

Pascack Valley Regional High School District

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

Course Name: Honors Anatomy and Physiology

Born On: August, 2020
Revised On: 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, vivisect, incubate, capture or otherwise harm or destroy animals or any parts thereof as part of a course of instruction.

Honors 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 |
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| <p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> 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. <p>Developing and Using Models Modeling</p> <ul style="list-style-type: none"> Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. <p>Planning and Carrying Out Investigations</p> <ul style="list-style-type: none"> 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. <p style="text-align: center;">----- <i>Connections to Nature of Science</i></p> <p>Scientific Investigations</p> <ul style="list-style-type: none"> 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. | <p>LS1.A: Structure and Function</p> <ul style="list-style-type: none"> Systems of specialized cells within organisms help them perform the essential functions of life. All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. <i>(Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)</i> 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. 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. | <p>Structure and Function</p> <ul style="list-style-type: none"> 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. <p>Stability and Change</p> <ul style="list-style-type: none"> Feedback (negative or positive) can stabilize or destabilize a system. <p>Systems and System Models</p> <ul style="list-style-type: none"> 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 |

| Essential Questions | Student Learning Objectives | Suggested Tasks/Activities | Evidence of Learning (Assessment) |
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| <ul style="list-style-type: none"> <i>Why is homeostasis important to survival?</i> | <p>Students will be able to:</p> <ul style="list-style-type: none"> Research academic | <p>Labs and Activities:</p> <ul style="list-style-type: none"> Dissect Tortilla Sandwich or Dill | <ul style="list-style-type: none"> Assessment of written and verbal mastery of |

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| <ul style="list-style-type: none"> ● <i>How does the anatomy of a structure dictate its physiology, i.e., does form always follow function?</i> ● <i>Are all parts of the body equally important?</i> | <p>requirements, job descriptions, scope of practice, work settings, salary, etc. for various health professions.</p> <ul style="list-style-type: none"> ● Explain how anatomy and physiology are related ● List levels of organization in the human body ● Define anatomical terms and medical prefixes and suffixes that are used by medical professionals. ● Practice describing body positions using standard medical terminology ● Discuss the importance of anatomical position ● Compare and contrast signs vs symptoms of anatomical and physiological conditions ● Define the function of serous membranes and serous fluid ● Explain the importance of homeostasis to survival ● Healthcare Skill-Communicate usage of common anatomical language used throughout medicine orally and written to describe patients disorders or disease | <p>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.</p> <ul style="list-style-type: none"> ● Construct and use models of a positive and negative feedback loop, identify the components of homeostatic imbalances such as blood sugar levels, blood pressure, heart rate, thermoregulation, and oxytocin levels during uterine contractions etc. ● HASPI Using Anatomical Language <ul style="list-style-type: none"> ○ Explain directional terminology, relative position, and body sections while examining patients in certain positions (Note: specific terminology related to quadrupeds ○ Identify regions of the body using region names on small pieces of paper and a partner ○ Use anatomical language when describing a patient's disease or disorder ● PROJECT: Digital presentation of research and investigation of careers in healthcare | <p>unit-specific vocabulary, on a performance or practical</p> <ul style="list-style-type: none"> ● Assessment of modeling skills by drawing and labeling diagrams, making analogies, and/or making observational sketches. ● Assessment of research, argumentation, and/or presentation skills by completing a project, including supporting documentation. ● 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. |
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| Resources/Materials | https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY_Tortora_14th_Ed https://www.explorelearning.com/ http://www.haspi.org/ |
| ELA Companion Standards | <p>RST.11-12.7 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>RST.11-12.8 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>WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p> |
| Interdisciplinary Connections | <p><i>English Language Arts/Literacy</i></p> <p>SL.11-12.1. 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>SL.11-12.4 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>MP.4 Model with mathematics.</p> <p>MP.2 Reason abstractly and quantitatively.</p> |
| Career Readiness, Life Literacies, and Key Skills | <p>9.2.12.CAP.4: 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>9.2.12.CAP.5: Assess and modify a personal plan to support current interests and postsecondary plans.</p> <p>9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.</p> <p>9.2.12.CAP.7: 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>9.2.12.CAP.8: Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.</p> <p>9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).</p> <p>9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).</p> <p>9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).</p> |

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| | <p>Career Readiness, Life Literacies, and Key Skills Practices 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>Computer Science & Design Thinking</p> | <p>8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena. 8.1.12.DA.6: Create and refine computational models to better represent relationships among different elements of data collected from a phenomena or process. 8.2.12.ED.1: 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>Modifications</p> | | | |
| <p>Multi-Lingual Learners</p> | <p>Special Education</p> | <p>At-Risk</p> | <p>Gifted and Talented</p> |
| <ul style="list-style-type: none"> ● Display labeled images of designs and parts. ● Use body movement and gestures to further explain concepts to students. ● Restate design steps aloud before project activity. ● Assign a native language partner. | <ul style="list-style-type: none"> ● Provide adequate scaffolds for the design process. ● Provide alternative choices (i.e. verbal or visual) to demonstrate proficiency. ● Provide an outline of lessons ● Get a written list of instructions ● Work or take a test in a different setting, such as a quiet room with few distractions ● Sit where they learn best (for example, near the teacher) ● Use an alarm to help with time management ● Work with a partner | <ul style="list-style-type: none"> ● Incorporate student choice ● Invite parents, neighbors, friends, the school principal and other community members to support classroom activities. ● Provide peer mentoring to improve techniques. | <ul style="list-style-type: none"> ● Lead the class in the deciphering of new learning. ● Create a more detailed report which includes additional research outside of project requirements. |

Honors 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 |
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| <p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> 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. <p>Developing and Using Models Modeling</p> <ul style="list-style-type: none"> Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. Use a model based on evidence to illustrate the relationships between systems or between components of a system. <p>Planning and Carrying Out Investigations</p> <ul style="list-style-type: none"> 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., | <p>LS1.A: Structure and Function</p> <ul style="list-style-type: none"> Systems of specialized cells within organisms help them perform the essential functions of life. All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. (<i>Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.</i>) 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. 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. <p>LS1.B: Growth and Development of Organisms</p> <ul style="list-style-type: none"> 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 | <p>Structure and Function</p> <ul style="list-style-type: none"> 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. <p>Stability and Change</p> <ul style="list-style-type: none"> Feedback (negative or positive) can stabilize or destabilize a system. <p>Systems and System Models</p> <ul style="list-style-type: none"> Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including |

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| <p>number of trials, cost, risk, time), and refine the design accordingly.</p> <p>Engaging in Argument from Evidence</p> <ul style="list-style-type: none"> Make and defend a claim based on evidence about the natural world that reflects scientific knowledge, and student-generated evidence. <p>-----</p> <p style="text-align: center;"><i>Connections to Nature of Science</i></p> <p>Scientific Investigations</p> <ul style="list-style-type: none"> 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. | <p>organism, composed of systems of tissues and organs that work together to meet the needs of the whole organism.</p> <p>LS3.B: Variation of Traits</p> <ul style="list-style-type: none"> 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. <p>LS4.B: Natural Selection</p> <ul style="list-style-type: none"> 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. <p>LS4.C: Adaptation</p> <ul style="list-style-type: none"> 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. | <p>energy, matter, and information flows— within and between systems at different scales</p> <p>Cause and Effect</p> <ul style="list-style-type: none"> Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. |
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| Essential Questions | Student Learning Objectives | Suggested Tasks/Activities | Evidence of Learning (Assessment) |
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| <ul style="list-style-type: none"> <i>How are cells and tissues related and how do they relate to body systems?</i> <i>How do multi - cellular body cells specialize to perform specific functions that help maintain homeostasis and benefit the body as a whole?</i> | <ul style="list-style-type: none"> Identify the four major tissue types and indicate structure, function and location of each tissue type Describe the general characteristics and functions of epithelial tissue and identify organs | <p>Labs/Activities:</p> <ul style="list-style-type: none"> 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 such as tendons, ligaments, bone, muscle, fascia, blood, cartilage and nerves | <ul style="list-style-type: none"> Assessment of written and verbal mastery of unit-specific vocabulary, on a performance or practical Assessment of modeling skills by drawing and labeling diagrams, |

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| <ul style="list-style-type: none"> ● <i>How does aging affect the tissues of the body?</i> ● <i>How does injury affect the tissues of the body?</i> | <p>in which each is found</p> <ul style="list-style-type: none"> ● Explain how glands are classified ● Compare and contrast the ground substance, cells and fibers in different types of connective tissue ● Explain the major functions of each type of connective tissue ● Identify where each type of connective tissue is found ● Compare and Contrast the three types of cartilage (Fibrocartilage, Elastic, and Hyaline) in terms of structure, function, and location ● Examine the structure and function of spongy and compact bone ● Describe the general characteristics and functions of nervous tissue ● Distinguish between neurons and neuroglia ● Describe the general structure of a neuron ● Create a diagram of Calcium homeostasis feedback system ● Compare and contrast the three types of muscle ● Utilize a microscope to observe tissue types | <ul style="list-style-type: none"> ● Observe tissue under the microscope make drawing of what they see, learn to describe what they see and make comparisons ● Using mathematical and computational thinking, examine T scores for bone mineral density, blood serum levels of parathyroid hormone, calcium and calcitonin to determine if a patient is diagnosed with osteoporosis (<i>Bone Density POGIL</i>). | <p>making analogies, and/or making observational sketches.</p> <ul style="list-style-type: none"> ● Assessment of lab skills (Experimental Design, Data Analysis, and/or Arguing a Scientific Claim) by submitting Lab Reports for each lab conducted ● 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. |
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| | <ul style="list-style-type: none"> Determine bone mineral density of a patient with osteoporosis Dissect a chicken wing | | |
| Resources/Materials | https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY_Tortora_14th_Ed http://www2.mbusd.org/staff/pware/labs/ChickenWingDissection.pdf https://opentextbc.ca/anatomyandphysiology/chapter/4-2-epithelial-tissue/ | | |
| ELA Companion Standards | <p>RST.11-12.7 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>RST.11-12.8 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>WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p> | | |
| Interdisciplinary Connections | <p><i>English Language Arts/Literacy</i></p> <p>SL.11-12.1. 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>SL.11-12.4 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>MP.4 Model with mathematics.</p> <p>MP.2 Reason abstractly and quantitatively.</p> <p>HSN.Q.A.3 Choose a level of accuracy appropriate to limitations on measurement when reporting quantities.</p> | | |
| 21st Century Life and Careers | <p>9.2.12.CAP.4: 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>9.2.12.CAP.5: Assess and modify a personal plan to support current interests and postsecondary plans.</p> <p>9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.</p> <p>9.2.12.CAP.7: 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>9.2.12.CAP.8: Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.</p> <p>9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g.,</p> | | |

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| | <p>1.1.12.prof.CR3a). 9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12.prof.CR2b, 2.2.12.LF.8). 9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).</p> <p>Career Readiness, Life Literacies, and Key Skills Practices 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> |
| Computer Science & Design Thinking | <p>8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena. 8.1.12.DA.6: Create and refine computational models to better represent relationships among different elements of data collected from a phenomena or process. 8.2.12.ED.1: Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.</p> |

Modifications

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

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| | (for example, near the teacher) <ul style="list-style-type: none"> ● Use an alarm to help with time management ● Work with a partner | | |
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Honors 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 |
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| <p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> ● 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. <p>Developing and Using Models Modeling</p> <ul style="list-style-type: none"> ● Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. ● Use a model based on evidence to illustrate the relationships between systems or between components of a system. <p>Planning and Carrying Out Investigations</p> <ul style="list-style-type: none"> ● 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 | <p>LS1.A: Structure and Function</p> <ul style="list-style-type: none"> ● Systems of specialized cells within organisms help them perform the essential functions of life. ● All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. <i>(Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)</i> ● 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. ● 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. <p>LS1.B: Growth and Development of Organisms</p> <ul style="list-style-type: none"> ● 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 | <p>Structure and Function</p> <ul style="list-style-type: none"> ● 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. <p>Stability and Change</p> <ul style="list-style-type: none"> ● Feedback (negative or positive) can stabilize or destabilize a system. <p>Systems and System Models</p> <ul style="list-style-type: none"> ● Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including |

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| <p>the data (e.g., number of trials, cost, risk, time), and refine the design accordingly.</p> <p>-----</p> <p><i>Connections to Nature of Science</i></p> <p>Scientific Investigations</p> <ul style="list-style-type: none"> 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. | <p>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>energy, matter, and information flows— within and between systems at different scales</p> |
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| Essential Questions | Student Learning Objectives | Suggested Tasks/Activities | Evidence of Learning (Assessment) |
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| Essential Questions | Student Learning Objectives | Suggested Tasks/Activities | Evidence of Learning (Assessment) |
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| <ul style="list-style-type: none"> <i>Why is the skin vital as the body's first line of defense and how does it serve this function?</i> <i>How do the skin and its components make up a complex organ that protects and interacts with other body systems?</i> <i>What are the various diseases and disorders associated with the integumentary system?</i> | <ul style="list-style-type: none"> Describe the basic structure of the layers of the skin Explain the main functions of the skin and examine how the skin helps to regulate body temperature using homeostatic feedback loops Summarize the factors that determine skin color and hair color Describe the accessory structures associated with the skin such as nails, hair, and glands Compare and contrast sebaceous, sudoriferous, mammary and ceruminous glands Describe the process of wound healing Using the "rule of nines" | <p>Lab/Activities:</p> <ul style="list-style-type: none"> Practice various suturing techniques using suture equipment and felt, bananas, and pig's feet Plan and carry out an investigation to determine which areas of the body are most sensitive to touch using a two-point discrimination test and associate these with the somatosensory cortex of the brain. Using Models, determine how skin regulates body temperature using feedback loops and details of physiological mechanisms (<i>Skin and Temperature Control</i>) Dissect the skin off the cat in order to identify relationships of structure and function of the integument through | <ul style="list-style-type: none"> Assessment of written and verbal mastery of unit-specific vocabulary, on a performance or practical. Assessment of modeling skills by drawing and labeling diagrams, making analogies, and/or making observational sketches. Assessment of lab skills (Experimental Design, Data Analysis, and/or Arguing a Scientific Claim) by submitting Lab Reports for each lab conducted 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. |

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| | <p>explain how to classify and treat burns</p> <ul style="list-style-type: none"> ● Examine various types of homeostatic imbalances of the skin including burns, acne, athlete's foot, skin cancer, impetigo, herpes, albinism ● Analyze and interpret data to examine the regulation of body temperature and the skin's homeostatic responses to the changes in temperature. ● perform suturing techniques on various materials representing the skin ● Explore careers related to the integument- Dermatologist, Plastic Surgeon, Esthetician | dissection of a cat | |
| Resources/Materials | <p>https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf</p> <p>https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY Tortora 14th Ed</p> <p>https://www.carolina.com/preserved-organisms-classroom-resources/cat-anatomy-and-dissection-guide/455575.pr?question=cat+dissection+guide</p> <p>https://www.carolina.com/preserved-dogs/dog-anatomy-a-photo-atlas/455794.pr?question=dog+anatomy</p> | | |
| ELA Companion Standards | <p>RST.11-12.8 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>WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p> | | |
| Interdisciplinary Connections | <i>English Language Arts/Literacy</i> | | |

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| | <p>SL.11-12.1. 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>SL.11-12.4 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>MP.4 Model with mathematics.</p> <p>MP.2 Reason abstractly and quantitatively.</p> |
| <p>Career Readiness, Life Literacies, and Key Skills</p> | <p>9.2.12.CAP.4: 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>9.2.12.CAP.5: Assess and modify a personal plan to support current interests and postsecondary plans.</p> <p>9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.</p> <p>9.2.12.CAP.7: 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>9.2.12.CAP.8: Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.</p> <p>9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).</p> <p>9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).</p> <p>9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).</p> <p>Career Readiness, Life Literacies, and Key Skills Practices</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>Computer Science & Design Thinking</p> | <p>8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.</p> |

| | <p>8.1.12.DA.6: Create and refine computational models to better represent relationships among different elements of data collected from a phenomena or process.</p> <p>8.2.12.ED.1: Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.</p> | | |
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| Modifications | | | |
| Multi-Lingual Learners | Special Education | At-Risk | Gifted and Talented |
| <ul style="list-style-type: none"> ● Display labeled images of designs and parts. ● Use body movement and gestures to further explain concepts to students. ● Restate design steps aloud before project activity. ● Assign a native language partner. | <ul style="list-style-type: none"> ● Provide adequate scaffolds for the design process. ● Provide alternative choices (i.e. verbal or visual) to demonstrate proficiency. ● Provide an outline of lessons ● Get a written list of instructions ● Work or take a test in a different setting, such as a quiet room with few distractions ● Sit where they learn best (for example, near the teacher) ● Use an alarm to help with time management ● Work with a partner | <ul style="list-style-type: none"> ● Incorporate student choice ● Invite parents, neighbors, friends, the school principal and other community members to support classroom activities. ● Provide peer mentoring to improve techniques. | <ul style="list-style-type: none"> ● Lead the class in the deciphering of new learning. ● Create a more detailed report which includes additional research outside of project requirements. |

Honors 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-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-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 |
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| <p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> 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. <p>Developing and Using Models Modeling</p> <ul style="list-style-type: none"> Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. Use a model based on evidence to illustrate the relationships between systems or between components of a system. | <p>LS1.A: Structure and Function</p> <ul style="list-style-type: none"> Systems of specialized cells within organisms help them perform the essential functions of life. All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. <i>(Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)</i> 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. 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. <p>LS1.B: Growth and Development of Organisms</p> <ul style="list-style-type: none"> 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 | <p>Structure and Function</p> <ul style="list-style-type: none"> 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. <p>Stability and Change</p> <ul style="list-style-type: none"> Feedback (negative or positive) can stabilize or destabilize a system. <p>Systems and System Models</p> <ul style="list-style-type: none"> Models (e.g., physical, mathematical, computer models) can be used to simulate systems and |

Planning and Carrying Out Investigations

- 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.

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.

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.

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.

interactions—including energy, matter, and information flows— within and between systems at different scales

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) |
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| <ul style="list-style-type: none"> ● <i>How is the digestion of food related to biochemical synthesis?</i> ● <i>Why can't 100% of food ingested be used internally?</i> ● <i>How do the digestive processes of monogastrics differ from ruminants?</i> ● <i>What are the various diseases and disorders associated with the digestive system?</i> | <p>Students will be able to:</p> <ul style="list-style-type: none"> ● Describe the general functions of the digestive system ● Investigate the structure of the wall of the alimentary canal ● Analyze the functions of the structures of the mouth, esophagus, stomach, small intestine, large intestine and rectum. ● Identify relationships of structure and function of the digestive system through dissection of the cat ● Identify the functions of the enzymes and other secretions in various locations of the digestive system ● Describe structure and function of the accessory organs such as the teeth, pancreas, liver, and gallbladder ● Examine the surface area of the inner lining of the small intestine and explain | <p>Labs/Activities:</p> <ul style="list-style-type: none"> ● Microscope activity (morphological changes in various parts of the tract) ● Comparative dissections: research and compare digestive systems (i.e. ruminants, non-ruminants, modified monogastrics and monogastrics) ● Review organic molecules and neutralization of stomach acid ● Construct explanations to understand how a nutritional label plays a role in percent daily values of nutrients and to examine the enzymes that digest nutrients along specific locations of the digestive tract (<i>Big Mac POGIL</i>) ● 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>) ● Analyze and interpret data that explains how specific enzymes break down nutrients throughout the various locations of the digestive tract (<i>Digestive Enzyme</i> | <ul style="list-style-type: none"> ● Assessment of written and verbal mastery of unit-specific vocabulary, on a performance or practical ● Assessment of skills such as asking questions, defining problems, and/or constructing explanations when completing the case study. ● Assessment of modeling skills by drawing and labeling diagrams, making analogies, and/or making observational sketches. ● Assessment of lab skills (Experimental Design, Data Analysis, and/or Arguing a Scientific Claim) by submitting Lab Reports for each lab conducted ● Assessment of skills such as Problem Solving, Creating and Interpreting Graphs, and/or Creating |

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| | <p>how its structure allows for greater absorption of nutrients</p> <ul style="list-style-type: none"> ● Design an adequate diet while examining carbohydrate, protein and fat content ● Explain the role of insulin and glucagon to diabetes, negative feedback ● Compare and contrast fat soluble vs. water soluble vitamins ● Investigate various types of homeostatic imbalances of the Digestive System such as colitis, crohn's, GERD, ulcers ● Explore careers related to the Digestive System- Nutritionist, Ultrasound technician, Colonoscopy technician, Feeding/Swallowing Therapist, Doctor- Gastroenterologist, Proctologist, Urologist | <p><i>POGIL</i>)</p> <ul style="list-style-type: none"> ● Dissection of the digestive system of the cat. ● Analyze and interpret data that demonstrates the specificity of enzymes and their ability to break down nutrients throughout the various locations of the digestive tract ● Compare and contrast the inner linings of the digestive tract under the microscope ● Analyze and interpret data on a food label/ diet to examine percent daily value of nutrients and the enzymes that digest the nutrients throughout the digestive tract. | <p>Scientific Explanations by taking quizzes as well as the Unit Test.</p> |
| <p>Resources/Materials</p> | <p>https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf</p> <p>https://www.carolina.com/preserved-organisms-classroom-resources/cat-anatomy-and-dissection-guide/455575.pr?question=cat+dissection+guide</p> <p>https://www.carolina.com/preserved-dogs/dog-anatomy-a-photo-atlas/455794.pr?question=dog+anatomy</p> <p>https://packgoats.com/understanding-goat-digestive-systems/</p> <p>https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY_Tortora_14th_Ed</p> | | |

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| ELA Companion Standards | <p>RST.11-12.7 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>RST.11-12.8 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>WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p> |
| Interdisciplinary Connections | <p><i>English Language Arts/Literacy</i></p> <p>SL.11-12.1. 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>SL.11-12.4 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>MP.4 Model with mathematics.</p> <p>MP.2 Reason abstractly and quantitatively.</p> |
| Career Readiness, Life Literacies, and Key Skills | <p>9.2.12.CAP.4: 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>9.2.12.CAP.5: Assess and modify a personal plan to support current interests and postsecondary plans.</p> <p>9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.</p> <p>9.2.12.CAP.7: 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>9.2.12.CAP.8: Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.</p> <p>9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a). 9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).</p> <p>9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).</p> <p>Career Readiness, Life Literacies, and Key Skills Practices</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> |

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| | <p>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> |
| Computer Science & Design Thinking | <p>8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena. 8.1.12.DA.6: Create and refine computational models to better represent relationships among different elements of data collected from a phenomena or process. 8.2.12.ED.1: Use research to design and create a product or system that addresses a problem and make modifications based on input from potential consumers.</p> |

Modifications

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

Honors 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 |
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| <p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> 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. <p>Developing and Using Models Modeling</p> <ul style="list-style-type: none"> Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. Use a model based on evidence to illustrate the relationships between systems or between components of a system. <p>Planning and Carrying Out Investigations</p> <ul style="list-style-type: none"> 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. <p style="text-align: center;">----- <i>Connections to Nature of Science</i></p> <p>Scientific Investigations</p> | <p>LS1.A: Structure and Function</p> <ul style="list-style-type: none"> Systems of specialized cells within organisms help them perform the essential functions of life. All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. (<i>Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.</i>) 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. 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. <p>LS1.B: Growth and Development of Organisms</p> <ul style="list-style-type: none"> 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. | <p>Structure and Function</p> <ul style="list-style-type: none"> 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. <p>Stability and Change</p> <ul style="list-style-type: none"> Feedback (negative or positive) can stabilize or destabilize a system. <p>Systems and System Models</p> <ul style="list-style-type: none"> 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 |

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| <ul style="list-style-type: none"> 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. | | |
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| Essential Questions | Student Learning Objectives | Suggested Tasks/Activities | Evidence of Learning (Assessment) |
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| <ul style="list-style-type: none"> <i>What are the physiologic mechanisms of the skeletal system?</i> <i>How do bones provide support, protection and movement for the body?</i> <i>What are the various diseases and disorders associated with the skeletal system?</i> | <ul style="list-style-type: none"> Describe the microscopic and macroscopic structure of the long bone and identify the structures within both Analyze the major functions of bone Compare and contrast endochondral and intramembranous ossification Classify bones by their shape Compare and contrast compact and spongy bone Investigate factors that affect bone development, growth and repair Explain homeostatic imbalances associated with the skeletal system Distinguish between yellow and red bone marrow Distinguish between the axial and appendicular skeletal systems and name the parts of each | <p>Labs/Activities:</p> <ul style="list-style-type: none"> Using medical radiography scans(X-Rays), students will 'diagnose' various types of skeletal fractures and dislocations(<i>HASPI Identifying X-Rays</i>) Develop and use models to determine how bone is made through the process of intramembranous and endochondral ossification (<i>Ossification POGIL</i>) Analyze and interpret data (diagnose and analyze surgical procedure) from knee injury which occurred during a ski accident (<i>Case Study-Knee Injury</i>) Practical assessment to Identify landmarks on many bones Performance task assessment- Scientific explanation of endochondral and intramembranous ossification processes Case Study Interpretation and Analysis | <ul style="list-style-type: none"> Assessment of written and verbal mastery of unit-specific vocabulary, on a performance or practical Assessment of skills such as asking questions, defining problems, and/or constructing explanations when completing the case study. Assessment of modeling skills by drawing and labeling diagrams, making analogies, and/or making observational sketches. Assessment of lab skills (Experimental Design, Data Analysis, and/or Arguing a Scientific Claim) by submitting Lab Reports for each lab conducted Assessment of skills such as Problem Solving, |

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| | <ul style="list-style-type: none">● Identify the terms used to identify bony landmarks such as crest, condyle, meatus, process, etc.● Locate and identify bones and their landmarks of the axial skeletal system● Locate and identify bones and their landmarks of the appendicular skeletal system● Analyze types of joints, types of movement and range of motion● Explain the structure and function of specific major joints (hip, knee, shoulder,.)● Investigate advances in hip and knee replacements● Describe fracture repair and remodelling● Compare and contrast male and female pelvis structure● Analyze homeostatic imbalances associated with the skeletal system such as fractures, osteogenesis imperfecta, osteoporosis, scoliosis, marfan's, ACL injuries, Tommy John surgery, Lisfranc injuries, dislocations and subluxations | | Creating and Interpreting Graphs, and/or Creating Scientific Explanations by taking quizzes as well as the Unit Test. |
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| | <ul style="list-style-type: none"> ● Explore careers related to the Skeletal System- X-Ray Technician, Physical Therapist, Athletic Trainer, Occupational Therapist, Orthopedic Surgeon ● Create observational drawings of structure of the skeletal system through dissection of a cat ● Diagnose skeletal abnormalities using medical radiography scans. ● Interpret and analyze case studies | | |
| Resources/Materials | <p>https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf</p> <p>https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY Tortora 14th Ed</p> <p>https://www.youtube.com/watch?v=MFkWypzHn2Q</p> <p>https://www.carolina.com/preserved-organisms-classroom-resources/cat-anatomy-and-dissection-guide/455575.pr?question=cat+dissection+guide</p> <p>https://www.carolina.com/preserved-dogs/dog-anatomy-a-photo-atlas/455794.pr?question=dog+anatomy</p> <p>https://opentextbc.ca/anatomyandphysiology/chapter/6-3-bone-structure/</p> | | |
| ELA Companion Standards | <p>RST.11-12.7 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>RST.11-12.8 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>WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p> | | |
| Interdisciplinary Connections | <p><u>ELA/Literacy</u></p> <p>SL.11-12.1. 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>SL.11-12.2. 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>SL.11-12.4 Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience.</p> | | |

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| | <p>SL.11-12.5. 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>MP.4 Model with mathematics.</p> <p>MP.2 Reason abstractly and quantitatively.</p> |
| <p>Career Readiness, Life Literacies, and Key Skills</p> | <p>9.2.12.CAP.4: 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>9.2.12.CAP.5: Assess and modify a personal plan to support current interests and postsecondary plans.</p> <p>9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.</p> <p>9.2.12.CAP.7: 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>9.2.12.CAP.8: Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.</p> <p>9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).</p> <p>9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).</p> <p>9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).</p> <p>Career Readiness, Life Literacies, and Key Skills Practices</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>Computer Science & Design Thinking</p> | <p>8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.</p> <p>8.1.12.DA.6: Create and refine computational models to better represent the relationships among different elements of data collected from a phenomena or process.</p> |

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

Honors Anatomy and Physiology

Unit 6: 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 |
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| <p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> 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. <p>Developing and Using Models Modeling</p> <ul style="list-style-type: none"> Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. Use a model based on evidence to illustrate the relationships between systems or between components of a system. <p>Planning and Carrying Out Investigations</p> <ul style="list-style-type: none"> 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. | <p>LS1.A: Structure and Function</p> <ul style="list-style-type: none"> Systems of specialized cells within organisms help them perform the essential functions of life. All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. (<i>Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.</i>) 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. 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. <p>LS1.B: Growth and Development of Organisms</p> <ul style="list-style-type: none"> 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, | <p>Structure and Function</p> <ul style="list-style-type: none"> 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. <p>Stability and Change</p> <ul style="list-style-type: none"> Feedback (negative or positive) can stabilize or destabilize a system. <p>Systems and System Models</p> <ul style="list-style-type: none"> Models (e.g., physical, mathematical, computer models) can be used to simulate systems and interactions—including energy, matter, and information flows— within |

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| <p>Asking Questions and Defining Problems</p> <ul style="list-style-type: none"> Analyze complex real-world problems by specifying criteria and constraints for successful solutions. <p>-----</p> <p style="text-align: center;"><i>Connections to Nature of Science</i></p> <p>Scientific Investigations</p> <ul style="list-style-type: none"> 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. | <p>composed of systems of tissues and organs that work together to meet the needs of the whole organism.</p> <p>ETS1.A: Defining and Delimiting Engineering Problems</p> <ul style="list-style-type: none"> 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. 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. | <p>and between systems at different scales</p> <p>-----</p> <p style="text-align: center;"><i>Connections to Engineering, Technology, and Applications of Science</i></p> <p>Influence of Science, Engineering, and Technology on Society and the Natural World</p> <ul style="list-style-type: none"> 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. |
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| Essential Questions | Student Learning Objectives | Suggested Tasks/Activities | Evidence of Learning (Assessment) |
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| <ul style="list-style-type: none"> <i>How does the muscle structure permit movement?</i> <i>How do the components of a skeletal muscle contribute to muscular movements?</i> <i>What are the various diseases and disorders associated with the muscular system?</i> | <ul style="list-style-type: none"> Describe the structure and function of muscle tissue Describe the structural unit of a myofibril Analyze the structure and function of neuromuscular Junction (role of ACH and ACHase) Describe the sliding-filament hypothesis for muscle contraction Compare and contrast aerobic and anaerobic endurance, including muscle fatigue, and explain | <p>Labs/Activities:</p> <ul style="list-style-type: none"> Using models, compare and contrast anaerobic and aerobic respiration to examine how muscles get energy needed for contraction (How do muscles get the energy they need for athletic activity) Using models, understand the structure of a sarcomere and how muscle fibers contract (Sliding Filament Theory POGIL) Plan and carry out an investigation to determine factors which influence muscle fatigue | <ul style="list-style-type: none"> Assessment of written and verbal mastery of unit-specific vocabulary, on a performance or practical Assessment of skills such as asking questions, defining problems, and/or constructing explanations when completing the case study. Assessment of modeling skills by drawing and |

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| | <p>its implications for muscle performance</p> <ul style="list-style-type: none"> ● Distinguish between a twitch, recruitment, and sustained contraction ● Explain how the attachments, locations, and interactions of skeletal muscles make different movements possible ● Identify, locate, and describe the actions of the major skeletal muscles of each body region. ● Investigate homeostatic imbalances associated with the muscular system such as strains, fibromyalgia, ms ● Explore careers related to the Muscular System- Physical Therapist, Athletic Trainer, Occupational Therapist, Orthopedic Surgeon, Dance Therapist, Massage Therapist, PT Aide, Acupuncturist. ● Use microscopes to compare and contrast smooth, skeletal and cardiac muscle ● Create a graph of data demonstrating an understanding of the factors that influence muscle fatigue | <p>and use mathematical and computational thinking to graph results (Muscle Fatigue Lab)</p> <ul style="list-style-type: none"> ● Scientific explanation illustrating function and malfunction of a muscle fiber ● Dissection- Observational drawings demonstrating structure and function of the muscular system through dissection of a cat ● Case study interpretation and analysis (A Perfect Storm Case Study) to explore how biochemical changes in the muscle fibers lead to muscle contractions called malignant hyperthermia often triggered in the operating room as an adverse reaction to general anaesthesia. ● Performance task assessment: demonstrating understanding of how muscles get the energy they need for athletic activity | <p>labeling diagrams, making analogies, and/or making observational sketches.</p> <ul style="list-style-type: none"> ● Assessment of lab skills (Experimental Design, Data Analysis, and/or Arguing a Scientific Claim) by submitting Lab Reports for each lab conducted ● Assessment of research, argumentation, and/or presentation skills by completing a project, including supporting documentation. ● 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. |
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| Resources/Materials | <p>https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf</p> <p>https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY_Tortora_14th_Ed</p> <p>https://www.carolina.com/preserved-organisms-classroom-resources/cat-anatomy-and-dissection-guide/455575.pr?question=cat+dissection+guide</p> <p>https://www.carolina.com/preserved-dogs/dog-anatomy-a-photo-atlas/455794.pr?question=dog+anatomy</p> <p>https://www.cusd80.com/cms/lib/AZ01001175/Centricity/Domain/8147/Muscle%20Fatigue%20Lab.pdf</p> <p>https://www.youtube.com/watch?v=SCznFaTwTPE</p> <p>https://www.explorelarning.com/</p> |
| ELA Companion Standards | <p>RST.11-12.7 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>RST.11-12.8 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>WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p> |
| Interdisciplinary Connections | <p><u>ELA/Literacy</u></p> <p>SL.11-12.1. 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>SL.11-12.2. 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>SL.11-12.4 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>SL.11-12.5. 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>Math</u></p> <p>MP.4 Model with mathematics.</p> <p>MP.2 Reason abstractly and quantitatively.</p> <p>HSN.Q.A.1 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> |
| Career Readiness, Life Literacies, and Key Skills | <p>9.2.12.CAP.4: 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>9.2.12.CAP.5: Assess and modify a personal plan to support current interests and postsecondary plans.</p> <p>9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those</p> |

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| | <p>skills.</p> <p>9.2.12.CAP.7: 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>9.2.12.CAP.8: Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.</p> <p>9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).</p> <p>9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).</p> <p>9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).</p> <p>Career Readiness, Life Literacies, and Key Skills Practices</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> | | |
| Computer Science & Design Thinking | <p>8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.</p> <p>8.2.12.ED.5: 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"> ● Display labeled images of designs and parts. ● Use body movement and gestures to further explain concepts to students. ● Restate design steps aloud before project activity. | <ul style="list-style-type: none"> ● Provide adequate scaffolds. ● Provide alternative choices (i.e. verbal or visual) to demonstrate proficiency. ● Provide an outline of lessons | <ul style="list-style-type: none"> ● Incorporate student choice ● Invite parents, neighbors, friends, the school principal and other community members to support classroom activities. ● Provide peer mentoring to improve techniques. | <ul style="list-style-type: none"> ● Lead the class in the deciphering of new learning. ● Create a more detailed report which includes additional research |

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| <ul style="list-style-type: none">● Assign a native language partner. | <ul style="list-style-type: none">● Get a written list of instructions● Work or take a test in a different setting, such as a quiet room with few distractions● Sit where they learn best (for example, near the teacher)● Use an alarm to help with time management● Work with a partner | | outside of lab requirements. |
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Honors Anatomy and Physiology

Unit 7: 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 |
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| <p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> 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. <p>Developing and Using Models Modeling</p> <ul style="list-style-type: none"> Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. Use a model based on evidence to illustrate the relationships between systems or between components of a system. <p>Planning and Carrying Out Investigations</p> <ul style="list-style-type: none"> 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. <p style="text-align: center;">----- <i>Connections to Nature of Science</i></p> <p>Scientific Investigations</p> <ul style="list-style-type: none"> 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. | <p>LS1.A: Structure and Function</p> <ul style="list-style-type: none"> Systems of specialized cells within organisms help them perform the essential functions of life. All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. <i>(Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)</i> 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. 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. <p>LS1.B: Growth and Development of Organisms</p> <ul style="list-style-type: none"> 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. | <p>Structure and Function</p> <ul style="list-style-type: none"> 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. <p>Stability and Change</p> <ul style="list-style-type: none"> Feedback (negative or positive) can stabilize or destabilize a system. <p>Systems and System Models</p> <ul style="list-style-type: none"> 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 |

| Essential Questions | Student Learning Objectives | Suggested Tasks/Activities | Evidence of Learning (Assessment) |
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| <ul style="list-style-type: none"> ● <i>How are the components of blood important to maintain life?</i> ● <i>Why is the heart an essential part of the cardiovascular system?</i> ● <i>How do the various types of blood vessels function in the cardiovascular system?</i> ● <i>What are the adverse consequences from incompatible blood transfusions in the ABO and Rh blood groupings?</i> ● <i>What are the various diseases and disorders associated with the cardiovascular system?</i> | <p><u>Students will:</u></p> <ul style="list-style-type: none"> ● Describe the structure and function of the heart and the vessels that supply blood to the heart ● Explain the process of hemopoiesis as well as the life cycle of a red blood cell, negative feedback control ● Recognize blood liquid connective tissue ● Model the functions and physical characteristics of blood ● Compare and contrast the systemic and pulmonary circulations ● Describe the role of the coronary circulation ● Construct a model of the pathway of blood through the heart ● Analyze the cardiac conduction system ● Investigate normal and abnormal electrocardiogram, bradycardia, tachycardia ● Graph and analyze data depicting the heart rate and blood pressure of a patient with a cardiovascular condition. | <p><u>Labs:</u></p> <ul style="list-style-type: none"> ● Using models, determine how blood flows through valves in the heart(<i>Valve POGIL</i>) ● Use mathematical and computational thinking to determine the components of the blood and overall cell volume(<i>Hematocrit</i>) ● Analyze and interpret data from a fetal heart monitor and a newborn's vital signs involving oxygen deficit(<i>A Tiny Heart Case Study</i>) ● Demonstrate proficient skills in using a sphygmomanometer to determine blood pressure of classmates (<i>Blood Pressure Activity</i>) ● Demonstrate proficient skills in using a stethoscope to assess normal and abnormal heart sounds (<i>Auscultation Activity</i>) ● Using mathematical and computational thinking to calculate overall white blood cell, erythrocyte and platelet count to diagnose various patients with blood disorders(<i>HASPI CBC</i>) ● Demonstrate proficient skills in taking a patient's radial, dorsal pedal, brachial and carotid pulse | <ul style="list-style-type: none"> ● Assessment of written and verbal mastery of unit-specific vocabulary, on a performance or practical ● Assessment of skills such as asking questions, defining problems, and/or constructing explanations when completing the case study. ● Assessment of modeling skills by drawing and labeling diagrams, making analogies, and/or making observational sketches. ● Assessment of lab skills (Experimental Design, Data Analysis, and/or Arguing a Scientific Claim) by submitting Lab Reports for each lab conducted ● Assessment of skills such as Problem Solving, Creating and Interpreting Graphs, and/or Creating Scientific Explanations by taking quizzes as well |

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| | <ul style="list-style-type: none"> ● Calculate cardiac output (heart rate and stroke volume) ● Utilize Starling's law of the heart ● Identify and interpret principal blood groups, blood group inheritance, transfusions, agglutination ● Identify comorbidity lifestyle factors and homeostatic imbalances associated with the cardiovascular system such as valve stenosis, atherosclerosis(CAD), myocardial infarction, heart failure, ASD ● Explore careers related to the Cardiovascular System- EKG Technician, Nutritionist, Radiology Technician, Phlebotomist, Cardiologist, Respiratory Technician, Pulmonologist ● Analyze and interpret patient data to create a "diagnosis" involving the cardiovascular system. ● Healthcare Skills <ul style="list-style-type: none"> ○ Use mathematical and computational thinking to interpret EKG data. ○ Demonstrate how to use a blood pressure | <p>points(<i>Pulse Points</i>)</p> <ul style="list-style-type: none"> ● Analyze and interpret data given to diagnose a patient with tachycardia using information from EKG, HR, BP and other health history exams (<i>Tachycardia Case Study</i>) ● Compare and contrast resting and exercise EKG using probes ● Dissection- Identify relationships of structure of function of various structures of a sheep heart through dissection (<i>Dissection of the sheep heart</i>) ● Performance task: analyze and compare evidence for different hematocrits. ● 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>) | <p>as the Unit Test.</p> |
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| | <p>cuff to determine diastolic and systolic blood pressure readings.</p> <ul style="list-style-type: none"> ○ Analyze and interpret blood type data to determine paternity. | | |
| Resources/Materials | <p>https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY Tortora 14th Ed https://www.carolina.com/preserved-organisms-classroom-resources/cat-anatomy-and-dissection-guide/455575.pr?question=cat+dissection+guide https://www.carolina.com/preserved-dogs/dog-anatomy-a-photo-atlas/455794.pr?question=dog+anatomy https://www.pasco.com/resources/lab-experiments/933</p> | | |
| ELA Companion Standards | <p>RST.11-12.7 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>RST.11-12.8 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>WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p> | | |
| Interdisciplinary Connections | <p><u>ELA/Literacy</u></p> <p>SL.11-12.1. 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>SL.11-12.2. 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>SL.11-12.4 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>SL.11-12.5. 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>Math</u></p> <p>MP.4 Model with mathematics.</p> <p>MP.2 Reason abstractly and quantitatively.</p> | | |

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| | <p>HSN.Q.A.1 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>Career Readiness, Life Literacies, and Key Skills</p> | <p>9.2.12.CAP.4: 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>9.2.12.CAP.5: Assess and modify a personal plan to support current interests and postsecondary plans.</p> <p>9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.</p> <p>9.2.12.CAP.7: 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>9.2.12.CAP.8: Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.</p> <p>9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).</p> <p>9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).</p> <p>9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).</p> <p>Career Readiness, Life Literacies, and Key Skills Practices</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>Computer Science & Design Thinking</p> | <p>8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.</p> <p>8.1.12.DA.6: Create and refine computational models to better represent relationships among different elements of data collected from a phenomena or process.</p> |

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

Honors Anatomy and Physiology

Unit 8: 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 |
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| <p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> 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. <p>Developing and Using Models Modeling</p> <ul style="list-style-type: none"> Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. Use a model based on evidence to illustrate the relationships between systems or between components of a system. <p>Planning and Carrying Out Investigations</p> <ul style="list-style-type: none"> 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. <p style="text-align: center;">----- <i>Connections to Nature of Science</i></p> <p>Scientific Investigations</p> <ul style="list-style-type: none"> 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. | <p>LS1.A: Structure and Function</p> <ul style="list-style-type: none"> Systems of specialized cells within organisms help them perform the essential functions of life. All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. <i>(Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)</i> 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. 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. <p>LS1.B: Growth and Development of Organisms</p> <ul style="list-style-type: none"> 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. | <p>Structure and Function</p> <ul style="list-style-type: none"> 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. <p>Stability and Change</p> <ul style="list-style-type: none"> Feedback (negative or positive) can stabilize or destabilize a system. <p>Systems and System Models</p> <ul style="list-style-type: none"> 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 |

| Essential Questions | Student Learning Objectives | Suggested Tasks/Activities | Evidence of Learning (Assessment) |
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| <ul style="list-style-type: none"> ● <i>Does our external environment influence how our nervous system works?</i> ● <i>How can the brain be so compartmentalized, yet communicate so effectively?</i> ● <i>How is technology improving the prospects of individuals with acute or degenerative brain damage?</i> ● <i>How and why does society view mental illness differently from other illnesses?</i> ● <i>What are the various diseases and disorders associated with the nervous system?</i> | <ul style="list-style-type: none"> ● Compare and contrast the central and peripheral nervous system ● Explain the general functions of the nervous system ● Distinguish among the types of neuroglia and their function in the CNS and PNS. ● Explain how a nerve conducts an impulse in unmyelinated and myelinated neurons ● Identify the name and function of the XII cranial nerves ● Depict how information passes from one nerve to another ● Describe the events that lead to the generation of an action potential ● Identify the structures and functions of the XII cranial nerves ● Decipher the function of each part of a reflex arc ● Describe the covering of the brain and spinal cord ● Identify the major parts of the brain and their | <p>Lab/Activities:</p> <ul style="list-style-type: none"> ● Using models of brain MRI images, understand more about location of brain lobes and their function (<i>Brain Imaging</i>) ● Sheep brain dissection ● Cow eye dissection ● Construct explanations that describe structural and functional areas of the brain that are impacted by a lack of blood flow(<i>stroke case study</i>) ● Using Models, examine how an action potential gets from one cell to another(<i>Conduction of Action Potential POGIL</i>) ● Using models, determine essential components of a somatic reflex arc(<i>Reflex Arc POGIL</i>) ● Cranial nerve mnemonic activity ● Say the names of color activity ● Finding your own blind spot activity ● Practice examining reflexes on each other (babinski reflex, knee jerk, etc.). ● Dissection of sheep brain ● Dissection of cow eye ● Case study Interpretation and analysis: applying an anatomical and physiological | <ul style="list-style-type: none"> ● Assessment of written and verbal mastery of unit-specific vocabulary, on a performance or practical ● Assessment of skills such as asking questions, defining problems, and/or constructing explanations when completing the case study. ● Assessment of modeling skills by drawing and labeling diagrams, making analogies, and/or making observational sketches. ● Assessment of lab skills (Experimental Design, Data Analysis, and/or Arguing a Scientific Claim) by submitting Lab Reports for each lab conducted ● Assessment of skills such as Problem Solving, Creating and Interpreting Graphs, and/or Creating Scientific Explanations by taking quizzes as well |

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| | <p>functions</p> <ul style="list-style-type: none"> ● Describe the major parts of the PNS ● Distinguish between the sympathetic and parasympathetic divisions of the autonomic nervous system ● Investigate homeostatic imbalances associated with the nervous system such as carpal tunnel, meningitis, MS, parkinsons, Alzheimers, ALS ● Explore careers related to the Nervous System- PT, OT, Optometrist, Neurologist, Optometry assistant, Psychologist, Psychiatrist | <p>concept to a real world situation.</p> <ul style="list-style-type: none"> ● Performance task: explain the action potential of a neuron ● Healthcare skill <ul style="list-style-type: none"> ○ perform babinski reflex and knee jerk reflex on 'patients' ○ Read models of brain images (MRI's) to describe function and 'diagnose' malfunction. | <p>as the Unit Test.</p> |
| Resources/Materials | <p>https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY_Tortora_14th_Ed https://www.carolina.com/preserved-organisms-classroom-resources/cat-anatomy-and-dissection-guide/455575.pr?question=cat+dissection+guide https://www.carolina.com/preserved-dogs/dog-anatomy-a-photo-atlas/455794.pr?question=dog+anatomy https://www.biologycorner.com/anatomy/sheepbrain/sheep_dissection.html https://www.exploratorium.edu/learning_studio/cow_</p> | | |
| ELA Companion Standards | <p>RST.11-12.7 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>RST.11-12.8 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>WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p> | | |
| Interdisciplinary Connections | <p><u><i>ELA/Literacy</i></u></p> | | |

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| | <p>SL.11-12.1. 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>SL.11-12.2. 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>SL.11-12.4 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>SL.11-12.5. 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>MP.2 Reason abstractly and quantitatively.</p> <p>HSN.Q.A.1 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>Career Readiness, Life Literacies, and Key Skills</p> | <p>9.2.12.CAP.4: 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>9.2.12.CAP.5: Assess and modify a personal plan to support current interests and postsecondary plans.</p> <p>9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.</p> <p>9.2.12.CAP.7: 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>9.2.12.CAP.8: Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.</p> <p>9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).</p> <p>9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).</p> <p>9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).</p> <p>Career Readiness, Life Literacies, and Key Skills Practices</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. 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> | | |
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| Computer Science & Design Thinking | <p>8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena. 8.1.12.DA.6: Create and refine computational models to better represent the relationships among different elements of data collected from a phenomena or process.</p> | | |
| Modifications | | | |
| Multi-Lingual Learners | Special Education | At-Risk | Gifted and Talented |
| <ul style="list-style-type: none"> ● Display labeled images of designs and parts. ● Use body movement and gestures to further explain concepts to students. ● Restate design steps aloud before project activity. ● Assign a native language partner. | <ul style="list-style-type: none"> ● Provide adequate scaffolds for the design process. ● Provide alternative choices (i.e. verbal or visual) to demonstrate proficiency. ● Provide an outline of lessons ● Get a written list of instructions ● Work or take a test in a different setting, such as a quiet room with few distractions ● Sit where they learn best (for example, near the teacher) ● Use an alarm to help with time management ● Work with a partner | <ul style="list-style-type: none"> ● Incorporate student choice ● Invite parents, neighbors, friends, the school principal and other community members to support classroom activities. ● Provide peer mentoring to improve techniques. | <ul style="list-style-type: none"> ● Lead the class in the deciphering of new learning. ● Create a more detailed report which includes additional research outside of project requirements. |

Honors Anatomy and Physiology

Unit 9: 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 |
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| <p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> 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. <p>Developing and Using Models Modeling</p> <ul style="list-style-type: none"> Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. Use a model based on evidence to illustrate the relationships between systems or between components of a system. <p>Planning and Carrying Out Investigations</p> <ul style="list-style-type: none"> 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. <p style="text-align: center;">----- <i>Connections to Nature of Science</i></p> <p>Scientific Investigations</p> <ul style="list-style-type: none"> 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. | <p>LS1.A: Structure and Function</p> <ul style="list-style-type: none"> Systems of specialized cells within organisms help them perform the essential functions of life. All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. <i>(Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)</i> 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. 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. <p>LS1.B: Growth and Development of Organisms</p> <ul style="list-style-type: none"> 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. | <p>Structure and Function</p> <ul style="list-style-type: none"> 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. <p>Stability and Change</p> <ul style="list-style-type: none"> Feedback (negative or positive) can stabilize or destabilize a system. <p>Systems and System Models</p> <ul style="list-style-type: none"> 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 |

| Essential Questions | Student Learning Objectives | Suggested Tasks/Activities | Evidence of Learning (Assessment) |
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| <ul style="list-style-type: none"> ● <i>Why are hormones needed to help regulate homeostasis in the body?</i> ● <i>What are the various diseases and disorders associated with the endocrine system?</i> | <ul style="list-style-type: none"> ● Distinguish between endocrine and exocrine glands ● Analyze the functions of hormones ● Explain how steroid and nonsteroid hormones affect target cells ● Model how the nervous system controls secretions of hormones ● Identify the location of the following glands and list the hormones they secrete: <ul style="list-style-type: none"> ○ pituitary gland ○ parathyroid glands ○ Adrenal gland ○ pancreas ● Explain the function of the hormones that are produced by the above glands ● Demonstrate how the hormones of the endocrine system are regulated ● Communicate how the body responds to stress ● Investigate homeostatic imbalances associated with the endocrine system such as Grave's, Hashimoto's, | <p>Labs/Objectives:</p> <ul style="list-style-type: none"> ● Construct explanations to diagnose a young patient with hyperthyroidism by analyzing hormone levels of the thyroid gland and a mass on the pituitary gland (<i>What's Wrong with Timothy Case</i>) ● Using models, identify the various endocrine glands and hormones (Endocrine Hormones POGIL) ● Using models, determine how hormones are regulated (Regulation of Hormone Secretion POGIL) ● Research androgen insensitivity syndrome, aromatase insufficiency (gender vs. sex) transgender and sports, Title IX ● Investigate performance-enhancing drugs ● Case study Interpretation and analysis: applying an anatomical and physiological concept to a real world situation. ● Performance task assessment: determining how hormones are regulated ● Debate/Discussion on performance enhancing drugs | <ul style="list-style-type: none"> ● Assessment of written and verbal mastery of unit-specific vocabulary, on a performance or practical ● Assessment of skills such as asking questions, defining problems, and/or constructing explanations when completing the case study. ● Assessment of modeling skills by drawing and labeling diagrams, making analogies, and/or making observational sketches. ● Assessment of lab skills (Experimental Design, Data Analysis, and/or Arguing a Scientific Claim) by submitting Lab Reports for each lab conducted ● Assessment of research, argumentation, and/or presentation skills by completing a project, including supporting documentation. ● Assessment of skills such |

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| | <p>Gigantism</p> <ul style="list-style-type: none"> Explore careers related to the Endocrine system- Social Work and Counseling, Psychologist, Endocrinologist, Immunologist | <ul style="list-style-type: none"> Discussion on androgen insensitivity syndrome, transgender and sports and Title IX | <p>as Problem Solving, Creating and Interpreting Graphs, and/or Creating Scientific Explanations by taking quizzes as well as the Unit Test.</p> |
| Resources/Materials | <p>https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY_Tortora_14th_Ed https://www.carolina.com/preserved-organisms-classroom-resources/cat-anatomy-and-dissection-guide/455575.pr?question=cat+dissection+guide https://www.carolina.com/preserved-dogs/dog-anatomy-a-photo-atlas/455794.pr?question=dog+anatomy</p> | | |
| ELA Companion Standards | <p>RST.11-12.8 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. WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p> | | |
| Interdisciplinary Connections | <p><u>ELA/Literacy</u> SL.11-12.1. 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. SL.11-12.2. 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. SL.11-12.4 Present information, findings and supporting evidence clearly, concisely, and logically. The content, organization, development, and style are appropriate to task, purpose, and audience. SL.11-12.5. 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>Math</u> MP.2 Reason abstractly and quantitatively. HSN.Q.A.1 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> | | |
| Career Readiness, Life Literacies, and Key Skills | <p>9.2.12.CAP.4: 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</p> | | |

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| | <p>debt repayment</p> <p>9.2.12.CAP.5: Assess and modify a personal plan to support current interests and postsecondary plans.</p> <p>9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.</p> <p>9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).</p> <p>9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).</p> <p>9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).</p> <p>Career Readiness, Life Literacies, and Key Skills Practices</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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| Computer Science & Design Thinking | <p>8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.</p> <p>8.2.12.ED.1: 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>8.2.12.ED.5: 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 | | | |
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| Multi-Lingual Learners | Special Education | At-Risk | Gifted and Talented |
| <ul style="list-style-type: none"> ● Display labeled images of designs and parts. ● Use body movement and gestures to further explain concepts to students. ● Restate design steps aloud before project activity. ● Assign a native language partner. | <ul style="list-style-type: none"> ● Provide adequate scaffolds for the design process. ● Provide alternative choices (i.e. verbal or visual) to demonstrate proficiency. ● Provide an outline of lessons ● Get a written list of instructions | <ul style="list-style-type: none"> ● Incorporate student choice ● Invite parents, neighbors, friends, the school principal and other community members to support classroom activities. ● Provide peer mentoring to improve techniques. | <ul style="list-style-type: none"> ● Lead the class in the deciphering of new learning. ● Create a more detailed report which includes additional research outside of project requirements. |

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| | <ul style="list-style-type: none"> • Work or take a test in a different setting, such as a quiet room with few distractions • Sit where they learn best (for example, near the teacher) • Use an alarm to help with time management • Work with a partner | | |
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Honors Anatomy and Physiology

Unit 10: 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 |
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| <p>Constructing Explanations and Designing Solutions</p> <ul style="list-style-type: none"> • 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. <p>Developing and Using Models Modeling</p> <ul style="list-style-type: none"> • Develop and use a model based on evidence to illustrate the relationships between systems or between components of a system. | <p>LS1.A: Structure and Function</p> <ul style="list-style-type: none"> • Systems of specialized cells within organisms help them perform the essential functions of life. • All cells contain genetic information in the form of DNA molecules. Genes are regions in the DNA that contain the instructions that code for the formation of proteins, which carry out most of the work of cells. <i>(Note: This Disciplinary Core Idea is also addressed by HS-LS3-1.)</i> • 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 | <p>Structure and Function</p> <ul style="list-style-type: none"> • 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. <p>Stability and Change</p> <ul style="list-style-type: none"> • Feedback (negative or positive) can stabilize or destabilize a system. |

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| <ul style="list-style-type: none"> Use a model based on evidence to illustrate the relationships between systems or between components of a system. <p>Planning and Carrying Out Investigations</p> <ul style="list-style-type: none"> 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. <p>Engaging in Argument from Evidence</p> <ul style="list-style-type: none"> Make and defend a claim based on evidence about the natural world that reflects scientific knowledge, and student-generated evidence. <p>-----</p> <p style="text-align: center;"><i>Connections to Nature of Science</i></p> <p>Scientific Investigations</p> <ul style="list-style-type: none"> 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. | <p>feedback) or discourage (negative feedback) what is going on inside the living system.</p> <ul style="list-style-type: none"> 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. <p>LS1.B: Growth and Development of Organisms</p> <ul style="list-style-type: none"> 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. <p>LS3.B: Variation of Traits</p> <ul style="list-style-type: none"> 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. | <p>Systems and System Models</p> <ul style="list-style-type: none"> 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 <p>Cause and Effect</p> <ul style="list-style-type: none"> Empirical evidence is required to differentiate between cause and correlation and make claims about specific causes and effects. |
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| Essential Questions | Student Learning Objectives | Suggested Tasks/Activities | Evidence of Learning (Assessment) |
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| <ul style="list-style-type: none"> <i>Is the reproductive system of humans the most efficient of all organisms?</i> <i>How does the anatomy of the</i> | <ul style="list-style-type: none"> Describe the structure and function of each part of the male and female reproductive systems Explain how hormones | <p>Labs/Activities:</p> <ul style="list-style-type: none"> Graphing hormone levels vs days of the menstrual cycle Research the obstetrical Dilemma (orthopedics, obstetrics and | <ul style="list-style-type: none"> Assessment of written and verbal mastery of unit-specific vocabulary, on a performance or practical |

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| <p><i>female reproductive system contribute to its physiology?</i></p> <ul style="list-style-type: none"> • <i>How does the anatomy of the male reproductive system contribute to its physiology?</i> • <i>What are the mechanisms of sexual reproduction that lead to the perpetuation of the species?</i> • <i>What are the various diseases and disorders associated with the reproductive system?</i> | <p>control the activities of the male and female reproductive organs and the development of secondary sex characteristics</p> <ul style="list-style-type: none"> • Interpret the hormonal control of the female menstrual cycle and lactation • Identify several methods of birth control • Graph of experimental data • Compare and contrast Spermatogenesis and Oogenesis • Communicate the processes of fertilization and embryonic development • Investigate homeostatic imbalances associated with the reproductive system including STDs, PCOS, HIV, fibroids, enlarged prostate, infertility and cancers • Explore careers related to the Reproductive system- Ultrasound Tech, Midwife, Doula, Lactation consultant, Geneticist, Reproductive Medicine Specialist | <p>evolution)</p> <ul style="list-style-type: none"> • Dissection of placentas, looking at various animal fetuses, measuring crown-rump length in order to identify structure of function of various structures of the reproductive system . • Birth video • Identify relationships of structure of function of various structures of the reproductive system. • Demonstrate a knowledge of various types of placentas through dissection • Describe how crown to rump length can be used to determine the age of a fetus • Label the phase of the menstrual cycle • Create portfolio discussing changes in the fetus at various stages of development • Healthcare Skills- analyze data related to the development of breast cancer | <ul style="list-style-type: none"> • Assessment of modeling skills by drawing and labeling diagrams, making analogies, and/or making observational sketches. • Assessment of lab skills (Experimental Design, Data Analysis, and/or Arguing a Scientific Claim) by submitting Lab Reports for each lab conducted • Assessment of research, argumentation, and/or presentation skills by completing a project, including supporting documentation. • 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. |
| Resources/Materials | | https://www.nj.gov/education/cccs/2020/NJSLS-Science.pdf | |

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| | <p>https://www.academia.edu/36004776/PRINCIPLES_OF_ANATOMY_AND_PHYSIOLOGY_Tortora_14th_Ed</p> <p>https://www.carolina.com/preserved-organisms-classroom-resources/cat-anatomy-and-dissection-guide/455575.pr?question=cat+dissection+guide</p> <p>https://www.carolina.com/preserved-dogs/dog-anatomy-a-photo-atlas/455794.pr?question=dog+anatomy</p> <p>https://www.google.com/search?ei=6nghX_PvKdDH_Qbp27rICQ&q=graphing+mensrtual+hormones&oq=graphing+mensrtual+hormones&gs_lcp=CgZwc3ktYWlQAzIHCCEQChCgATIHCCEQChCrAjlHCCEQChCrAjoHCAAQRxCwAzoLCAAQsQMqgwEQkQI6BAgAEEM6BwgAELEDEEM6BAguEEM6BgggEAOQQzoLCAAQsQMqgwE6BQgAELEDOgIIADoLCC4QsQMqXwEQowI6CAguEJECEJMCOgUIABCRAjoHCC4QsQMqQzoICC4QsQMqgwE6DgggELEDEIMBEMcBEKMCQgsILhCxAXDHARCvAtOECaaQcjoGCAAQFhAeOggIABAWEAoQHjoGCAAQDRAeOggIABAEAOQHIDKFIjqwFg0rYBaAJwAHgAgAG7AYgBvxuSAQQwLjI3mAEAOAEBqgEHZ3dzLXdperABAMABAQ&scIent=psy-ab&ved=0ahUKewjzjKz6x_LqAhXQY98KHemtDpkQ4dUDCAw&uact=5</p> |
| ELA Companion Standards | <p>RST.11-12.8 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>WHST.9-12.2 Write informative/explanatory texts, including the narration of historical events, scientific procedures/ experiments, or technical processes.</p> |
| Interdisciplinary Connections | <p><u>ELA/Literacy</u></p> <p>SL.11-12.1. 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>SL.11-12.2. 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>SL.11-12.4 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>SL.11-12.5. 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>Math</u></p> <p>MP.2 Reason abstractly and quantitatively.</p> <p>HSN.Q.A.1 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> |
| Career Readiness, Life Literacies, and Key Skills | <p>9.2.12.CAP.4: 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> |

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| | <p>9.2.12.CAP.5: Assess and modify a personal plan to support current interests and postsecondary plans.</p> <p>9.2.12.CAP.6: Identify transferable skills in career choices and design alternative career plans based on those skills.</p> <p>9.2.12.CAP.7: 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>9.2.12.CAP.8: Determine job entrance criteria (e.g., education credentials, math/writing/reading comprehension tests, drug tests) used by employers in various industry sectors.</p> <p>9.4.12.CI.1: Demonstrate the ability to reflect, analyze, and use creative skills and ideas (e.g., 1.1.12prof.CR3a).</p> <p>9.4.12.CI.2: Identify career pathways that highlight personal talents, skills, and abilities (e.g., 1.4.12prof.CR2b, 2.2.12.LF.8).</p> <p>9.4.12.CI.3: Investigate new challenges and opportunities for personal growth, advancement, and transition (e.g., 2.1.12.PGD.1).</p> <p>Career Readiness, Life Literacies, and Key Skills Practices</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>Computer Science and Design Thinking</p> | <p>8.1.12.DA.5: Create data visualizations from large data sets to summarize, communicate, and support different interpretations of real-world phenomena.</p> <p>8.2.12.ED.1: 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>8.2.12.ED.5: 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 | | | |
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| Multi-Lingual Learners | Special Education | At-Risk | Gifted and Talented |
| <ul style="list-style-type: none"> ● Display labeled images of designs and parts. ● Use body movement and gestures to further explain concepts to students. ● Restate design steps aloud before project activity. ● Assign a native language partner. | <ul style="list-style-type: none"> ● Provide adequate scaffolds for the design process. ● Provide alternative choices (i.e. verbal or visual) to demonstrate proficiency. ● Provide an outline of lessons ● Get a written list of instructions ● Work or take a test in a different setting, such as a quiet room with few distractions ● Sit where they learn best (for example, near the teacher) ● Use an alarm to help with time management ● Work with a partner | <ul style="list-style-type: none"> ● Incorporate student choice ● Invite parents, neighbors, friends, the school principal and other community members to support classroom activities. ● Provide peer mentoring to improve techniques. | <ul style="list-style-type: none"> ● Lead the class in the deciphering of new learning. ● Create a more detailed report which includes additional research outside of project requirements. |

Additional Resources to promote DEI:

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