multi-Lingual Learners</b></p>	<p><b>Special Education</b></p>	<p><b>At-Risk</b></p>	<p><b>Gifted and Talented</b></p>
<ul style="list-style-type: none"> <li>● Display labeled images of designs and parts.</li> <li>● Use body movement and gestures to further explain concepts to</li> </ul>	<ul style="list-style-type: none"> <li>● Reinforce safety rules when using equipment</li> <li>● Provide adequate scaffolds for the design process.</li> </ul>	<ul style="list-style-type: none"> <li>● Incorporate student choice</li> <li>● Invite parents, neighbors, friends, the school principal and other community members to support</li> </ul>	<ul style="list-style-type: none"> <li>● Lead the class in the deciphering of new learning.</li> </ul>

<p>students.</p> <ul style="list-style-type: none"><li>● Restate design steps aloud before project activity.</li><li>● Assign a native language partner.</li></ul>	<ul style="list-style-type: none"><li>● Provide alternative choices (i.e. verbal or visual) to demonstrate proficiency.</li><li>● Provide an outline of lessons</li><li>● Get a written list of instructions</li><li>● Work or take a test in a different setting, such as a quiet room with few distractions</li><li>● Sit where they learn best (for example, near the teacher)</li></ul>	<p>classroom activities.</p> <ul style="list-style-type: none"><li>● Provide peer mentoring to improve techniques.</li></ul>	<ul style="list-style-type: none"><li>● Create a more detailed report which includes additional research outside of project requirements.</li></ul>
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## Introduction to Anatomy and Physiology

## Unit 3: The Integumentary System

Time Allotted: 3-4 weeks

## New Jersey Student Learning Standards (NJSLS)

**HS-LS1-1.** Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.

**HS-LS1-2** Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

**HS-LS1-3** Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

**HS-LS1-4.** Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms

Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
<p><b>Constructing Explanations and Designing Solutions</b></p> <ul style="list-style-type: none"> <li>Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.</li> </ul> <p><b>Developing and Using Models Modeling</b></p> <ul style="list-style-type: none"> <li>Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> <li>Use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> </ul> <p><b>Planning and Carrying Out Investigations</b></p> <ul style="list-style-type: none"> <li>Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.</li> </ul> <p>-----</p> <p style="text-align: center;"><i>Connections to Nature of Science</i></p> <p><b>Scientific Investigations</b></p> <ul style="list-style-type: none"> <li>Use a Variety of Methods Scientific inquiry is characterized by a common set of values that include: logical thinking, precision, open-mindedness, objectivity, skepticism, replicability of results, and honest and ethical reporting of findings.</li> </ul>	<p><b>LS1.A: Structure and Function</b></p> <ul style="list-style-type: none"> <li>Systems of specialized cells within organisms help them perform the essential functions of life.</li> <li>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. <i>(Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)</i></li> <li>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.</li> <li>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.</li> </ul> <p><b>LS1.B: Growth and Development of Organisms</b></p> <ul style="list-style-type: none"> <li>In multicellular organisms individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. The organism begins as a single cell (fertilized egg) that divides successively to produce many cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both daughter cells. Cellular division and differentiation produce and maintain a complex organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism.</li> </ul>	<p><b>Structure and Function</b></p> <ul style="list-style-type: none"> <li>Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.</li> </ul> <p><b>Stability and Change</b></p> <ul style="list-style-type: none"> <li>Feedback (negative or positive) can stabilize or destabilize a system.</li> </ul> <p><b>Systems and System Models</b></p> <ul style="list-style-type: none"> <li>Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows— within and between systems at different scales</li> </ul>

Essential Questions	Student Learning Objectives	Suggested Tasks/Activities	Evidence of Learning (Assessment)
<ul style="list-style-type: none"> <li>● <i>Why is the skin vital as the body's first line of defense?</i></li> <li>● <i>How do the skin and its components make up a complex organ that protects and interacts with other body systems?</i></li> <li>● <i>What are the various diseases and disorders associated with the integumentary system?</i></li> </ul>	<ul style="list-style-type: none"> <li>● Describe the basic structure of the layers of the skin</li> <li>● Explain the main functions of the skin and examine how the skin helps to regulate body temperature using homeostatic feedback loops</li> <li>● Summarize the factors that determine skin color and hair color</li> <li>● Describe the accessory structures associated with the skin such as nails, hair, glands, hooves, horns, antler and fur</li> <li>● Describe the process of wound healing</li> <li>● Examine various types of homeostatic imbalances of the skin including burns</li> <li>● Investigate neurologic control of skin function</li> <li>● Explore careers related to the integument- Dermatologist, Plastic Surgeon, Esthetician</li> </ul>	<p>Lab/Activities:</p> <ul style="list-style-type: none"> <li>● Use microscopes to observe thick and thin skin, hair and glands. Draw and label what you see</li> <li>● Plan and carry out an investigation to determine which areas of the body are most sensitive to touch using a 2 point discrimination test.</li> <li>● Using Models, determine how skin regulates body temperature using feedback loops and details of physiological mechanisms(<i>Skin and Temperature Control</i>)</li> <li>● Prepare cats for dissection (washing of fur to clear off extra preservative)</li> <li>● Dissect the skin off the cat</li> <li>● Construct a model of a typical cross section of skin. Label all parts</li> <li>● Healthcare Skills- Carry out an investigation to perform suturing techniques on various materials representing the skin</li> </ul>	<ul style="list-style-type: none"> <li>● Assessment of written and verbal mastery of unit-specific vocabulary, on a performance or practical</li> <li>● Assessment of skills such as asking questions, defining problems, and/or constructing explanations when completing the case study.</li> <li>● Assessment of modeling skills by drawing, coloring and labeling diagrams, making analogies, and/or making observational sketches.</li> <li>● Assessment of lab skills (Experimental Design, Data Analysis, and/or Arguing a Scientific Claim) by submitting Lab Reports for each lab conducted</li> <li>● Assessment of research, argumentation, and/or presentation skills by completing the project, including supporting documentation.</li> <li>● Assessment of skills such as Problem Solving, Creating and Interpreting Graphs, and/or Creating Scientific Explanations by taking quizzes as well as the Unit Test.</li> </ul>
<b>Resources/Materials</b>	<a href="https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf">https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf</a>		

	<p><a href="https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY_Tortora_14th_Ed">https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY_Tortora_14th_Ed</a></p> <p><a href="https://www.carolina.com/preserved-organisms-classroom-resources/cat-anatomy-and-dissection-guide/455575.pr?question=cat+dissection+guide">https://www.carolina.com/preserved-organisms-classroom-resources/cat-anatomy-and-dissection-guide/455575.pr?question=cat+dissection+guide</a></p> <p><a href="https://www.carolina.com/preserved-dogs/dog-anatomy-a-photo-atlas/455794.pr?question=dog+anatomy">https://www.carolina.com/preserved-dogs/dog-anatomy-a-photo-atlas/455794.pr?question=dog+anatomy</a></p>
<b>ELA Companion Standards</b>	<p><b>RST.11-12.8</b> Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.</p> <p><b>WHST.9-12.2</b> Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.</p>
<b>Interdisciplinary Connections</b>	<p><i>English Language Arts/Literacy</i></p> <p><b>SL.11-12.1.</b> Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with peers on grades 11–12 topics, texts, and issues, building on others’ ideas and expressing their own clearly and persuasively.</p> <p><b>SL.11-12.4</b> Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.</p> <p><i>Math</i></p> <p><b>MP.4</b> Model with mathematics.</p> <p><b>MP.2</b> Reason abstractly and quantitatively.</p>
<b>Career Readiness, Life Literacies, and Key Skills</b>	<p><b>9.2.12.CAP.4:</b> Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them including educational training requirements, costs, loans, and debt repayment</p> <p><b>9.2.12.CAP.5:</b> Assess and modify a personal plan to support current interests and postsecondary plans.</p> <p><b>9.2.12.CAP.6:</b> Identify transferable skills in career choices and design alternative career plans based on those skills. •</p> <p><b>9.2.12.CAP.7:</b> Use online resources to examine licensing, certification, and credentialing requirements at the local, state, and national levels to maintain compliance with industry requirements in areas of career interest.</p> <p><b>9.2.12.CAP.8:</b> Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.</p> <p><b>9.4.12.CI.1:</b> Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).</p> <p><b>9.4.12.CI.2:</b> Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).</p> <p><b>9.4.12.CI.3:</b> Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).</p> <p><b>Career Readiness, Life Literacies, and Key Skills Practices</b></p> <p>Act as a responsible and contributing community member and employee</p> <p>Demonstrate creativity and innovation.</p> <p>Utilize critical thinking to make sense of problems and persevere in solving them.</p> <p>Model integrity, ethical leadership, and effective management.</p>

	<p>Plan education and career paths aligned to personal goals.</p> <p>Use technology to enhance productivity, increase collaboration, and communicate effectively.</p> <p>Work productively in teams while using cultural/global competence.</p>
<b>Computer Science &amp; Design Thinking</b>	<p><b>8.1.12.DA.5:</b> Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.</p> <p><b>8.1.12.DA.6:</b> Create and refine computational models to better represent the relationships among different elements of data collected from a phenomena or process.</p>

<b>Modifications</b>			
<b>Multi-Lingual Learners</b>	<b>Special Education</b>	<b>At-Risk</b>	<b>Gifted and Talented</b>
<ul style="list-style-type: none"> <li>● Display labeled images of designs and parts.</li> <li>● Use body movement and gestures to further explain concepts to students.</li> <li>● Restate design steps aloud before project activity.</li> <li>● Assign a native language partner.</li> </ul>	<ul style="list-style-type: none"> <li>● Reinforce safety rules when using equipment</li> <li>● Provide adequate scaffolds for the design process.</li> <li>● Provide alternative choices (i.e. verbal or visual) to demonstrate proficiency.</li> <li>● Provide an outline of lessons</li> <li>● Get a written list of instructions</li> <li>● Work or take a test in a different setting, such as a quiet room with few distractions</li> <li>● Sit where they learn best (for example, near the teacher)</li> </ul>	<ul style="list-style-type: none"> <li>● Incorporate student choice</li> <li>● Invite parents, neighbors, friends, the school principal and other community members to support classroom activities.</li> <li>● Provide peer mentoring to improve techniques.</li> </ul>	<ul style="list-style-type: none"> <li>● Lead the class in the deciphering of new learning.</li> <li>● Create a more detailed report which includes additional research outside of project requirements.</li> </ul>

<b>Resources/Materials</b>	<p><a href="https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf">https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf</a></p> <p><a href="https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY_Tortora_14th_Ed">https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY_Tortora_14th_Ed</a></p> <p><a href="https://www.carolina.com/preserved-organisms-classroom-resources/cat-anatomy-and-dissection-guide/455575.pr?question=cat+dissection+guide">https://www.carolina.com/preserved-organisms-classroom-resources/cat-anatomy-and-dissection-guide/455575.pr?question=cat+dissection+guide</a></p> <p><a href="https://www.carolina.com/preserved-dogs/dog-anatomy-a-photo-atlas/455794.pr?question=dog+anatomy">https://www.carolina.com/preserved-dogs/dog-anatomy-a-photo-atlas/455794.pr?question=dog+anatomy</a></p>
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## Introduction to Anatomy and Physiology

## Unit 4: The Digestive System

Time Allotted: 4-5 weeks

## New Jersey Student Learning Standards (NJSLS)

**HS-LS1-1.** Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.

**HS-LS1-2** Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

**HS-LS1-3** Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

**HS-LS1-4.** Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

**HS-LS1-6** Construct and revise an explanation based on evidence for how carbon, hydrogen, and oxygen from sugar molecules may combine with other elements to form amino acids and/or other large carbon-based molecules.

**HS-LS1-7** Use a model to illustrate that cellular respiration is a chemical process whereby the bonds of food molecules and oxygen

**HS-LS2-3** Construct and revise an explanation based on evidence for the cycling of matter and flow of energy in aerobic and anaerobic conditions.

**HS-LS2-4** Use mathematical representations to support claims for the cycling of matter and flow of energy among organisms in an ecosystem.

Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
<p><b>Constructing Explanations and Designing Solutions</b></p> <ul style="list-style-type: none"> <li>Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.</li> </ul> <p><b>Developing and Using Models Modeling</b></p> <ul style="list-style-type: none"> <li>Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> <li>Use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> </ul> <p><b>Planning and Carrying Out Investigations</b></p> <ul style="list-style-type: none"> <li>Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and</li> </ul>	<p><b>LS1.A: Structure and Function</b></p> <ul style="list-style-type: none"> <li>Systems of specialized cells within organisms help them perform the essential functions of life.</li> <li>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. <i>(Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)</i></li> <li>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.</li> <li>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.</li> </ul> <p><b>LS1.B: Growth and Development of Organisms</b></p> <ul style="list-style-type: none"> <li>In multicellular organisms individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. The organism begins as a single cell (fertilized egg) that divides successively to produce many cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both daughter cells. Cellular division and differentiation produce and maintain a complex organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism.</li> </ul>	<p><b>Structure and Function</b></p> <ul style="list-style-type: none"> <li>Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.</li> </ul> <p><b>Stability and Change</b></p> <ul style="list-style-type: none"> <li>Feedback (negative or positive) can stabilize or destabilize a system.</li> </ul> <p><b>Systems and System Models</b></p> <ul style="list-style-type: none"> <li>Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales</li> </ul>



consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.

#### Engaging in Argument from Evidence

- Make and defend a claim based on evidence about the natural world that reflects scientific knowledge, and student-generated evidence.

#### Using Mathematics and Computational Thinking

- Use mathematical representations of phenomena or design solutions to support claims.

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*Connections to Nature of Science*

#### Scientific Investigations

- Use a Variety of Methods Scientific inquiry is characterized by a common set of values that include: logical thinking, precision, open-mindedness, objectivity, skepticism, replicability of results, and honest and ethical reporting of findings.

#### Scientific Knowledge is Open to Revision in Light of New Evidence

- Most scientific knowledge is quite durable, but is, in principle, subject to change based on new evidence and/or reinterpretation of existing evidence.

#### LS1.C: Organization for Matter and Energy Flow in Organisms

- The sugar molecules thus formed contain carbon, hydrogen, and oxygen: their hydrocarbon backbones are used to make amino acids and other carbon-based molecules that can be assembled into larger molecules (such as proteins or DNA), used for example to form new cells.
- As matter and energy flow through different organizational levels of living systems, chemical elements are recombined in different ways to form different products.
- As a result of these chemical reactions, energy is transferred from one system of interacting molecules to another. Cellular respiration is a chemical process in which the bonds of food molecules and oxygen molecules are broken and new compounds are formed that can transport energy to muscles. Cellular respiration also releases the energy needed to maintain body temperature despite ongoing energy transfer to the surrounding environment.

#### LS2.B: Cycles of Matter and Energy Transfer in Ecosystems

- Photosynthesis and cellular respiration (including anaerobic processes) provide most of the energy for life processes.
- Plants or algae form the lowest level of the food web. At each link upward in a food web, only a small fraction of the matter consumed at the lower level is transferred upward, to produce growth and release energy in cellular respiration at the higher level. Given this inefficiency, there are generally fewer organisms at higher levels of a food web. Some matter reacts to release energy for life functions, some matter is stored in newly made structures, and much is discarded. The chemical elements that make up the molecules of organisms pass through food webs and into and out of the atmosphere and soil, and they are combined and recombined in different ways. At each link in an ecosystem, matter and energy are conserved.

#### LS3.B: Variation of Traits

- In sexual reproduction, chromosomes can sometimes swap sections during the process of meiosis (cell division), thereby creating new genetic combinations and thus more genetic variation. Although DNA replication is tightly regulated and remarkably accurate, errors do occur and result in mutations, which are also a source of genetic variation. Environmental factors can also cause mutations in genes, and viable mutations are inherited.
- Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus the variation and distribution of traits observed depends on both genetic and environmental factors.

#### Cause and Effect

- Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.

#### Energy and Matter

- Changes of energy and matter in a system can be described in terms of energy and matter flows into, out of, and within that system.
- Energy cannot be created or destroyed—it only moves between one place and another place, between objects and/or fields, or between systems.
- Energy drives the cycling of matter within and between systems.

Essential Questions	Student Learning Objectives	Suggested Tasks/Activities	Evidence of Learning (Assessment)
<ul style="list-style-type: none"> <li>● <i>How is the digestion of food related to biochemical synthesis?</i></li> <li>● <i>Why can't 100% of food ingested be used internally?</i></li> <li>● <i>How do the digestive processes of monogastrics differ from ruminants?</i></li> <li>● <i>What are the various diseases and disorders associated with the digestive system?</i></li> </ul>	<ul style="list-style-type: none"> <li>● Describe the general functions of the digestive system</li> <li>● Describe the structure of the wall of the alimentary canal</li> <li>● Describe the functions of the structures of the mouth, esophagus, stomach, small intestine, large intestine and rectum.</li> <li>● Describe structure and function of the accessory organs such as the teeth, pancreas, liver, and gallbladder</li> <li>● Describe an adequate diet while examining carb, protein and fat content</li> <li>● Compare and contrast fat soluble vs water soluble vitamins</li> <li>● Examine various types of homeostatic imbalances of the Digestive System (i.e. diabetes, Crohns, colitis, colorectal cancer, etc.)</li> <li>● Explore careers related to the Digestive System- Nutritionist, Ultrasound technician, Colonoscopy technician, Feeding/Swallowing Therapist, Doctor- Gastroenterologist, Proctologist, Urologist and dentist</li> </ul>	<p>Labs/Activities:</p> <ul style="list-style-type: none"> <li>● Microscope activity (morphological changes in various parts of the tract)</li> <li>● Comparative dissections: research and compare digestive systems</li> <li>● Review organic molecules and neutralization of stomach acid</li> <li>● Analyze a cereal box food label</li> <li>● String activity showing the lengths of various types of digestive systems</li> <li>● "Modeling Alimentary Canal" Activity</li> <li>● Construct explanations as you design a patient history, vitals, signs and symptoms associated with a specific digestive system disorder/disease (<i>Digestive System Diagnosis</i>)</li> <li>● Dissection of the digestive system of the cat to identify relationships of structure and function of the digestive system</li> </ul>	<ul style="list-style-type: none"> <li>● Assessment of written and verbal mastery of unit-specific vocabulary, on a performance or practical</li> <li>● Assessment of skills such as asking questions, defining problems, and/or constructing explanations when completing the case study.</li> <li>● Assessment of modeling skills by drawing and labeling diagrams, making analogies, and/or making observational sketches.</li> <li>● Assessment of lab skills (Experimental Design, Data Analysis, and/or Arguing a Scientific Claim) by submitting Lab Reports for each lab conducted</li> <li>● Assessment of research, argumentation, and/or presentation skills by completing the project, including supporting documentation.</li> <li>● Assessment of skills such as Problem Solving, Creating and Interpreting Graphs, and/or Creating Scientific Explanations by taking quizzes as well as</li> </ul>

			the Unit Test.
<b>Resources/Materials</b>	<a href="https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf">https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf</a> <a href="https://www.carolina.com/preserved-organisms-classroom-resources/cat-anatomy-and-dissection-guide/455575.pr?question=cat+dissection+guide">https://www.carolina.com/preserved-organisms-classroom-resources/cat-anatomy-and-dissection-guide/455575.pr?question=cat+dissection+guide</a> <a href="https://www.carolina.com/preserved-dogs/dog-anatomy-a-photo-atlas/455794.pr?question=dog+anatomy">https://www.carolina.com/preserved-dogs/dog-anatomy-a-photo-atlas/455794.pr?question=dog+anatomy</a> <a href="https://packgoats.com/understanding-goat-digestive-systems/">https://packgoats.com/understanding-goat-digestive-systems/</a> <a href="https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY_Tortora_14th_Ed">https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY_Tortora_14th_Ed</a>		
<b>ELA Companion Standards</b>	<p><b>RST.11-12.7</b> Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.</p> <p><b>RST.11-12.8</b> Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.</p> <p><b>WHST.9-12.2</b> Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.</p>		
<b>Interdisciplinary Connections</b>	<p><i>English Language Arts/Literacy</i></p> <p><b>SL.11-12.1.</b> Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with peers on grades 11–12 topics, texts, and issues, building on others’ ideas and expressing their own clearly and persuasively.</p> <p><b>SL.11-12.4</b> Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.</p> <p><i>Math</i></p> <p><b>MP.4</b> Model with mathematics.</p> <p><b>MP.2</b> Reason abstractly and quantitatively.</p>		
<b>Career Readiness, Life Literacies, and Key Skills</b>	<p><b>9.2.12.CAP.4:</b> Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them including educational training requirements, costs, loans, and debt repayment</p> <p><b>9.2.12.CAP.5:</b> Assess and modify a personal plan to support current interests and postsecondary plans.</p> <p><b>9.2.12.CAP.6:</b> Identify transferable skills in career choices and design alternative career plans based on those skills. •</p> <p><b>9.2.12.CAP.7:</b> Use online resources to examine licensing, certification, and credentialing requirements at the local, state, and national levels to maintain compliance with industry requirements in areas of career interest.</p> <p><b>9.2.12.CAP.8:</b> Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.</p> <p><b>9.4.12.CI.1:</b> Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a). <b>9.4.12.CI.2:</b> Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).</p> <p><b>9.4.12.CI.3:</b> Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).</p>		

	<p><b>Career Readiness, Life Literacies, and Key Skills Practices</b>                  Act as a responsible and contributing community member and employee                  Demonstrate creativity and innovation.                  Utilize critical thinking to make sense of problems and persevere in solving them.                  Model integrity, ethical leadership, and effective management.                  Plan education and career paths aligned to personal goals.                  Use technology to enhance productivity, increase collaboration, and communicate effectively.                  Work productively in teams while using cultural/global competence.</p>		
<p><b>Computer Science &amp; Design Thinking</b></p>	<p><b>8.1.12.DA.5:</b> Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.  <b>8.1.12.DA.6:</b> Create and refine computational models to better represent the relationships among different elements of data collected from a phenomena or process.</p>		
<p><b>Modifications</b></p>			
<p><b>Multi-Lingual Learners</b></p>	<p><b>Special Education</b></p>	<p><b>At-Risk</b></p>	<p><b>Gifted and Talented</b></p>
<ul style="list-style-type: none"> <li>● Display labeled images of designs and parts.</li> <li>● Use body movement and gestures to further explain concepts to students.</li> <li>● Restate design steps aloud before project activity.</li> <li>● Assign a native language partner.</li> </ul>	<ul style="list-style-type: none"> <li>● Reinforce safety rules when using equipment</li> <li>● Provide adequate scaffolds for the design process.</li> <li>● Provide alternative choices (i.e. verbal or visual) to demonstrate proficiency.</li> <li>● Provide an outline of lessons</li> <li>● Get a written list of instructions</li> <li>● Work or take a test in a different setting, such as a quiet room with few distractions</li> <li>● Sit where they learn best (for example, near the teacher)</li> </ul>	<ul style="list-style-type: none"> <li>● Incorporate student choice</li> <li>● Invite parents, neighbors, friends, the school principal and other community members to support classroom activities.</li> <li>● Provide peer mentoring to improve techniques.</li> </ul>	<ul style="list-style-type: none"> <li>● Lead the class in the deciphering of new learning.</li> <li>● Create a more detailed report which includes additional research outside of project requirements.</li> </ul>

## Introduction to Anatomy and Physiology

### Unit 5: The Skeletal System

**Time Allotted: 6 weeks**

#### New Jersey Student Learning Standards (NJSLS)

**HS-LS1-1.** Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.

**HS-LS1-2** Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

**HS-LS1-3** Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

**HS-LS1-4.** Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
<p><b>Constructing Explanations and Designing Solutions</b></p> <ul style="list-style-type: none"> <li>Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.</li> </ul> <p><b>Developing and Using Models Modeling</b></p> <ul style="list-style-type: none"> <li>Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> <li>Use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> </ul> <p><b>Planning and Carrying Out Investigations</b></p> <ul style="list-style-type: none"> <li>Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.</li> </ul> <p style="text-align: center;">----- <i>Connections to Nature of Science</i></p> <p><b>Scientific Investigations</b></p> <ul style="list-style-type: none"> <li>Use a Variety of Methods Scientific inquiry is characterized by a common set of values that include: logical thinking,</li> </ul>	<p><b>LS1.A: Structure and Function</b></p> <ul style="list-style-type: none"> <li>Systems of specialized cells within organisms help them perform the essential functions of life.</li> <li>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. (<i>Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.</i>)</li> <li>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.</li> <li>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.</li> </ul> <p><b>LS1.B: Growth and Development of Organisms</b></p> <ul style="list-style-type: none"> <li>In multicellular organisms individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. The organism begins as a single cell (fertilized egg) that divides successively to produce many cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both daughter cells. Cellular division and differentiation produce and maintain a complex organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism.</li> </ul>	<p><b>Structure and Function</b></p> <ul style="list-style-type: none"> <li>Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.</li> </ul> <p><b>Stability and Change</b></p> <ul style="list-style-type: none"> <li>Feedback (negative or positive) can stabilize or destabilize a system.</li> </ul> <p><b>Systems and System Models</b></p> <ul style="list-style-type: none"> <li>Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales</li> </ul>

precision, open-mindedness, objectivity, skepticism, replicability of results, and honest and ethical reporting of findings.			
Essential Questions			
Essential Questions	Student Learning Objectives	Suggested Tasks/Activities	Evidence of Learning (Assessment)
<ul style="list-style-type: none"> <li>How does the mechanical needs of the bone determine how the bone will develop?</li> <li>What are the physiologic mechanisms of the skeletal system?</li> <li>How do bones provide support, protection and movement for the body?</li> <li>How does bone age and what role do hormones play in the aging process?</li> <li>What are the various diseases and disorders associated with the skeletal system?</li> </ul>	<ul style="list-style-type: none"> <li>Describe the major structure and functions of bone</li> <li>Classify bones by their shape</li> <li>Compare and contrast compact and spongy bone</li> <li>Describe factors that affect bone development, growth and repair</li> <li>Distinguish between the axial and appendicular skeletal systems</li> <li>Locate and identify bones and their landmarks of the axial skeletal system</li> <li>Locate and identify bones and their landmarks of the appendicular skeletal system</li> <li>Explain the morphological differences between male and female pelvis</li> <li>Describe homeostatic imbalances associated with the skeletal system such as fractures, osteogenesis imperfecta, osteoporosis, scoliosis, marfan's</li> <li>Describe bone repair and remodelling</li> <li>Explore careers related to the Skeletal System- X-Ray Technician, Physical Therapist, Athletic Trainer,</li> </ul>	Labs/Activities: <ul style="list-style-type: none"> <li>Healthcare Skills- Diagnosis of skeletal abnormalities using medical radiography scans.</li> <li>Compare and contrast CT and MRI images of similar structures</li> <li>Analyze and interpret data (diagnose and analyze surgical procedure) from knee injury which occurred during a ski accident (Case Study-Knee Injury)</li> <li>Dissection- Observational drawings of structure of the skeletal system through dissection of a cat</li> <li>Draw diagrams detailing various methods of bone formation</li> <li>Case study interpretation and analysis</li> <li>Practical assessments of bone identification and bony landmark identification</li> </ul>	<ul style="list-style-type: none"> <li>Assessment of written and verbal mastery of unit-specific vocabulary, on a performance or practical</li> <li>Assessment of skills such as asking questions, defining problems, and/or constructing explanations when completing the case study.</li> <li>Assessment of modeling skills by drawing and labeling diagrams, making analogies, and/or making observational sketches.</li> <li>Assessment of lab skills (Experimental Design, Data Analysis, and/or Arguing a Scientific Claim) by submitting Lab Reports for each lab conducted</li> <li>Assessment of research, argumentation, and/or presentation skills by completing the project, including supporting documentation.</li> <li>Assessment of skills such as Problem Solving, Creating and Interpreting Graphs, and/or Creating Scientific Explanations by</li> </ul>

	Occupational Therapist, Orthopedic Surgeon		taking quizzes as well as the Unit Test.
<b>Resources/Materials</b>	<a href="https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf">https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf</a> <a href="https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY_Tortora_14th_Ed">https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY_Tortora_14th_Ed</a> <a href="https://www.youtube.com/watch?v=MFkWypzHn2Q">https://www.youtube.com/watch?v=MFkWypzHn2Q</a> <a href="https://www.carolina.com/preserved-organisms-classroom-resources/cat-anatomy-and-dissection-guide/455575.pr?question=cat+dissection+guide">https://www.carolina.com/preserved-organisms-classroom-resources/cat-anatomy-and-dissection-guide/455575.pr?question=cat+dissection+guide</a> <a href="https://www.carolina.com/preserved-dogs/dog-anatomy-a-photo-atlas/455794.pr?question=dog+anatomy">https://www.carolina.com/preserved-dogs/dog-anatomy-a-photo-atlas/455794.pr?question=dog+anatomy</a> <a href="https://opentextbc.ca/anatomyandphysiology/chapter/6-3-bone-structure/">https://opentextbc.ca/anatomyandphysiology/chapter/6-3-bone-structure/</a>		
<b>ELA Companion Standards</b>	<p><b>RST.11-12.7</b> Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.</p> <p><b>RST.11-12.8</b> Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.</p> <p><b>WHST.9-12.2</b> Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.</p>		
<b>Interdisciplinary Connections</b>	<p><b><u>ELA/Literacy</u></b></p> <p><b>SL.11-12.1.</b> Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with peers on grades 11–12 topics, texts, and issues, building on others’ ideas and expressing their own clearly and persuasively.</p> <p><b>SL.11-12.2.</b> Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, qualitatively, orally) evaluating the credibility and accuracy of each source.</p> <p><b>SL.11-12.4</b> Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.</p> <p><b>SL.11-12.5.</b> Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.</p> <p><b><u>Math</u></b></p> <p><b>MP.4</b> Model with mathematics.</p> <p><b>MP.2</b> Reason abstractly and quantitatively.</p>		
<b>Career Readiness, Life Literacies, and Key Skills</b>	<p><b>9.2.12.CAP.4:</b> Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them including educational training requirements, costs, loans, and debt repayment</p> <p><b>9.2.12.CAP.5:</b> Assess and modify a personal plan to support current interests and postsecondary plans.</p> <p><b>9.2.12.CAP.6:</b> Identify transferable skills in career choices and design alternative career plans based on those skills. •</p> <p><b>9.2.12.CAP.7:</b> Use online resources to examine licensing, certification, and credentialing requirements at the local, state, and national levels to maintain compliance with industry requirements in areas of career interest.</p> <p><b>9.2.12.CAP.8:</b> Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests,</p>		

	<p>drug tests) used by employers in various industry sectors.</p> <p><b>9.4.12.CI.1:</b> Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).</p> <p><b>9.4.12.CI.2:</b> Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).</p> <p><b>9.4.12.CI.3:</b> Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).</p> <p><b>Career Readiness, Life Literacies, and Key Skills Practices</b></p> <p>Act as a responsible and contributing community member and employee</p> <p>Demonstrate creativity and innovation.</p> <p>Utilize critical thinking to make sense of problems and persevere in solving them.</p> <p>Model integrity, ethical leadership, and effective management.</p> <p>Plan education and career paths aligned to personal goals.</p> <p>Use technology to enhance productivity, increase collaboration, and communicate effectively.</p> <p>Work productively in teams while using cultural/global competence.</p>
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<p><b>Computer Science &amp; Design Thinking</b></p>	<p><b>8.1.12.DA.5:</b> Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.</p> <p><b>8.1.12.DA.6:</b> Create and refine computational models to better represent the relationships among different elements of data collected from a phenomena or process.</p> <p><b>8.2.12.ED.5:</b> Evaluate the effectiveness of a product or system based on factors that are related to its requirements, specifications, and constraints (e.g., safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, ergonomics).</p>
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**Modifications**

<b>Multi-Lingual Learners</b>	<b>Special Education</b>	<b>At-Risk</b>	<b>Gifted and Talented</b>
<ul style="list-style-type: none"> <li>● Display labeled images of designs and parts.</li> <li>● Use body movement and gestures to further explain concepts to students.</li> <li>● Restate design steps aloud before project activity.</li> <li>● Assign a native language partner.</li> </ul>	<ul style="list-style-type: none"> <li>● Reinforce safety rules when using equipment</li> <li>● Provide adequate scaffolds for the design process.</li> <li>● Provide alternative choices (i.e. verbal or visual) to demonstrate proficiency.</li> <li>● Provide an outline of lessons</li> <li>● Get a written list of instructions</li> <li>● Work or take a test in a different setting, such as a quiet room with few</li> </ul>	<ul style="list-style-type: none"> <li>● Incorporate student choice</li> <li>● Invite parents, neighbors, friends, the school principal and other community members to support classroom activities.</li> <li>● Provide peer mentoring to improve techniques.</li> </ul>	<ul style="list-style-type: none"> <li>● Lead the class in the deciphering of new learning.</li> <li>● Create a more detailed report which includes additional research outside of project requirements.</li> </ul>



	distractions <ul style="list-style-type: none"> <li>Sit where they learn best (for example, near the teacher)</li> </ul>	
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**Introduction to Anatomy and Physiology**

**Unit 6: Joints**

**Time Allotted: 1 Week**

**New Jersey Student Learning Standards (NJSLS)**

**HS-LS1-1.** Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.

**HS-LS1-2** Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

**HS-LS1-3** Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

**HS-LS1-4.** Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

**HS-LS3-2.** Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.

Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
<p><b>Constructing Explanations and Designing Solutions</b></p> <ul style="list-style-type: none"> <li>Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.</li> </ul> <p><b>Developing and Using Models Modeling</b></p> <ul style="list-style-type: none"> <li>Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> <li>Use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> </ul> <p><b>Planning and Carrying Out Investigations</b></p> <ul style="list-style-type: none"> <li>Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.</li> </ul>	<p><b>LS1.A: Structure and Function</b></p> <ul style="list-style-type: none"> <li>Systems of specialized cells within organisms help them perform the essential functions of life.</li> <li>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. <i>(Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)</i></li> <li>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.</li> <li>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.</li> </ul> <p><b>LS1.B: Growth and Development of Organisms</b></p> <ul style="list-style-type: none"> <li>In multicellular organisms individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. The organism begins as a single cell (fertilized egg) that divides successively to produce many cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both daughter cells. Cellular division and differentiation produce and maintain a complex organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism.</li> </ul>	<p><b>Structure and Function</b></p> <ul style="list-style-type: none"> <li>Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.</li> </ul> <p><b>Stability and Change</b></p> <ul style="list-style-type: none"> <li>Feedback (negative or positive) can stabilize or destabilize a system.</li> </ul> <p><b>Systems and System Models</b></p> <ul style="list-style-type: none"> <li>Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows— within</li> </ul>

<p><b>Engaging in Argument from Evidence</b></p> <ul style="list-style-type: none"> <li>Make and defend a claim based on evidence about the natural world that reflects scientific knowledge, and student-generated evidence.</li> </ul> <p>-----</p> <p style="text-align: center;"><i>Connections to Nature of Science</i></p> <p><b>Scientific Investigations</b></p> <ul style="list-style-type: none"> <li>Use a Variety of Methods Scientific inquiry is characterized by a common set of values that include: logical thinking, precision, open-mindedness, objectivity, skepticism, replicability of results, and honest and ethical reporting of findings.</li> </ul>	<p><b>LS3.B: Variation of Traits</b></p> <ul style="list-style-type: none"> <li>In sexual reproduction, chromosomes can sometimes swap sections during the process of meiosis (cell division), thereby creating new genetic combinations and thus more genetic variation. Although DNA replication is tightly regulated and remarkably accurate, errors do occur and result in mutations, which are also a source of genetic variation. Environmental factors can also cause mutations in genes, and viable mutations are inherited.</li> <li>Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus the variation and distribution of traits observed depends on both genetic and environmental factors.</li> </ul>	<p>and between systems at different scales</p> <p><b>Cause and Effect</b></p> <ul style="list-style-type: none"> <li>Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.</li> </ul>
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Essential Questions	Student Learning Objectives	Suggested Tasks/Activities	Evidence of Learning (Assessment)
<ul style="list-style-type: none"> <li><i>What roles do tendons and ligaments play in joint structure?</i></li> <li><i>How does the structure of a joint define its range of motion?</i></li> <li><i>How does the joint structure of quadrupeds affect their range of motion?</i></li> <li><i>What are the various diseases and disorders associated with joints?</i></li> </ul>	<ul style="list-style-type: none"> <li>Describe types of joints, types of movement and range of motion</li> <li>Describe the structure and function of a synovial joint</li> <li>Demonstrate understanding of how levers are used in the body to enable muscles and bones to work together</li> <li>Describe the structure and function of specific major joints (hip, knee, shoulder,.)</li> <li>Describe advances in hip and knee replacement</li> <li>Describe specific injuries to joints and repair mechanisms (ACL injuries, Tommy John surgery, Lisfranc injuries, dislocations and subluxations)</li> </ul>	<p>Labs/Activities:</p> <ul style="list-style-type: none"> <li>In partners describe the range of motion of articular joints</li> <li>Research differences between rheumatoid arthritis and osteoarthritis</li> <li>Healthcare Skills- Diagnosis of skeletal abnormalities using medical radiography scans.</li> </ul>	<ul style="list-style-type: none"> <li>Assessment of written and verbal mastery of unit-specific vocabulary, on a performance or practical</li> <li>Assessment of modeling skills by drawing and labeling diagrams, making analogies, and/or making observational sketches.</li> <li>Assessment of lab skills (Experimental Design, Data Analysis, and/or Arguing a Scientific Claim) by submitting Lab Reports for each lab conducted</li> <li>Assessment of research, argumentation, and/or presentation skills by completing the project, including supporting documentation.</li> <li>Assessment of skills such as Problem Solving,</li> </ul>

			Creating and Interpreting Graphs, and/or Creating Scientific Explanations by taking quizzes as well as the Unit Test.
<b>Resources/Materials</b>	<a href="https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf">https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf</a> <a href="https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY_Tortora_14th_Ed">https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY_Tortora_14th_Ed</a> <a href="https://www.carolina.com/preserved-organisms-classroom-resources/cat-anatomy-and-dissection-guide/455575.pr?question=cat+dissection+guide">https://www.carolina.com/preserved-organisms-classroom-resources/cat-anatomy-and-dissection-guide/455575.pr?question=cat+dissection+guide</a> <a href="https://www.carolina.com/preserved-dogs/dog-anatomy-a-photo-atlas/455794.pr?question=dog+anatomy">https://www.carolina.com/preserved-dogs/dog-anatomy-a-photo-atlas/455794.pr?question=dog+anatomy</a>		
<b>ELA Companion Standards</b>	<p><b>RST.11-12.8</b> Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.</p> <p><b>WHST.9-12.2</b> Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p>		
<b>Interdisciplinary Connections</b>	<p><u><b>ELA/Literacy</b></u></p> <p><b>SL.11-12.1.</b> Initiate and participate effectively in a range of collaborative discussions (one-on- one, in groups, and teacher-led) with peers on grades 11–12 topics, texts, and issues, building on others’ ideas and expressing their own clearly and persuasively.</p> <p><b>SL.11-12.2.</b> Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, qualitatively, orally) evaluating the credibility and accuracy of each source.</p> <p><b>SL.11-12.4</b> Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.</p> <p><u><b>Math</b></u></p> <p><b>MP.2</b> Reason abstractly and quantitatively.</p> <p><b>HSN.Q.A.1</b> Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.</p>		
<b>Career Readiness, Life Literacies, and Key Skills</b>	<p><b>9.4.12.CI.1:</b> Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12.prof.CR3a).</p> <p><b>9.4.12.CI.2:</b> Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12.prof.CR2b, 2.2.12.LF.8).</p> <p><b>9.4.12.CI.3:</b> Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).</p> <p><b>Career Readiness, Life Literacies, and Key Skills Practices</b></p> <p>Act as a responsible and contributing community member and employee</p>		

	<p>Demonstrate creativity and innovation.                  Utilize critical thinking to make sense of problems and persevere in solving them.                  Model integrity, ethical leadership, and effective management.                  Plan education and career paths aligned to personal goals.                  Use technology to enhance productivity, increase collaboration, and communicate effectively.                  Work productively in teams while using cultural/global competence.</p>		
<b>Computer Science &amp; Design Thinking</b>	<p><b>8.1.12.DA.5:</b> Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.  <b>8.1.12.DA.6:</b> Create and refine computational models to better represent the relationships among different elements of data collected from a phenomena or process.  <b>8.2.12.ED.5:</b> Evaluate the effectiveness of a product or system based on factors that are related to its requirements, specifications, and constraints (e.g., safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, ergonomics).</p>		
<b>Modifications</b>			
<b>Multi-Lingual Learners</b>	<b>Special Education</b>	<b>At-Risk</b>	<b>Gifted and Talented</b>
<ul style="list-style-type: none"> <li>● Display labeled images of designs and parts.</li> <li>● Use body movement and gestures to further explain concepts to students.</li> <li>● Restate design steps aloud before project activity.</li> <li>● Assign a native language partner.</li> </ul>	<ul style="list-style-type: none"> <li>● Reinforce safety rules when using equipment</li> <li>● Provide adequate scaffolds for the design process.</li> <li>● Provide alternative choices (i.e. verbal or visual) to demonstrate proficiency.</li> <li>● Provide an outline of lessons</li> <li>● Get a written list of instructions</li> <li>● Work or take a test in a different setting, such as a quiet room with few distractions</li> <li>● Sit where they learn best (for example, near the teacher)</li> </ul>	<ul style="list-style-type: none"> <li>● Incorporate student choice</li> <li>● Invite parents, neighbors, friends, the school principal and other community members to support classroom activities.</li> <li>● Provide peer mentoring to improve techniques.</li> </ul>	<ul style="list-style-type: none"> <li>● Lead the class in the deciphering of new learning.</li> <li>● Create a more detailed report which includes additional research outside of project requirements.</li> </ul>

## Introduction to Anatomy and Physiology

### Unit 7: The Nervous System

**Time Allotted: 5 Weeks**

#### New Jersey Student Learning Standards (NJSLS)

**HS-LS1-1.** Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.

**HS-LS1-2** Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

**HS-LS1-3** Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

**HS-LS1-4.** Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
<p><b>Constructing Explanations and Designing Solutions</b></p> <ul style="list-style-type: none"> <li>Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.</li> </ul> <p><b>Developing and Using Models Modeling</b></p> <ul style="list-style-type: none"> <li>Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> <li>Use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> </ul> <p><b>Planning and Carrying Out Investigations</b></p> <ul style="list-style-type: none"> <li>Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.</li> </ul> <p style="text-align: center;">-----</p> <p style="text-align: center;"><i>Connections to Nature of Science</i></p> <p><b>Scientific Investigations</b></p>	<p><b>LS1.A: Structure and Function</b></p> <ul style="list-style-type: none"> <li>Systems of specialized cells within organisms help them perform the essential functions of life.</li> <li>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. <i>(Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)</i></li> <li>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.</li> <li>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.</li> </ul> <p><b>LS1.B: Growth and Development of Organisms</b></p> <ul style="list-style-type: none"> <li>In multicellular organisms individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. The organism begins as a single cell (fertilized egg) that divides successively to produce many cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both daughter cells. Cellular division and differentiation produce and maintain a complex organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism.</li> </ul>	<p><b>Structure and Function</b></p> <ul style="list-style-type: none"> <li>Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.</li> </ul> <p><b>Stability and Change</b></p> <ul style="list-style-type: none"> <li>Feedback (negative or positive) can stabilize or destabilize a system.</li> </ul> <p><b>Systems and System Models</b></p> <ul style="list-style-type: none"> <li>Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows—within and between systems at different scales</li> </ul>

<ul style="list-style-type: none"> <li>Use a Variety of Methods Scientific inquiry is characterized by a common set of values that include: logical thinking, precision, open-mindedness, objectivity, skepticism, replicability of results, and honest and ethical reporting of findings.</li> </ul>			
Essential Questions			
Essential Questions	Student Learning Objectives	Suggested Tasks/Activities	Evidence of Learning (Assessment)
<ul style="list-style-type: none"> <li>Does our external environment influence how our nervous system works?</li> <li>How can the brain be so compartmentalized, yet communicate so effectively?</li> <li>How do the endocrine and nervous system interact with each other?</li> <li>How and why does society view mental illness differently from other illnesses?</li> <li>What are the various diseases and disorders associated with the nervous system?</li> </ul>	<ul style="list-style-type: none"> <li>Compare and contrast the central and peripheral nervous system</li> <li>Explain the general functions of the nervous system</li> <li>Explain how a nerve conducts an impulse</li> <li>Depict how information passes from one nerve to another</li> <li>Decipher the function of each part of a reflex arc</li> <li>Describe the covering of the brain and spinal cord</li> <li>Identify the major parts of the brain and their functions</li> <li>Investigate homeostatic imbalances associated with the nervous system such as carpal tunnel, meningitis, MS, parkinsons, Alzheimers, ALS</li> <li>Explore careers related to the Nervous System- PT, OT, Optometrist, Neurologist, Optometry assistant, Psychologist, Psychiatrist</li> </ul>	<p>Lab/Activities:</p> <ul style="list-style-type: none"> <li>Construct a model of the brain using a swim cap or paper to examine basic brain anatomy "<i>Brain Cap Activity</i>"</li> <li>Sheep brain dissection</li> <li>Cow eye dissection</li> <li>Distinguish the color activity</li> <li>Finding your own blind spot activity</li> <li>Practice examining reflexes on each other (babinski reflex, knee jerk, etc.).</li> <li>Dissection of sheep brain</li> <li>Dissection of cow eye</li> <li>Case study Interpretation and analysis: applying an anatomical and physiological concept to a real world situation.</li> <li>Healthcare skill                             <ul style="list-style-type: none"> <li>perform babinski reflex and knee jerk reflex on 'patients'</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>Assessment of written and verbal mastery of unit-specific vocabulary, on a performance or practical</li> <li>Assessment of skills such as asking questions, defining problems, and/or constructing explanations when completing the case study.</li> <li>Assessment of modeling skills by drawing and labeling diagrams, making analogies, and/or making observational sketches.</li> <li>Assessment of lab skills (Experimental Design, Data Analysis, and/or Arguing a Scientific Claim) by submitting Lab Reports for each lab conducted</li> <li>Assessment of skills such as Problem Solving, Creating and Interpreting Graphs, and/or Creating Scientific Explanations by taking quizzes as well as the Unit Test.</li> </ul>
<b>Resources/Materials</b>		<a href="https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf">https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf</a>	

	<p><a href="https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY_Tortora_14th_Ed">https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY_Tortora_14th_Ed</a></p> <p><a href="https://www.carolina.com/preserved-organisms-classroom-resources/cat-anatomy-and-dissection-guide/455575.pr?question=cat+dissection+guide">https://www.carolina.com/preserved-organisms-classroom-resources/cat-anatomy-and-dissection-guide/455575.pr?question=cat+dissection+guide</a></p> <p><a href="https://www.carolina.com/preserved-dogs/dog-anatomy-a-photo-atlas/455794.pr?question=dog+anatomy">https://www.carolina.com/preserved-dogs/dog-anatomy-a-photo-atlas/455794.pr?question=dog+anatomy</a></p> <p><a href="https://www.biologycorner.com/anatomy/sheepbrain/sheep_dissection.html">https://www.biologycorner.com/anatomy/sheepbrain/sheep_dissection.html</a></p> <p><a href="https://www.exploratorium.edu/learning_studio/cow_eye/">https://www.exploratorium.edu/learning_studio/cow_eye/</a></p> <p><a href="https://faculty.washington.edu/chudler/words.html">https://faculty.washington.edu/chudler/words.html</a></p>
<p><b>ELA Companion Standards</b></p>	<p><b>RST.11-12.7</b> Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g. quantitative data, video, multimedia) in order to address a question or solve a problem.</p> <p><b>RST.11-12.8</b> Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.</p> <p><b>WHST.9-12.2</b> Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.</p>
<p><b>Interdisciplinary Connections</b></p>	<p><u><b>ELA/Literacy</b></u></p> <p><b>SL.11-12.1.</b> Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with peers on grades 11–12 topics, texts, and issues, building on others’ ideas and expressing their own clearly and persuasively.</p> <p><b>SL.11-12.2.</b> Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, qualitatively, orally) evaluating the credibility and accuracy of each source.</p> <p><b>SL.11-12.4</b> Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.</p> <p><b>SL.11-12.5.</b> Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.</p> <p><u><b>Math</b></u></p> <p><b>MP.2</b> Reason abstractly and quantitatively.</p> <p><b>HSN.Q.A.1</b> Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.</p>
<p><b>Career Readiness, Life Literacies and Key Skills</b></p>	<p><b>9.2.12.CAP.4:</b> Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them including educational training requirements, costs, loans, and debt repayment</p> <p><b>9.2.12.CAP.5:</b> Assess and modify a personal plan to support current interests and postsecondary plans.</p> <p><b>9.2.12.CAP.6:</b> Identify transferable skills in career choices and design alternative career plans based on those skills. •</p> <p><b>9.2.12.CAP.7:</b> Use online resources to examine licensing, certification, and credentialing requirements at the local, state, and national levels to maintain compliance with industry requirements in areas of career interest.</p> <p><b>9.2.12.CAP.8:</b> Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.</p> <p><b>9.4.12.CI.1:</b> Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).</p> <p><b>9.4.12.CI.2:</b> Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b,</p>

	<p>2.2.12.LF.8).  <b>9.4.12.CI.3:</b> Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).</p> <p><b>Career Readiness, Life Literacies, and Key Skills Practices</b>                  Act as a responsible and contributing community member and employee                  Demonstrate creativity and innovation.                  Utilize critical thinking to make sense of problems and persevere in solving them.                  Model integrity, ethical leadership, and effective management.                  Plan education and career paths aligned to personal goals.                  Use technology to enhance productivity, increase collaboration, and communicate effectively.                  Work productively in teams while using cultural/global competence.</p>		
<p><b>Computer Science &amp; Design Thinking</b></p>	<p><b>8.1.12.DA.5:</b> Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.</p> <p><b>8.2.12.ED.1:</b> Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.</p> <p><b>8.2.12.ED.4:</b> Design a product or system that addresses a global problem and document decisions made based on research, constraints, trade-offs, and aesthetic and ethical considerations and share this information with an appropriate audience.</p> <p><b>8.2.12.ED.5:</b> Evaluate the effectiveness of a product or system based on factors that are related to its requirements, specifications, and constraints (e.g., safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, ergonomics).</p>		
<p><b>Modifications</b></p>			
<p style="text-align: center;"><b>Multi-Lingual Learners</b></p> <ul style="list-style-type: none"> <li>● Display labeled images of designs and parts.</li> <li>● Use body movement and gestures to further explain concepts to students.</li> <li>● Restate design steps aloud before project activity.</li> <li>● Assign a native language partner.</li> </ul>	<p style="text-align: center;"><b>Special Education</b></p> <ul style="list-style-type: none"> <li>● Reinforce safety rules when using equipment</li> <li>● Provide adequate scaffolds for the design process.</li> <li>● Provide alternative choices (i.e. verbal or visual) to demonstrate proficiency.</li> <li>● Provide an outline of lessons</li> <li>● Get a written list of instructions</li> <li>● Work or take a test in a different setting, such as a</li> </ul>	<p style="text-align: center;"><b>At-Risk</b></p> <ul style="list-style-type: none"> <li>● Incorporate student choice</li> <li>● Invite parents, neighbors, friends, the school principal and other community members to support classroom activities.</li> <li>● Provide peer mentoring to improve techniques.</li> </ul>	<p style="text-align: center;"><b>Gifted and Talented</b></p> <ul style="list-style-type: none"> <li>● Lead the class in the deciphering of new learning.</li> <li>● Create a more detailed report which includes additional research outside of project requirements.</li> </ul>



	quiet room with few distractions <ul style="list-style-type: none"> <li>• Sit where they learn best (for example, near the teacher)</li> </ul>		
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**Introduction to Anatomy and Physiology**  
**Unit 8: The Muscular System**

**Time Allotted: 4 weeks**

**New Jersey Student Learning Standards (NJSLS)**

**HS-LS1-1.** Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.

**HS-LS1-2** Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

**HS-LS1-3** Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

**HS-LS1-4.** Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

**HS-ETS1-1.** Analyze a major global challenge to specify qualitative and quantitative criteria and constraints for solutions that account for societal needs and wants.

Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
<p><b>Constructing Explanations and Designing Solutions</b></p> <ul style="list-style-type: none"> <li>• Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.</li> </ul> <p><b>Developing and Using Models Modeling</b></p> <ul style="list-style-type: none"> <li>• Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> <li>• Use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> </ul> <p><b>Planning and Carrying Out Investigations</b></p> <ul style="list-style-type: none"> <li>• Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.</li> </ul>	<p><b>LS1.A: Structure and Function</b></p> <ul style="list-style-type: none"> <li>• Systems of specialized cells within organisms help them perform the essential functions of life.</li> <li>• 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. <i>(Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)</i></li> <li>• 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.</li> <li>• 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.</li> </ul> <p><b>LS1.B: Growth and Development of Organisms</b></p> <ul style="list-style-type: none"> <li>• In multicellular organisms individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. The organism begins as a single cell (fertilized egg) that divides successively to produce many</li> </ul>	<p><b>Structure and Function</b></p> <ul style="list-style-type: none"> <li>• Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.</li> </ul> <p><b>Stability and Change</b></p> <ul style="list-style-type: none"> <li>• Feedback (negative or positive) can stabilize or destabilize a system.</li> </ul> <p><b>Systems and System Models</b></p> <ul style="list-style-type: none"> <li>• Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows— within and between systems at different scales</li> </ul> <p style="text-align: center;">-----</p>

<p><b>Asking Questions and Defining Problems</b></p> <ul style="list-style-type: none"> <li>Analyze complex real-world problems by specifying criteria and constraints for successful solutions.</li> </ul> <p>-----</p> <p style="text-align: center;"><i>Connections to Nature of Science</i></p> <p><b>Scientific Investigations</b></p> <ul style="list-style-type: none"> <li>Use a Variety of Methods Scientific inquiry is characterized by a common set of values that include: logical thinking, precision, open-mindedness, objectivity, skepticism, replicability of results, and honest and ethical reporting of findings.</li> </ul>	<p>cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both daughter cells. Cellular division and differentiation produce and maintain a complex organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism.</p> <p><b>ETS1.A: Defining and Delimiting Engineering Problems</b></p> <ul style="list-style-type: none"> <li>Criteria and constraints also include satisfying any requirements set by society, such as taking issues of risk mitigation into account, and they should be quantified to the extent possible and stated in such a way that one can tell if a given design meets them.</li> <li>Humanity faces major global challenges today, such as the need for supplies of clean water and food or for energy sources that minimize pollution, which can be addressed through engineering. These global challenges also may have manifestations in local communities.</li> </ul>	<p style="text-align: center;"><i>Connections to Engineering, Technology, and Applications of Science</i></p> <p><b>Influence of Science, Engineering, and Technology on Society and the Natural World</b></p> <ul style="list-style-type: none"> <li>New technologies can have deep impacts on society and the environment, including some that were not anticipated. Analysis of costs and benefits is a critical aspect of decisions about technology.</li> </ul>
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Essential Questions	Student Learning Objectives	Suggested Tasks/Activities	Evidence of Learning (Assessment)
<ul style="list-style-type: none"> <li><i>How does the muscle structure permit movement?</i></li> <li><i>How do the components of a skeletal muscle contribute to muscular movements?</i></li> <li><i>What are the various diseases and disorders associated with the muscular system?</i></li> <li><i>How is the structure of the muscle related to its physiological functions?</i></li> </ul>	<ul style="list-style-type: none"> <li>Describe the structure and function of muscle tissue</li> <li>Describe the structural unit of a myofibril</li> <li>Explain how the attachments, locations, and interactions of skeletal muscles make different movements possible</li> <li>Identify, locate, and describe the actions of the major skeletal muscles of each body region.</li> <li>Investigate homeostatic imbalances associated with the muscular system such as strains, fibromyalgia, ms</li> <li>Explore careers related to the</li> </ul>	<p>Labs/Activities:</p> <ul style="list-style-type: none"> <li>Diagram a basic muscle fiber</li> <li>Using a virtual animation, observe how muscles and bone work together to cause a contraction and movement of the body “Muscles and Bone” Gizmo</li> <li>Plan and carry out an investigation to determine how muscles tires</li> <li>Scientific explanation illustrating function and malfunction of a muscle fiber</li> <li>Dissection- Observational drawings demonstrating structure and function of the muscular system through dissection of a cat</li> <li>Use microscopes to compare and</li> </ul>	<ul style="list-style-type: none"> <li>Assessment of written and verbal mastery of unit-specific vocabulary, on a performance or practical</li> <li>Assessment of skills such as asking questions, defining problems, and/or constructing explanations when completing the case study.</li> <li>Assessment of modeling skills by drawing and labeling diagrams, making analogies, and/or making observational sketches.</li> <li>Assessment of lab skills</li> </ul>

	<p>Muscular System-Physical Therapist, Athletic Trainer, Occupational Therapist, Orthopedic Surgeon, Dance Therapist, Massage Therapist, PT Aide, Acupuncturist.</p>	<p>contrast smooth, skeletal and cardiac muscle</p> <ul style="list-style-type: none"> <li>• Career Research Project</li> </ul>	<p>(Experimental Design, Data Analysis, and/or Arguing a Scientific Claim) by submitting Lab Reports for each lab conducted</p> <ul style="list-style-type: none"> <li>• Assessment of research, argumentation, and/or presentation skills by completing a project, including supporting documentation.</li> <li>• Assessment of skills such as Problem Solving, Creating and Interpreting Graphs, and/or Creating Scientific Explanations by taking quizzes as well as the Unit Test.</li> </ul>
<b>Resources/Materials</b>	<p><a href="https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf">https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf</a>  <a href="https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY_Tortora_14th_Ed">https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY_Tortora_14th_Ed</a>  <a href="https://www.carolina.com/preserved-organisms-classroom-resources/cat-anatomy-and-dissection-guide/455575.pr?question=cat+dissection+guide">https://www.carolina.com/preserved-organisms-classroom-resources/cat-anatomy-and-dissection-guide/455575.pr?question=cat+dissection+guide</a>  <a href="https://www.carolina.com/preserved-dogs/dog-anatomy-a-photo-atlas/455794.pr?question=dog+anatomy">https://www.carolina.com/preserved-dogs/dog-anatomy-a-photo-atlas/455794.pr?question=dog+anatomy</a>  <a href="https://www.cusd80.com/cms/lib/AZ01001175/Centricity/Domain/8147/Muscle%20Fatigue%20Lab.pdf">https://www.cusd80.com/cms/lib/AZ01001175/Centricity/Domain/8147/Muscle%20Fatigue%20Lab.pdf</a>  <a href="https://www.youtube.com/watch?v=SCznFaTWTPE">https://www.youtube.com/watch?v=SCznFaTWTPE</a>  <a href="https://www.explorelearning.com/">https://www.explorelearning.com/</a></p>		
<b>ELA Companion Standards</b>	<p><b>RST.11-12.7</b> Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.</p> <p><b>RST.11-12.8</b> Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.</p> <p><b>WHST.9-12.2</b> Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.</p>		
<b>Interdisciplinary Connections</b>	<p><b><i>ELA/Literacy</i></b></p> <p><b>SL.11-12.1.</b> Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with peers on grades 11–12 topics, texts, and issues, building on others’ ideas and expressing their own clearly and persuasively.</p> <p><b>SL.11-12.2.</b> Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, qualitatively, orally) evaluating the credibility and accuracy of each source.</p>		

	<p><b>SL.11-12.4</b> Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.</p> <p><b>SL.11-12.5.</b> Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.</p> <p><i>Math</i></p> <p><b>MP.4</b> Model with mathematics.</p> <p><b>MP.2</b> Reason abstractly and quantitatively.</p> <p><b>HSN.Q.A.1</b> Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.</p>
<p><b>Career Readiness, Life Literacies, and Key Skills</b></p>	<p><b>9.2.12.CAP.4:</b> Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them including educational training requirements, costs, loans, and debt repayment</p> <p><b>9.2.12.CAP.5:</b> Assess and modify a personal plan to support current interests and postsecondary plans.</p> <p><b>9.2.12.CAP.6:</b> Identify transferable skills in career choices and design alternative career plans based on those skills. •</p> <p><b>9.2.12.CAP.7:</b> Use online resources to examine licensing, certification, and credentialing requirements at the local, state, and national levels to maintain compliance with industry requirements in areas of career interest.</p> <p><b>9.2.12.CAP.8:</b> Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.</p> <p><b>9.4.12.CI.1:</b> Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).</p> <p><b>9.4.12.CI.2:</b> Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).</p> <p><b>9.4.12.CI.3:</b> Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).</p> <p><b>Career Readiness, Life Literacies, and Key Skills Practices</b></p> <p>Act as a responsible and contributing community member and employee</p> <p>Demonstrate creativity and innovation.</p> <p>Utilize critical thinking to make sense of problems and persevere in solving them.</p> <p>Model integrity, ethical leadership, and effective management.</p> <p>Plan education and career paths aligned to personal goals.</p> <p>Use technology to enhance productivity, increase collaboration, and communicate effectively.</p> <p>Work productively in teams while using cultural/global competence.</p>
<p><b>Computer Science &amp; Design Thinking</b></p>	<p><b>8.1.12.DA.5:</b> Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.</p> <p><b>8.2.12.ED.5:</b> Evaluate the effectiveness of a product or system based on factors that are related to its requirements, specifications, and constraints (e.g., safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, ergonomics).</p>

Modifications			
Multi-Lingual Learners	Special Education	At-Risk	Gifted and Talented
<ul style="list-style-type: none"> <li>● Display labeled images of designs and parts.</li> <li>● Use body movement and gestures to further explain concepts to students.</li> <li>● Restate design steps aloud before project activity.</li> <li>● Assign a native language partner.</li> </ul>	<ul style="list-style-type: none"> <li>● Reinforce safety rules when using equipment</li> <li>● Provide adequate scaffolds for the design process.</li> <li>● Provide alternative choices (i.e. verbal or visual) to demonstrate proficiency.</li> <li>● Provide an outline of lessons</li> <li>● Get a written list of instructions</li> <li>● Work or take a test in a different setting, such as a quiet room with few distractions</li> <li>● Sit where they learn best (for example, near the teacher)</li> </ul>	<ul style="list-style-type: none"> <li>● Incorporate student choice</li> <li>● Invite parents, neighbors, friends, the school principal and other community members to support classroom activities.</li> <li>● Provide peer mentoring to improve techniques.</li> </ul>	<ul style="list-style-type: none"> <li>● Lead the class in the deciphering of new learning.</li> <li>● Create a more detailed report which includes additional research outside of project requirements.</li> </ul>

## Introduction to Anatomy and Physiology

### Unit 9: The Cardiovascular System

**Time Allotted: 5 Weeks**

#### New Jersey Student Learning Standards (NJSLS)

**HS-LS1-1.** Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.

**HS-LS1-2.** Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

**HS-LS1-3.** Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

**HS-LS1-4.** Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms

Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
<p><b>Constructing Explanations and Designing Solutions</b></p> <ul style="list-style-type: none"> <li>Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.</li> </ul> <p><b>Developing and Using Models Modeling</b></p> <ul style="list-style-type: none"> <li>Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> <li>Use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> </ul> <p><b>Planning and Carrying Out Investigations</b></p> <ul style="list-style-type: none"> <li>Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.</li> </ul> <p style="text-align: center;">----- <i>Connections to Nature of Science</i></p> <p><b>Scientific Investigations</b></p>	<p><b>LS1.A: Structure and Function</b></p> <ul style="list-style-type: none"> <li>Systems of specialized cells within organisms help them perform the essential functions of life.</li> <li>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. (<i>Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.</i>)</li> <li>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.</li> <li>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.</li> </ul> <p><b>LS1.B: Growth and Development of Organisms</b></p> <ul style="list-style-type: none"> <li>In multicellular organisms individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. The organism begins as a single cell (fertilized egg) that divides successively to produce many cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both daughter cells. Cellular division and differentiation produce and maintain a complex organism, composed of systems of tissues</li> </ul>	<p><b>Structure and Function</b></p> <ul style="list-style-type: none"> <li>Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.</li> </ul> <p><b>Stability and Change</b></p> <ul style="list-style-type: none"> <li>Feedback (negative or positive) can stabilize or destabilize a system.</li> </ul> <p><b>Systems and System Models</b></p> <ul style="list-style-type: none"> <li>Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows— within and between systems at different scales</li> </ul>

<ul style="list-style-type: none"> <li>Use a Variety of Methods Scientific inquiry is characterized by a common set of values that include: logical thinking, precision, open-mindedness, objectivity, skepticism, replicability of results, and honest and ethical reporting of findings.</li> </ul>	<p>and organs that work together to meet the needs of the whole organism.</p>		
Essential Questions	Student Learning Objectives	Suggested Tasks/Activities	Evidence of Learning (Assessment)
<ul style="list-style-type: none"> <li><i>How are the components of blood important to maintain life?</i></li> <li><i>Why is the heart an essential part of the cardiovascular system?</i></li> <li><i>What are the adverse consequences from incompatible blood transfusions?</i></li> <li><i>What are the various diseases and disorders associated with the cardiovascular system?</i></li> <li><i>What is the relationship between the cardiovascular and respiratory system?</i></li> </ul>	<ul style="list-style-type: none"> <li>Describe the structure and function of blood</li> <li>Describe blood grouping system, compatibility and transfusions</li> <li>Describe the structure and function of white blood cells, differential WBC counts</li> <li>Describe the structure and function of platelets, blood clotting and clotting disorders</li> <li>Describe the location, structure and function of the heart</li> <li>Describe the systemic and pulmonary circulations</li> <li>Describe the pathway of blood through the heart</li> <li>Describe the coronary circulation</li> <li>Describe the cardiac conduction system</li> <li>Analyze normal and abnormal electrocardiogram</li> <li>Describe how to calculate cardiac output (heart rate and stroke volume)</li> </ul>	<ul style="list-style-type: none"> <li>Describe the blood flow through the systemic and pulmonary circulation</li> <li>Describe the blood flow through the heart valves</li> <li>Get up and move heart rate activity</li> <li>Aerobic versus anaerobic journaling activity</li> <li>Demonstrate proficient skills in using a sphygmomanometer to determine blood pressure of classmates (<i>Blood Pressure Activity</i>)</li> <li>Demonstrate proficient skills in using a stethoscope to assess normal and abnormal heart sounds(<i>Auscultation Activity</i>)</li> <li>Demonstrate proficient skills in taking a patient's pulse</li> <li>Demonstrate the ability to read a basic EKG</li> <li>Demonstrate the pathway of blood flow through the heart</li> <li>Healthcare Skills- Demonstrate how to use a blood pressure cuff to determine diastolic and systolic blood pressure readings.</li> <li>Dissection-Identify relationships of structure and function of the cardiovascular system through dissection of a cat (<i>Dissection of the heart of the cat</i>)</li> </ul>	<ul style="list-style-type: none"> <li>Assessment of written and verbal mastery of unit-specific vocabulary, on a performance or practical</li> <li>Assessment of skills such as asking questions, defining problems, and/or constructing explanations when completing the case study.</li> <li>Assessment of modeling skills by drawing and labeling diagrams, making analogies, and/or making observational sketches.</li> <li>Assessment of lab skills (Experimental Design, Data Analysis, and/or Arguing a Scientific Claim) by submitting Lab Reports for each lab conducted</li> <li>Assessment of skills such as Problem Solving, Creating and Interpreting Graphs, and/or Creating Scientific Explanations by taking quizzes as well as the Unit Test.</li> </ul>

		<ul style="list-style-type: none"> <li>● Dissection- Identify relationships of structure of function of various structures of a sheep heart through dissection (<i>Dissection of the sheep heart</i>)</li> <li>● Healthcare Skills - Analyze and interpret blood type data to determine compatibility and paternity.</li> </ul>	
<b>Resources/Materials</b>	<a href="https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf">https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf</a> <a href="https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY_Tortora_14th_Ed">https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY_Tortora_14th_Ed</a> <a href="https://www.carolina.com/preserved-organisms-classroom-resources/cat-anatomy-and-dissection-guide/455575.pr?question=cat+dissection+guide">https://www.carolina.com/preserved-organisms-classroom-resources/cat-anatomy-and-dissection-guide/455575.pr?question=cat+dissection+guide</a> <a href="https://www.carolina.com/preserved-dogs/dog-anatomy-a-photo-atlas/455794.pr?question=dog+anatomy">https://www.carolina.com/preserved-dogs/dog-anatomy-a-photo-atlas/455794.pr?question=dog+anatomy</a> <a href="https://www.pasco.com/resources/lab-experiments/933">https://www.pasco.com/resources/lab-experiments/933</a>		
<b>ELA Companion Standards</b>	<p><b>RST.11-12.7</b> Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.</p> <p><b>RST.11-12.8</b> Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.</p> <p><b>WHST.9-12.2</b> Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.</p>		
<b>Interdisciplinary Connections</b>	<p><b><u>ELA/Literacy</u></b></p> <p><b>SL.11-12.1.</b> Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with peers on grades 11–12 topics, texts, and issues, building on others’ ideas and expressing their own clearly and persuasively.</p> <p><b>SL.11-12.2.</b> Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, qualitatively, orally) evaluating the credibility and accuracy of each source.</p> <p><b>SL.11-12.4</b> Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.</p> <p><b>SL.11-12.5.</b> Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.</p> <p><b><u>Math</u></b></p> <p><b>MP.4</b> Model with mathematics.</p> <p><b>MP.2</b> Reason abstractly and quantitatively.</p>		



	<p><b>HSN.Q.A.1</b> Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.</p>		
<p><b>Career Readiness, Life Literacies, and Key Skills</b></p>	<p><b>9.2.12.CAP.4:</b> Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them including educational training requirements, costs, loans, and debt repayment</p> <p><b>9.2.12.CAP.5:</b> Assess and modify a personal plan to support current interests and postsecondary plans.</p> <p><b>9.2.12.CAP.6:</b> Identify transferable skills in career choices and design alternative career plans based on those skills.</p> <p><b>9.2.12.CAP.7:</b> Use online resources to examine licensing, certification, and credentialing requirements at the local, state, and national levels to maintain compliance with industry requirements in areas of career interest.</p> <p><b>9.2.12.CAP.8:</b> Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.</p> <p><b>9.4.12.CI.1:</b> Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).</p> <p><b>9.4.12.CI.2:</b> Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).</p> <p><b>9.4.12.CI.3:</b> Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).</p> <p><b>Career Readiness, Life Literacies, and Key Skills Practices</b></p> <p>Act as a responsible and contributing community member and employee</p> <p>Demonstrate creativity and innovation.</p> <p>Utilize critical thinking to make sense of problems and persevere in solving them.</p> <p>Model integrity, ethical leadership, and effective management.</p> <p>Plan education and career paths aligned to personal goals.</p> <p>Use technology to enhance productivity, increase collaboration, and communicate effectively.</p> <p>Work productively in teams while using cultural/global competence.</p>		
<p><b>Computer Science &amp; Design Thinking</b></p>	<p><b>8.1.12.DA.5:</b> Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.</p> <p><b>8.2.12.ED.1:</b> Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.</p> <p><b>8.2.12.ED.5:</b> Evaluate the effectiveness of a product or system based on factors that are related to its requirements, specifications, and constraints (e.g., safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, ergonomics).</p>		
<p><b>Modifications</b></p>			
<p><b>Multi-Lingual Learners</b></p>	<p><b>Special Education</b></p>	<p><b>At-Risk</b></p>	<p><b>Gifted and Talented</b></p>
<ul style="list-style-type: none"> <li>● Display labeled images of designs and parts.</li> <li>● Use body movement and gestures to further explain</li> </ul>	<ul style="list-style-type: none"> <li>● Reinforce safety rules when using equipment</li> <li>● Provide adequate scaffolds for the design process.</li> </ul>	<ul style="list-style-type: none"> <li>● Incorporate student choice</li> <li>● Invite parents, neighbors, friends, the school principal and other community members to support</li> </ul>	<ul style="list-style-type: none"> <li>● Lead the class in the deciphering of new learning.</li> </ul>

<p>concepts to students.</p> <ul style="list-style-type: none"> <li>● Restate design steps aloud before project activity.</li> <li>● Assign a native language partner.</li> </ul>	<ul style="list-style-type: none"> <li>● Provide alternative choices (i.e. verbal or visual) to demonstrate proficiency.</li> <li>● Provide an outline of lessons</li> <li>● Get a written list of instructions</li> <li>● Work or take a test in a different setting, such as a quiet room with few distractions</li> <li>● Sit where they learn best (for example, near the teacher)</li> </ul>	<p>classroom activities.</p> <ul style="list-style-type: none"> <li>● Provide peer mentoring to improve techniques.</li> </ul>	<ul style="list-style-type: none"> <li>● Create a more detailed report which includes additional research outside of project requirements.</li> </ul>
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**Introduction to Anatomy and Physiology**

**Unit 10: The Respiratory System**

**Time Allotted: 2 Weeks**

**New Jersey Student Learning Standards (NJSLS)**

**HS-LS1-1.** Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.

**HS-LS1-2** Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

**HS-LS1-3** Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

**HS-LS1-4.** Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

**HS-LS3-2.** Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.

<b>Science &amp; Engineering Practices</b>	<b>Disciplinary Core Ideas</b>	<b>Cross-Cutting Concepts</b>
<p><b>Constructing Explanations and Designing Solutions</b></p> <ul style="list-style-type: none"> <li>● Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.</li> </ul> <p><b>Developing and Using Models Modeling</b></p> <ul style="list-style-type: none"> <li>● Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> <li>● Use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> </ul>	<p><b>LS1.A: Structure and Function</b></p> <ul style="list-style-type: none"> <li>● Systems of specialized cells within organisms help them perform the essential functions of life.</li> <li>● 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. <i>(Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)</i></li> <li>● 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.</li> <li>● 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.</li> </ul>	<p><b>Structure and Function</b></p> <ul style="list-style-type: none"> <li>● Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.</li> </ul> <p><b>Stability and Change</b></p> <ul style="list-style-type: none"> <li>● Feedback (negative or positive) can stabilize or destabilize a system.</li> </ul>

<p><b>Planning and Carrying Out Investigations</b></p> <ul style="list-style-type: none"> <li>Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.</li> </ul> <p><b>Engaging in Argument from Evidence</b></p> <ul style="list-style-type: none"> <li>Make and defend a claim based on evidence about the natural world that reflects scientific knowledge, and student-generated evidence.</li> </ul> <p>-----</p> <p style="text-align: center;"><i>Connections to Nature of Science</i></p> <p><b>Scientific Investigations</b></p> <ul style="list-style-type: none"> <li>Use a Variety of Methods Scientific inquiry is characterized by a common set of values that include: logical thinking, precision, open-mindedness, objectivity, skepticism, replicability of results, and honest and ethical reporting of findings.</li> </ul>	<p><b>LS1.B: Growth and Development of Organisms</b></p> <ul style="list-style-type: none"> <li>In multicellular organisms individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. The organism begins as a single cell (fertilized egg) that divides successively to produce many cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both daughter cells. Cellular division and differentiation produce and maintain a complex organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism.</li> </ul> <p><b>LS3.B: Variation of Traits</b></p> <ul style="list-style-type: none"> <li>In sexual reproduction, chromosomes can sometimes swap sections during the process of meiosis (cell division), thereby creating new genetic combinations and thus more genetic variation. Although DNA replication is tightly regulated and remarkably accurate, errors do occur and result in mutations, which are also a source of genetic variation. Environmental factors can also cause mutations in genes, and viable mutations are inherited.</li> <li>Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus the variation and distribution of traits observed depends on both genetic and environmental factors.</li> </ul>	<p><b>Systems and System Models</b></p> <ul style="list-style-type: none"> <li>Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows— within and between systems at different scales</li> </ul> <p><b>Cause and Effect</b></p> <ul style="list-style-type: none"> <li>Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.</li> </ul>
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<b>Essential Questions</b>	<b>Student Learning Objectives</b>	<b>Suggested Tasks/Activities</b>	<b>Evidence of Learning (Assessment)</b>
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Essential Questions	Student Learning Objectives	Suggested Tasks/Activities	Evidence of Learning (Assessment)
<ul style="list-style-type: none"> <li><i>How are gases exchanged between the environment and the circulatory system?</i></li> <li><i>How are gases exchanged between the circulatory system and individual cells?</i></li> <li><i>What are the various diseases and disorders associated with the cardiovascular system?</i></li> </ul>	<ul style="list-style-type: none"> <li>Describe the structure and function of the upper and lower respiratory systems</li> <li>Describe the role of the respiratory system in voice production</li> <li>Describe gas exchange in the lungs</li> <li>Describe major measure of lung volume and diseases associated with decreased capacity</li> <li>Describe homeostatic imbalances associated with the respiratory system, Lung</li> </ul>	<p>Labs/Activities:</p> <ul style="list-style-type: none"> <li>Gas exchange “Gamified” board game</li> <li>Create and label a model of a spirogram (Spirometer lab activity)</li> <li>Using mathematics to calculate total lung volume</li> <li>Case study on the effects of smoking on lung function</li> <li>Dissection of the cat lungs</li> <li>Expansion of cat lungs with a straw</li> <li>Healthcare Skills- Analyze and interpret changes in oxygen flow in people with asthma and COPD</li> </ul>	<ul style="list-style-type: none"> <li>Assessment of written and verbal mastery of unit-specific vocabulary, on a performance or practical</li> <li>Assessment of skills such as asking questions, defining problems, and/or constructing explanations when completing the case study.</li> <li>Assessment of modeling skills by drawing and labeling diagrams, making analogies, and/or making observational sketches.</li> </ul>

	<p>cancer, COPD, Emphysema, sarcoidosis, lung transplants</p> <ul style="list-style-type: none"> <li>Describe differences between internal and external respiration</li> </ul>		<ul style="list-style-type: none"> <li>Assessment of lab skills (Experimental Design, Data Analysis, and/or Arguing a Scientific Claim) by submitting Lab Reports for each lab conducted</li> <li>Assessment of research, argumentation, and/or presentation skills by completing the project, including supporting documentation.</li> <li>Assessment of skills such as Problem Solving, Creating and Interpreting Graphs, and/or Creating Scientific Explanations by taking quizzes as well as the Unit Test.</li> </ul>
<b>Resources/Materials</b>	<p><a href="https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf">https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf</a>  <a href="https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY_Tortora_14th_Ed">https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY_Tortora_14th_Ed</a>  <a href="https://www.carolina.com/preserved-organisms-classroom-resources/cat-anatomy-and-dissection-guide/455575.pr?question=cat+dissection+guide">https://www.carolina.com/preserved-organisms-classroom-resources/cat-anatomy-and-dissection-guide/455575.pr?question=cat+dissection+guide</a>  <a href="https://www.carolina.com/preserved-dogs/dog-anatomy-a-photo-atlas/455794.pr?question=dog+anatomy">https://www.carolina.com/preserved-dogs/dog-anatomy-a-photo-atlas/455794.pr?question=dog+anatomy</a>  <a href="https://www.pasco.com/resources/lab-experiments/938">https://www.pasco.com/resources/lab-experiments/938</a>  <a href="https://d2n0lz049icia2.cloudfront.net/lab_experiment/c_82/EB23_Volume_of_Breath_S.pdf">https://d2n0lz049icia2.cloudfront.net/lab_experiment/c_82/EB23_Volume_of_Breath_S.pdf</a></p>		
<b>ELA Companion Standards</b>	<p><b>RST.11-12.7</b> Integrate and evaluate multiple sources of information presented in diverse formats and media (e.g., quantitative data, video, multimedia) in order to address a question or solve a problem.</p> <p><b>RST.11-12.8</b> Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.</p> <p><b>WHST.9-12.2</b> Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.</p>		
<b>Interdisciplinary Connections</b>	<b><i>ELA/Literacy</i></b>		

	<p><b>SL.11-12.1.</b> Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with peers on grades 11–12 topics, texts, and issues, building on others’ ideas and expressing their own clearly and persuasively.</p> <p><b>SL.11-12.2.</b> Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, qualitatively, orally) evaluating the credibility and accuracy of each source.</p> <p><b>SL.11-12.4</b> Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.</p> <p><b>SL.11-12.5.</b> Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.</p> <p><i>Math</i></p> <p><b>MP.4</b> Model with mathematics.</p> <p><b>MP.2</b> Reason abstractly and quantitatively.</p> <p><b>HSN.Q.A.1</b> Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.</p>
<p><b>Career Readiness, Life Literacies, and Key Skills</b></p>	<p><b>9.2.12.CAP.4:</b> Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them including educational training requirements, costs, loans, and debt repayment</p> <p><b>9.2.12.CAP.5:</b> Assess and modify a personal plan to support current interests and postsecondary plans.</p> <p><b>9.2.12.CAP.6:</b> Identify transferable skills in career choices and design alternative career plans based on those skills. •</p> <p><b>9.2.12.CAP.7:</b> Use online resources to examine licensing, certification, and credentialing requirements at the local, state, and national levels to maintain compliance with industry requirements in areas of career interest.</p> <p><b>9.2.12.CAP.8:</b> Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.</p> <p><b>9.4.12.CI.1:</b> Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).</p> <p><b>9.4.12.CI.2:</b> Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).</p> <p><b>9.4.12.CI.3:</b> Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).</p> <p><b>Career Readiness, Life Literacies, and Key Skills Practices</b></p> <p>Act as a responsible and contributing community member and employee</p> <p>Demonstrate creativity and innovation.</p> <p>Utilize critical thinking to make sense of problems and persevere in solving them.</p> <p>Model integrity, ethical leadership, and effective management.</p> <p>Plan education and career paths aligned to personal goals.</p> <p>Use technology to enhance productivity, increase collaboration, and communicate effectively.</p> <p>Work productively in teams while using cultural/global competence.</p>
<p><b>Computer Science &amp; Design Thinking</b></p>	<p><b>8.1.12.DA.5:</b> Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.</p>

	<p><b>8.2.12.ED.1:</b> Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.</p> <p><b>8.2.12.ED.5:</b> Evaluate the effectiveness of a product or system based on factors that are related to its requirements, specifications, and constraints (e.g., safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, ergonomics).</p>		
Modifications			
Multi-Lingual Learners	Special Education	At-Risk	Gifted and Talented
<ul style="list-style-type: none"> <li>● Display labeled images of designs and parts.</li> <li>● Use body movement and gestures to further explain concepts to students.</li> <li>● Restate design steps aloud before project activity.</li> <li>● Assign a native language partner.</li> </ul>	<ul style="list-style-type: none"> <li>● Reinforce safety rules when using equipment</li> <li>● Provide adequate scaffolds for the design process.</li> <li>● Provide alternative choices (i.e. verbal or visual) to demonstrate proficiency.</li> <li>● Provide an outline of lessons</li> <li>● Get a written list of instructions</li> <li>● Work or take a test in a different setting, such as a quiet room with few distractions</li> <li>● Sit where they learn best (for example, near the teacher)</li> </ul>	<ul style="list-style-type: none"> <li>● Incorporate student choice</li> <li>● Invite parents, neighbors, friends, the school principal and other community members to support classroom activities.</li> <li>● Provide peer mentoring to improve techniques.</li> </ul>	<ul style="list-style-type: none"> <li>● Lead the class in the deciphering of new learning.</li> <li>● Create a more detailed report which includes additional research outside of project requirements.</li> </ul>

## Introduction to Anatomy and Physiology

### Unit 11: The Endocrine System

**Time Allotted: 2 Weeks**

#### New Jersey Student Learning Standards (NJSLS)

**HS-LS1-1.** Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.

**HS-LS1-2** Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

**HS-LS1-3** Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

**HS-LS1-4.** Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
<p><b>Constructing Explanations and Designing Solutions</b></p> <ul style="list-style-type: none"> <li>Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.</li> </ul> <p><b>Developing and Using Models Modeling</b></p> <ul style="list-style-type: none"> <li>Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> <li>Use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> </ul> <p><b>Planning and Carrying Out Investigations</b></p> <ul style="list-style-type: none"> <li>Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.</li> </ul> <p style="text-align: center;">----- Connections to Nature of Science</p>	<p><b>LS1.A: Structure and Function</b></p> <ul style="list-style-type: none"> <li>Systems of specialized cells within organisms help them perform the essential functions of life.</li> <li>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. <i>(Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)</i></li> <li>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.</li> <li>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.</li> </ul> <p><b>LS1.B: Growth and Development of Organisms</b></p> <ul style="list-style-type: none"> <li>In multicellular organisms individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. The organism begins as a single cell (fertilized egg) that divides successively to produce many cells, with each parent cell passing identical genetic material (two variants of each chromosome pair) to both daughter cells. Cellular division and differentiation produce</li> </ul>	<p><b>Structure and Function</b></p> <ul style="list-style-type: none"> <li>Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.</li> </ul> <p><b>Stability and Change</b></p> <ul style="list-style-type: none"> <li>Feedback (negative or positive) can stabilize or destabilize a system.</li> </ul> <p><b>Systems and System Models</b></p> <ul style="list-style-type: none"> <li>Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows— within</li> </ul>

<p><b>Scientific Investigations</b></p> <ul style="list-style-type: none"> <li>Use a Variety of Methods Scientific inquiry is characterized by a common set of values that include: logical thinking, precision, open-mindedness, objectivity, skepticism, replicability of results, and honest and ethical reporting of findings.</li> </ul>	<p>and maintain a complex organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism.</p>	<p>and between systems at different scales</p>
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Essential Questions	Student Learning Objectives	Suggested Tasks/Activities	Evidence of Learning (Assessment)
<ul style="list-style-type: none"> <li><i>Why are hormones needed to help regulate homeostasis in the body?</i></li> <li><i>What are the various diseases and disorders associated with the endocrine system?</i></li> <li><i>What are the long-term effects of hormone replacement therapies?</i></li> <li><i>What are the relationships between the nervous and the endocrine system?</i></li> </ul>	<ul style="list-style-type: none"> <li>Distinguish between endocrine and exocrine glands</li> <li>Analyze the functions of hormones</li> <li>Explain how steroid and nonsteroid hormones affect target cells</li> <li>Model how the nervous system controls secretions of hormones</li> <li>Identify the location of the following glands and list the hormones they secrete:                             <ul style="list-style-type: none"> <li>○ pituitary gland</li> <li>○ parathyroid glands</li> <li>○ Adrenal gland</li> <li>○ pancreas</li> </ul> </li> <li>Explain the function of the hormones that are produced by the above glands</li> <li>Demonstrate how the hormones of the endocrine system are regulated</li> <li>Communicate how the body responds to stress</li> <li>Investigate homeostatic imbalances associated with the endocrine system such as</li> </ul>	<p>Labs/Objectives:</p> <ul style="list-style-type: none"> <li>Case study on endocrine disorders</li> <li>Using models, identify the various endocrine glands and hormones (Endocrine Hormones POGIL)</li> <li>Using models, determine how hormones are regulated</li> <li>Investigate performance-enhancing drugs</li> <li>Case study Interpretation and analysis: applying an anatomical and physiological concept to a real world situation.</li> <li>Performance task assessment: determining how hormones are regulated</li> <li>Describe how performance enhancing drugs (PID's) can help or hurt an athlete</li> <li>Label a diagram of the body showing the position of all of the endocrine organs</li> <li>Performance task assessment determining how positive and negative feedback is used in the endocrine system</li> </ul>	<ul style="list-style-type: none"> <li>Assessment of written and verbal mastery of unit-specific vocabulary, on a performance or practical</li> <li>Assessment of skills such as asking questions, defining problems, and/or constructing explanations when completing the case study.</li> <li>Assessment of modeling skills by drawing and labeling diagrams, making analogies, and/or making observational sketches.</li> <li>Assessment of lab skills (Experimental Design, Data Analysis, and/or Arguing a Scientific Claim) by submitting Lab Reports for each lab conducted</li> <li>Assessment of research, argumentation, and/or presentation skills by completing the project, including supporting documentation.</li> <li>Assessment of skills such as Problem Solving,</li> </ul>



	<p>Grave's, Hashimoto's, Gigantism</p> <ul style="list-style-type: none"> <li>Explore careers related to the Endocrine system- Social Work and Counseling, Psychologist, Endocrinologist, Immunologist</li> </ul>		<p>Creating and Interpreting Graphs, and/or Creating Scientific Explanations by taking quizzes as well as the Unit Test.</p>
<b>Resources/Materials</b>	<p><a href="https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf">https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf</a>  <a href="https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY_Tortora_14th_Ed">https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY_Tortora_14th_Ed</a>  <a href="https://www.carolina.com/preserved-organisms-classroom-resources/cat-anatomy-and-dissection-guide/455575.pr?question=cat+dissection+guide">https://www.carolina.com/preserved-organisms-classroom-resources/cat-anatomy-and-dissection-guide/455575.pr?question=cat+dissection+guide</a>  <a href="https://www.carolina.com/preserved-dogs/dog-anatomy-a-photo-atlas/455794.pr?question=dog+anatomy">https://www.carolina.com/preserved-dogs/dog-anatomy-a-photo-atlas/455794.pr?question=dog+anatomy</a></p>		
<b>ELA Companion Standards</b>	<p><b>RST.11-12.8</b> Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.</p> <p><b>WHST.9-12.2</b> Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.</p>		
<b>Interdisciplinary Connections</b>	<p><b><u>ELA/Literacy</u></b></p> <p><b>SL.11-12.1.</b> Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with peers on grades 11–12 topics, texts, and issues, building on others' ideas and expressing their own clearly and persuasively.</p> <p><b>SL.11-12.2.</b> Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, qualitatively, orally) evaluating the credibility and accuracy of each source.</p> <p><b>SL.11-12.4</b> Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.</p> <p><b>SL.11-12.5.</b> Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.</p> <p><b><u>Math</u></b></p> <p><b>MP.2</b> Reason abstractly and quantitatively.</p> <p><b>HSN.Q.A.1</b> Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.</p>		
<b>Career Readiness, Life Literacies, and Key Skills</b>	<p><b>9.2.12.CAP.4:</b> Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them including educational training requirements, costs, loans, and debt repayment</p> <p><b>9.2.12.CAP.5:</b> Assess and modify a personal plan to support current interests and postsecondary plans.</p> <p><b>9.2.12.CAP.6:</b> Identify transferable skills in career choices and design alternative career plans based on those skills.</p> <p><b>9.4.12.CI.1:</b> Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).</p> <p><b>9.4.12.CI.2:</b> Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).</p>		

	<p><b>9.4.12.CI.3:</b> Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).</p> <p><b>Career Readiness, Life Literacies, and Key Skills Practices</b>                  Act as a responsible and contributing community member and employee                  Demonstrate creativity and innovation.                  Utilize critical thinking to make sense of problems and persevere in solving them.                  Model integrity, ethical leadership, and effective management.                  Plan education and career paths aligned to personal goals.                  Use technology to enhance productivity, increase collaboration, and communicate effectively.                  Work productively in teams while using cultural/global competence.</p>		
<p><b>Computer Science &amp; Design Thinking</b></p>	<p><b>8.1.12.DA.5:</b> Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.</p> <p><b>8.2.12.ED.1:</b> Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.</p> <p><b>8.2.12.ED.5:</b> Evaluate the effectiveness of a product or system based on factors that are related to its requirements, specifications, and constraints (e.g., safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, ergonomics).</p>		
<p><b>Modifications</b></p>			
<p><b>Multi-Lingual Learners</b></p>	<p><b>Special Education</b></p>	<p><b>At-Risk</b></p>	<p><b>Gifted and Talented</b></p>
<ul style="list-style-type: none"> <li>● Display labeled images of designs and parts.</li> <li>● Use body movement and gestures to further explain concepts to students.</li> <li>● Restate design steps aloud before project activity.</li> <li>● Assign a native language partner.</li> </ul>	<ul style="list-style-type: none"> <li>● Reinforce safety rules when using equipment</li> <li>● Provide adequate scaffolds for the design process.</li> <li>● Provide alternative choices (i.e. verbal or visual) to demonstrate proficiency.</li> <li>● Provide an outline of lessons</li> <li>● Get a written list of instructions</li> <li>● Work or take a test in a different setting, such as a quiet room with few distractions</li> <li>● Sit where they learn best (for example, near the teacher)</li> </ul>	<ul style="list-style-type: none"> <li>● Incorporate student choice</li> <li>● Invite parents, neighbors, friends, the school principal and other community members to support classroom activities.</li> <li>● Provide peer mentoring to improve techniques.</li> </ul>	<ul style="list-style-type: none"> <li>● Lead the class in the deciphering of new learning.</li> <li>● Create a more detailed report which includes additional research outside of project requirements.</li> </ul>

## Introduction to Anatomy and Physiology

### Unit 12: The Reproductive System

**Time Allotted: 2 Weeks**

#### New Jersey Student Learning Standards (NJSLS)

**HS-LS1-1.** Construct an explanation based on evidence for how the structure of DNA determines the structure of proteins which carry out the essential functions of life through systems of specialized cells.

**HS-LS1-2** Develop and use a model to illustrate the hierarchical organization of interacting systems that provide specific functions within multicellular organisms.

**HS-LS1-3** Plan and conduct an investigation to provide evidence that feedback mechanisms maintain homeostasis.

**HS-LS1-4.** Use a model to illustrate the role of cellular division (mitosis) and differentiation in producing and maintaining complex organisms.

**HS-LS3-2.** Make and defend a claim based on evidence that inheritable genetic variations may result from: (1) new genetic combinations through meiosis, (2) viable errors occurring during replication, and/or (3) mutations caused by environmental factors.

Science & Engineering Practices	Disciplinary Core Ideas	Cross-Cutting Concepts
<p><b>Constructing Explanations and Designing Solutions</b></p> <ul style="list-style-type: none"> <li>Construct an explanation based on valid and reliable evidence obtained from a variety of sources (including students' own investigations, models, theories, simulations, peer review) and the assumption that theories and laws that describe the natural world operate today as they did in the past and will continue to do so in the future.</li> </ul> <p><b>Developing and Using Models Modeling</b></p> <ul style="list-style-type: none"> <li>Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> <li>Use a model based on evidence to illustrate the relationships between systems or between components of a system.</li> </ul> <p><b>Planning and Carrying Out Investigations</b></p> <ul style="list-style-type: none"> <li>Plan and conduct an investigation individually and collaboratively to produce data to serve as the basis for evidence, and in the design: decide on types, how much, and accuracy of data needed to produce reliable measurements and consider limitations on</li> </ul>	<p><b>LS1.A: Structure and Function</b></p> <ul style="list-style-type: none"> <li>Systems of specialized cells within organisms help them perform the essential functions of life.</li> <li>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. <i>(Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)</i></li> <li>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.</li> <li>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.</li> </ul> <p><b>LS1.B: Growth and Development of Organisms</b></p> <ul style="list-style-type: none"> <li>In multicellular organisms individual cells grow and then divide via a process called mitosis, thereby allowing the organism to grow. The organism begins as a single cell (fertilized egg) that divides successively to produce many cells, with each parent cell passing identical genetic</li> </ul>	<p><b>Structure and Function</b></p> <ul style="list-style-type: none"> <li>Investigating or designing new systems or structures requires a detailed examination of the properties of different materials, the structures of different components, and connections of components to reveal its function and/or solve a problem.</li> </ul> <p><b>Stability and Change</b></p> <ul style="list-style-type: none"> <li>Feedback (negative or positive) can stabilize or destabilize a system.</li> </ul> <p><b>Systems and System Models</b></p> <ul style="list-style-type: none"> <li>Models (e.g., physical, mathematical, computer models) can be used to simulate systems and</li> </ul>

<p>the precision of the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.</p> <p><b>Engaging in Argument from Evidence</b></p> <ul style="list-style-type: none"> <li>Make and defend a claim based on evidence about the natural world that reflects scientific knowledge, and student-generated evidence.</li> </ul> <p>-----</p> <p style="text-align: center;"><i>Connections to Nature of Science</i></p> <p><b>Scientific Investigations</b></p> <ul style="list-style-type: none"> <li>Use a Variety of Methods Scientific inquiry is characterized by a common set of values that include: logical thinking, precision, open-mindedness, objectivity, skepticism, replicability of results, and honest and ethical reporting of findings.</li> </ul>	<p>material (two variants of each chromosome pair) to both daughter cells. Cellular division and differentiation produce and maintain a complex organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism.</p> <p><b>LS3.B: Variation of Traits</b></p> <ul style="list-style-type: none"> <li>In sexual reproduction, chromosomes can sometimes swap sections during the process of meiosis (cell division), thereby creating new genetic combinations and thus more genetic variation. Although DNA replication is tightly regulated and remarkably accurate, errors do occur and result in mutations, which are also a source of genetic variation. Environmental factors can also cause mutations in genes, and viable mutations are inherited.</li> <li>Environmental factors also affect expression of traits, and hence affect the probability of occurrences of traits in a population. Thus the variation and distribution of traits observed depends on both genetic and environmental factors.</li> </ul>	<p>interactions—including energy, matter, and information flows— within and between systems at different scales</p> <p><b>Cause and Effect</b></p> <ul style="list-style-type: none"> <li>Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects.</li> </ul>
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Essential Questions	Student Learning Objectives	Suggested Tasks/Activities	Evidence of Learning (Assessment)
<ul style="list-style-type: none"> <li><i>Is the reproductive system of humans the most efficient of all organisms?</i></li> <li><i>How does the anatomy of the female reproductive system contribute to its physiology?</i></li> <li><i>How does the anatomy of the male reproductive system contribute to its physiology?</i></li> <li><i>What are the mechanisms of sexual reproduction that lead to the perpetuation of the species?</i></li> <li><i>What are the various diseases and disorders associated with the reproductive system?</i></li> <li><i>What are the phases of the female menstrual cycle and what is the role of the endocrine system in each phase?</i></li> <li><i>How does fertilization occur?</i></li> </ul>	<ul style="list-style-type: none"> <li>Describe the structure and function of each part of the male and female reproductive systems</li> <li>Explain the roles of hormones during puberty</li> <li>Interpret the hormonal control of the female menstrual cycle and lactation</li> <li>Identify several methods of birth control</li> <li>Graph of experimental data</li> <li>Investigate homeostatic imbalances associated with the reproductive system including STDs, PCOS, HIV, fibroids, enlarged prostate, infertility and cancers</li> <li>Explore careers related to the Reproductive system-</li> </ul>	<p>Labs/Activities:</p> <ul style="list-style-type: none"> <li>The real story of where babies come from: A card game activity</li> <li>Describe how hormones change during the menstrual cycle</li> <li>Dissection of placentas, looking at various animal fetuses</li> <li>Birth video</li> <li>Identify relationships of structure of function of various structures of the reproductive system.</li> <li>Label the phase of the menstrual cycle</li> <li>Healthcare Skills- analyze data related to the development of breast cancer</li> </ul>	<ul style="list-style-type: none"> <li>Assessment of written and verbal mastery of unit-specific vocabulary, on a performance or practical</li> <li>Assessment of modeling skills by drawing and labeling diagrams, making analogies, and/or making observational sketches.</li> <li>Assessment of lab skills (Experimental Design, Data Analysis, and/or Arguing a Scientific Claim) by submitting Lab Reports for each lab conducted</li> <li>Assessment of research, argumentation, and/or presentation skills by completing a project, including supporting</li> </ul>

<ul style="list-style-type: none"> <li>How does placentation occur and how do placentas differ from organism to organism?</li> </ul>	Ultrasound Tech, Midwife, Doula, Lactation consultant, Geneticist, Reproductive Medicine Specialist		documentation. <ul style="list-style-type: none"> <li>Assessment of skills such as Problem Solving, Creating and Interpreting Graphs, and/or Creating Scientific Explanations by taking quizzes as well as the Unit Test.</li> </ul>
<b>Resources/Materials</b>	<a href="https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf">https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf</a> <a href="https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY_Tortora_14th_Ed">https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY_Tortora_14th_Ed</a> <a href="https://www.carolina.com/preserved-organisms-classroom-resources/cat-anatomy-and-dissection-guide/455575.pr?question=cat+dissection+guide">https://www.carolina.com/preserved-organisms-classroom-resources/cat-anatomy-and-dissection-guide/455575.pr?question=cat+dissection+guide</a> <a href="https://www.carolina.com/preserved-dogs/dog-anatomy-a-photo-atlas/455794.pr?question=dog+anatomy">https://www.carolina.com/preserved-dogs/dog-anatomy-a-photo-atlas/455794.pr?question=dog+anatomy</a> <a href="#">Graphing Menstrual Hormones - Videos</a>		
<b>ELA Companion Standards</b>	<p><b>RST.11-12.8</b> Evaluate the hypotheses, data, analysis, and conclusions in a science or technical text, verifying the data when possible and corroborating or challenging conclusions with other sources of information.</p> <p><b>WHST.9-12.2</b> Write informative/explanatory texts, including the narration of historical events, scientific procedures/experiments, or technical processes.</p>		
<b>Interdisciplinary Connections</b>	<p><b><u>ELA/Literacy</u></b></p> <p><b>SL.11-12.1.</b> Initiate and participate effectively in a range of collaborative discussions (one-on-one, in groups, and teacher-led) with peers on grades 11–12 topics, texts, and issues, building on others’ ideas and expressing their own clearly and persuasively.</p> <p><b>SL.11-12.2.</b> Integrate multiple sources of information presented in diverse media or formats (e.g., visually, quantitatively, qualitatively, orally) evaluating the credibility and accuracy of each source.</p> <p><b>SL.11-12.4</b> Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.</p> <p><b>SL.11-12.5.</b> Make strategic use of digital media (e.g., textual, graphical, audio, visual, and interactive elements) in presentations to enhance understanding of findings, reasoning, and evidence and to add interest.</p> <p><b><u>Math</u></b></p> <p><b>MP.2</b> Reason abstractly and quantitatively.</p> <p><b>HSN.Q.A.1</b> Use units as a way to understand problems and to guide the solution of multi-step problems; choose and interpret units consistently in formulas; choose and interpret the scale and the origin in graphs and data displays.)</p>		
<b>Career Readiness, Life Literacies, and Key Skills</b>	<p><b>9.2.12.CAP.4:</b> Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them including educational training requirements, costs, loans, and debt repayment</p> <p><b>9.2.12.CAP.5:</b> Assess and modify a personal plan to support current interests and postsecondary plans.</p> <p><b>9.2.12.CAP.6:</b> Identify transferable skills in career choices and design alternative career plans based on those skills. •</p> <p><b>9.2.12.CAP.7:</b> Use online resources to examine licensing, certification, and credentialing requirements at the local,</p>		

	<p>state, and national levels to maintain compliance with industry requirements in areas of career interest.</p> <p><b>9.2.12.CAP.8:</b> Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.</p> <p><b>9.4.12.CI.1:</b> Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).</p> <p><b>9.4.12.CI.2:</b> Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).</p> <p><b>9.4.12.CI.3:</b> Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).</p> <p><b>Career Readiness, Life Literacies, and Key Skills Practices</b></p> <p>Act as a responsible and contributing community member and employee</p> <p>Demonstrate creativity and innovation.</p> <p>Utilize critical thinking to make sense of problems and persevere in solving them.</p> <p>Model integrity, ethical leadership, and effective management.</p> <p>Plan education and career paths aligned to personal goals.</p> <p>Use technology to enhance productivity, increase collaboration, and communicate effectively.</p> <p>Work productively in teams while using cultural/global competence.</p>
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<b>Computer Science and Design Thinking</b>	<p><b>8.1.12.DA.5:</b> Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.</p> <p><b>8.2.12.ED.1:</b> Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.</p> <p><b>8.2.12.ED.5:</b> Evaluate the effectiveness of a product or system based on factors that are related to its requirements, specifications, and constraints (e.g., safety, reliability, economic considerations, quality control, environmental concerns, manufacturability, maintenance and repair, ergonomics).</p>
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**Modifications**

<b>Multi-Lingual Learners</b>	<b>Special Education</b>	<b>At-Risk</b>	<b>Gifted and Talented</b>
<ul style="list-style-type: none"> <li>● Display labeled images of designs and parts.</li> <li>● Use body movement and gestures to further explain concepts to students.</li> <li>● Restate design steps aloud before project activity.</li> <li>● Assign a native language partner.</li> </ul>	<ul style="list-style-type: none"> <li>● Reinforce safety rules when using equipment</li> <li>● Provide adequate scaffolds for the design process.</li> <li>● Provide alternative choices (i.e., verbal, or visual) to demonstrate proficiency.</li> <li>● Provide an outline of lessons</li> <li>● Get a written list of instructions</li> <li>● Work or take a test in a different setting, such as a</li> </ul>	<ul style="list-style-type: none"> <li>● Incorporate student choice</li> <li>● Invite parents, neighbors, friends, the school principal, and other community members to support classroom activities.</li> <li>● Provide peer mentoring to improve techniques.</li> </ul>	<ul style="list-style-type: none"> <li>● Lead the class in the deciphering of new learning.</li> <li>● Create a more detailed report which includes additional research outside of project requirements.</li> </ul>

	quiet room with few distractions <ul style="list-style-type: none"><li>• Preferential Seating</li></ul>		
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*Additional Resources to promote DEI:*

- [Structure Matters: Twenty-One Teaching Strategies to Promote Student Engagement and Cultivate Classroom Equity](#)
- [Race Matters](#)
- [Inclusive Teaching](#)