Rumson-Fair Haven Regional High School

Course: *Anatomy and Physiology Honors*
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Board Approval: August 2025

Section I: Course Description

Anatomy and Physiology Honors is a course that expands the student's knowledge of the human body systems, the fundamental concepts of anatomy, and the inner workings of the human body. It provides a base of knowledge about terminology, current issues, and clinical advances in today's medical field. This course will examine how the structure of the human body determines the functions of the human body. It will look at how certain systems are composed and how that composition allows the system to function properly. Anatomy & Physiology, like most sciences, can be related directly to the students' everyday lives. This course takes that approach and helps the students understand why their bodies function the way that they do. *Anatomy and Physiology Honors* meets five days a week. *Anatomy and Physiology Honors* carries a weight of five credits and satisfies one of the high school graduation requirements in science.

Section II: NJSLS: New Jersey Student Learning Standards/Learning Objectives:

1. ***2020 New Jersey Student Learning Standards – Science***:
    - Scientific and technological advances have proliferated and now permeate most aspects of life in the 21st century. It is increasingly important that all members of our society develop an understanding of scientific and engineering concepts and processes. Learning how to construct scientific explanations and how to design evidence-based solutions provides students with tools to think critically about personal and societal issues and needs. Students can then contribute meaningfully to decision-making processes, such as discussions about climate change, new approaches to health care, and innovative solutions to local and global problems.
2. ***2020 New Jersey Student Learning Standards: Comprehensive Health and Physical Education:***
    - Successful preparation of students for the opportunities, rigors, and advances of the 21st Century cannot be accomplished without a strong and sustained emphasis on the health and wellness of all students. Today's students are continually bombarded with physical, mental, and social influences that affect not only learning in school, but also the lifelong health of the citizens that schools are preparing for graduation. To that end, the New Jersey Student Learning Standards - Comprehensive Health and Physical Education (NJSLS-CHPE) were revised to address the need for students to gain knowledge and skills in caring for themselves, interact effectively with others, and analyze the impact of choices and consequences.
3. ***2023 New Jersey Student Learning Standards – Mathematics:***
    - A New Jersey education in Mathematics builds quantitatively and analytically literate citizens prepared to meet the demands of college and career, and to engage productively in an information-driven society; … A high-quality mathematics education fosters a population that…leverages data in decision-making and as a lens for discussing, analyzing, and responding to practical questions, persists to make sense of and model problems arising in everyday life, society, and the workplace, thinks critically and strategically to assess quantitative relationships and to solutions to complex problems, employs precise reasoning and constructs viable arguments to deduce conclusions, recognize false statements and assess peers' reasoning, interprets, evaluates and critiques the mathematics embedded in social, scientific and commercial systems, as well as the claims made in the private and public sectors, communicates precisely when conveying, representing, and justifying both qualitative and quantitative perspectives.
4. ***2023 New Jersey Student Learning Standards English Language Arts:***
    - A New Jersey education in English Language Arts builds readers, writers, and communicators prepared to meet the demands of college and career and to engage as productive American citizens with global responsibilities. ...Students will develop the necessary skills in reading, writing, speaking, and listening that are the foundations for creative and purposeful expression in language; read rich, challenging texts that build their knowledge of the world, grow their confidence and identities as readers, and develop critical thinking skills and vocabulary necessary for long-term success[; e]ngage in regular, meaningful, writing authentic tasks, exploring valued topics, writing for impact and expression, and sharing their work with others (including authentic audiences); leverage complex texts and digital media to develop comprehension, active listening, and discussion skills; ground daily writing and discussion in evidence, fostering an ability to read critically, build arguments, cite evidence, and communicate ideas to contribute meaningfully as productive citizens; evaluate the reliability, credibility, and perspective of authors and speakers across all forms of media; express ideas and knowledge through a variety of modalities and media, and serve as effective communicators who purposefully read, write, and speak across multiple disciplines [and l]earn to persist in reading complex texts, establishing lifelong habits to read voluntarily for pleasure, for further education, for information on public policy, and for advancement in the workplace.
5. ***Standard 8.1 (Computer Science) and 8.2 (Design Thinking) of the 2020 NJSLS:***

- "The 'Intent and Spirit of the Computer Science and Design Thinking Standards' is to focus on deep understanding of concepts that enable students to think critically and systematically about leveraging technology to solve local and global issues. Authentic learning experiences that enable students to apply content knowledge, integrate concepts across disciplines, develop computational thinking skills, acquire and incorporate varied perspectives, and communicate with diverse audiences about the use and effects of computing prepares New Jersey students for college and careers."

6. ***Standard 9.4 (Life Literacies and Key Skills)* of the *2020 NJSLS*:**
   - "This standard outlines key literacies and technical skills such as critical thinking, global and cultural awareness, and technology literacy that are critical for students to develop to live and work in an interconnected global economy."
     ***Climate Change:** The state of New Jersey has mandated instruction in, "Climate Change across all content areas, leveraging the passion students have shown for this critical issue and providing them opportunities to develop a deep understanding of the science behind the changes and to explore the solutions our world desperately needs."
7. ****Amistad Law: N.J.S.A. 18A 52:16A-88:***
   - The inclusion of lessons and resources/texts dealing with the African slave trade, slavery in America, the vestiges of slavery in this country and the contributions of African-Americans to our society will be implemented in English and Social Studies courses in accordance with state law: "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."
8. ****Holocaust Law: N.J.S.A. 18A 35-28:***
   - The inclusion of lessons and resources/texts that enable pupils to identify and analyze applicable theories concerning human nature and behavior; to understand that genocide is a consequence of prejudice and discrimination; and to understand that issues of moral dilemma and conscience have a profound impact on life will be implemented in English and Social Studies courses in accordance with state law: "Every board of education shall include instruction on the Holocaust and genocides in an appropriate place in the curriculum of all elementary and secondary school pupils. The instruction shall further emphasize the personal responsibility that each citizen bears to fight racism and hatred whenever and wherever it happens."
9. ****LGBT and Disabilities Law: N.J.S.A. 18A:35-4.35*:**
   - A transformative approach to the inclusion of lessons and resources/texts on the contributions and issues concerning the LGBTQ+ population and people with disabilities will be implemented across all core subjects in accordance with state law: "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 (N.J.S.A.18A:35-4.36). A board of education shall have policies and procedures in place pertaining to the selection of instructional materials to implement the requirements of N.J.S.A. 18A:35-4.35."
10. ****Asian American and Pacific Islanders Legislation: N.J.S.A 4021/A6100:***
    - The inclusion of lessons and resources/texts on the history and contributions of Asian Americans and Pacific Islanders, will enable New Jersey's schools to provide a curriculum that reflects the diversity of our state. In accordance with state law: "A board of education shall include instruction on the history and contributions of Asian Americans and Pacific Islanders in an appropriate place in the curriculum of students in grades kindergarten through as part of the school district's implementation of the New Jersey Student Learning Standards in Social Studies."
11. Acquisition/development/refinement of the higher-order critical thinking skills aligned with the *Revised Bloom's Taxonomy of Cognitive Objectives*

Section III: Curriculum Modifications

The *Anatomy and Physiology Honors* curriculum is subject to case-by-case modifications to support/advance the needs of all students, including special education students, English language learners, gifted students, and those at risk of school failure. These modifications are based on Individualized Learning Programs (IEPs), recommendations made by the district's Multilingual Learners (ML) coordinator, feedback from members of the Intervention & Referral Services Team (*I&RS*) for at-risk students, and 504 Plans.

Coursework and assessments will be modified on an individual basis for students when necessary. Modifications may include but are not limited to those outlined on the Modifications/Accommodations for Science Courses chart.

Section IV: Preparation for Standardized Testing

Instruction in *Anatomy and Physiology Honors* is aligned with the requirements of state and national standardized assessments, including the *NJGPA*, *NJSLA*, the *ACT*, the *PSAT,* and the *SAT*.

Section V: Curriculum Pacing Guide

Curriculum Pacing Guide	
Course Title: *Anatomy and Physiology Honors*	**Grade Level:** 11 & 12
Unit I: Levels of Organization	Weeks 1 - 4
Unit II: Support & Movement	Weeks 5 - 12
Unit III: Integration & Coordination	Weeks 13 - 24
Unit IV: Transport	Weeks 25 - 32
Unit V: Absorption & Secretion	Weeks 33 - 40

Section VI: Primary Texts and Year-Long Instructional Resources

The following texts and instructional resources are employed for all students in *Anatomy and Physiology Honors*:

- Google Classroom
- *Common Sense Education* (www.commonsense.org)
- Edpuzzle
- Kahoot
- Open Stax
- National Center for Case Study Teaching in Science
- Supplemental Text - Tate, Philip. Seeley's Principles of Anatomy & Physiology. Mc-Graw Hill, New York, 2012.
- Supplemental Worksheets - Marieb, Elaine. Anatomy & Physiology Coloring Book: A Complete Study Guide. Pearson, New York, 2015.
- Lab Activities - Martin, Terry. Laboratory Manual for Hole's Human Anatomy & Physiology. Mc-Graw Hill. New York, 2014.
- Physiological Activities - Various. Human Physiology (Volumes 1 & 2). Vernier Technology, Oregon, 2018.
- Live Surgery Program associated with the Liberty Science Center
- Suggested Videos:
    - Inside the Living Body
    - Medical Mysteries
    - Knee Replacement Surgery
    - Science of Dwarfism
    - Science of Gigantism
    - Science of Speed Eating
    - Body Worlds Video
    - Bizarre ER
    - Untold Stories of the ER
    - Inside the Body Trade
    - Something the Lord Made

- Incredible Human Machine
- Human Body: Pushing the limits (sight, strength, sensation, brain power)

Section VII: Grading Formula and Assessment Modes

Marking period grades in *Anatomy and Physiology Honors* are determined via a percentage weighting model. The specific grading categories and weightings of each will be determined before the start of each academic year and will be published in the posted/distributed course syllabi.

Assessments in *Anatomy and Physiology Honors* vary greatly in format, scope/content/skills assessed, and alternative assessments; differentiation in assessments and choice will be incorporated as appropriate. Preliminary assessments of each format will be used as benchmarks, and summative assessments will be created/revised collaboratively each year and planned by members of the *Anatomy and Physiology Honors* instructional team to inform future learning and to measure student growth.

Section VIII: Unit Templates

The following unit templates have been established for the *Anatomy and Physiology Honors* curriculum by the *Anatomy and Physiology Honors* instructional team:

<table>
<tr><th colspan="2">Unit I: Levels of Organization</th></tr>
<tr><td colspan="2">Unit Summary</td></tr>
<tr><td colspan="2">This unit introduces students to the foundational principles of human anatomy & physiology, highlighting their similarities and differences while emphasizing the use of the scientific method to solve problems. Learners will identify and describe the levels of structural organization in the human body, name the organ systems with their major organs and functions, and list essential life-sustaining functions. The concept of homeostasis and its critical role in maintaining health will be defined and explained. Students will learn and demonstrate anatomical position, use proper anatomical terminology to describe body directions, surfaces, and planes, and locate major body cavities and their contents. Dissections of fetal pigs and cats will reinforce the use of anatomical terms to identify organ locations. The unit also explores the role of chemistry in biology by describing classes of organic molecules and inorganic substances common in cells, the characteristics of a composite cell, the structure and function of cell membranes, and the organelles within the cytoplasm. Students will explain how substances move into and out of cells, describe the cell cycle and mechanisms of cell division, and discuss stem-cell roles and ethical issues surrounding their use. The consequences of improper cell cycle function will be examined. Finally, students will study the four major tissue types, understanding their structural and functional differences, learning to identify them microscopically, and describing their chief locations in the body.</td></tr>
<tr><th colspan="2">Standards/Core Ideas/Performance Expectations/Progress Indicators</th></tr>
<tr><td colspan="2">The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in Anatomy and Physiology Honors:
● 2020 New Jersey Student Learning Standards: Science
○ HS-LS1.1-4, & 6- 7, HS-LS3.1 & 2, HS-ETS1.4
● 2023 New Jersey Student Learning Standards: Mathematics
○ N.Q.A.1, G.MG.1, S.ID.1., S.IC.6, S.CP.7
● 2020 New Jersey Student Learning Standards: Comprehensive Health and Physical Education
○ N.J.S.A. 18A:40-33
● 2023 New Jersey Student Learning Standards: English Language Arts 11-12
○ RI.CR.11–12.1., RI.CI.11–12.2., W.WR.11-12.5, W.SE.11–12.6., W.WP.11–12.4, SL.PI.11-12.4
● 2020 New Jersey Student Learning Standards: Computer Science and Design Thinking
○ 8.1.12.IC.1, 8.2.12.ED.1, 8.2.12.ITH.1
● 2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills
○ 9.4.12.CI.1, 9.4.12.CT.2, 9.4.12.IML.2</td></tr>
<tr><th>Unit Essential Questions</th><th>Unit Enduring Understandings</th></tr>
<tr><td>● Why is the study of anatomy & physiology important to understanding how the body works?
● How are anatomy & physiology related?
● How do cell structures enable cells to carry out life processes?
● How does a cell maintain homeostasis, and how does that contribute to the maintenance of</td><td>● Understanding the structure and function of the body's components is fundamental to comprehending how the entire organism operates, maintains life, and responds to its environment.
● The specific structure (anatomy) of a body part dictates and enables its particular function (physiology), and conversely, function often influences and modifies structure.
● Specialized structures within a cell are organized and adapted to perform specific, interdependent functions, collectively enabling the cell to carry out all essential life processes.
● Cells maintain homeostasis through various regulatory mechanisms, and the collective homeostatic balance of individual cells is critical for</td></tr>
</table>

homeostasis in a human? ● How and why do cells divide? ● How do the different types of tissues work together to allow the body to function properly? ● How do the structures of the various tissue types make their function possible?	maintaining the overall stable internal environment necessary for the survival of the entire human organism. ● Cells divide through mitosis for growth and repair, and meiosis for reproduction, to ensure the continuity of life, enable organismal development, repair damaged tissues, and pass genetic information to offspring. ● Different types of tissues are organized into complex organs and systems, working cooperatively and interdependently to perform specialized functions essential for the body's proper operation and overall survival. ● Each tissue type possesses unique structural characteristics, including cell shape, arrangement, and extracellular matrix composition, that are specifically adapted to enable its specialized function, thereby contributing to the overall capabilities of organs and systems.

Evidence of Learning

Formative & Alternative Assessments:	**Benchmark & Summative Assessments:**	**Resources Needed:**
● Lab Safety Review ● Anatomical Terminology Activity ● Homeostasis Activity ● Body System Activity ● Scientific Method & Measurements Lab ● Balance Lab ● Cancer Project ● Individual student check ins with teacher	● Body Cavity & Region Labeling Quiz (Benchmark) ● Introductory Information Test (Benchmark) ● Balance Lab Report (Benchmark) ● Cells & Metabolism Test	● Chapters 1 & 2 in the supplemental textbook ● Vernier software and lab manual ● Respective materials for each cooperative and lab activity ● Edpuzzle ● Kahoot

Unit II: Support & Movement

Unit Summary

In this unit, students will explore the structure and function of the integumentary, skeletal, and muscular systems. They will begin by examining the layers of the skin and their specific roles, including protection, temperature regulation, and sensation. The unit covers skin accessory organs—such as hair, nails, and glands—and their functions, as well as how the skin contributes to thermoregulation, pigmentation, and wound healing. Students will differentiate between degrees of burns, identify integumentary structures, and analyze common skin disorders. The skeletal system section introduces bone classification, structure, and the processes of bone formation and remodeling, highlighting the effects of sunlight, nutrition, hormones, and physical activity. Learners will identify major bones of the axial and appendicular skeletons, types of fractures and their healing processes, and use anatomical terminology to describe skeletal features. Joints are studied in terms of their categories, structures—particularly synovial joints—and associated disorders. Finally, the muscular system portion focuses on muscle fiber anatomy, the physiology of muscle contraction, energy use, oxygen debt, and muscle fatigue. Students will differentiate between fast- and slow-twitch fibers, describe types of muscle contractions, and learn key movement terms such as origin, insertion, prime mover, antagonist, synergist, and fixator. They will also identify major muscles of the human body and their functions, providing a comprehensive understanding of how the body moves and maintains posture.

Standards/Core Ideas/Performance Expectations/Progress Indicators

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Anatomy and Physiology Honors:*

- *2020 New Jersey Student Learning Standards: Science*
  - HS-LS1.1-4, HS-LS3.2, HS-ETS1.3 & 4
- *2023 New Jersey Student Learning Standards: Mathematics*
  - N.Q.A.1, G.MG.1, S.ID.1, S.IC.6, S.CP.7
- *2023 New Jersey Student Learning Standards: English Language Arts 11-12*
  - RI.CR.11–12.1., RI.CI.11–12.2., W.WR.11-12.5, W.SE.11–12.6., W.WP.11–12.4, SL.PI.11-12.4
- *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
  - 8.1.12.IC.1, 8.2.12.ED.1, 8.2.12.ITH.1
- *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills*
  - 9.4.12.CI.1, 9.4.12.CT.2, 9.4.12.IML.2

Unit Essential Questions	Unit Enduring Understandings

• How does the skin work to maintain homeostasis within the body? • How do the accessory organs function with the skin to regulate homeostasis? • How does the structure of the bone allow its function? • How does the organization of the skeleton allow it to provide movements? • Where and how are skeletal muscles linked to the bones? • What types of tissue are in skeletal muscle? • What does a skeletal muscle fiber contain?	• The skin maintains homeostasis through its diverse functions, including temperature regulation, protection against pathogens, sensory reception, and prevention of water loss. • Accessory organs such as hair, nails, and glands (sweat and sebaceous) collaborate with the skin to perform specialized roles, collectively contributing to the regulation of body temperature, protection, and overall homeostatic balance. • The structure of bone tissue provides the strength, rigidity, and flexibility necessary to support the body, protect organs, facilitate movement, and store minerals. • The skeletal system's structure, composed of bones connected by joints and acted upon by muscles, forms a lever system that enables a wide range of movements, providing both stability and mobility for the body. • The human body contains a variety of skeletal muscles, each with a specific location and attachment points within different body regions. • Various types of connective tissue are integrated within skeletal muscle, providing structural support and organizing muscle fibers into functional units. • A skeletal muscle fiber contains distinct components (sarcolemma, sarcoplasm, myofibrils, sarcoplasmic reticulum, T-tubules), each playing a critical role in the process of muscle contraction and relaxation.

Evidence of Learning

Formative & Alternative Assessments:	**Benchmark & Summative Assessments:**	**Resources Needed:**
• Fingerprint Lab • Skin Vascularity Lab • Integumentary System Disorder Poster • Virtual Bone Dissection • Skeletal System Disorder Poster • Grip Strength Lab • Muscle Art Project • Grip Strength & Fatigue Lab • Muscular System Disorder Poster • Individual student check ins with teacher	• Skin Vascularity Lab Report • Skin Labeling Quiz • Integumentary System Test • Skeleton Labeling Quiz • Skull & Vertebral Column Labeling Quiz • Skeletal System Test • Grip Strength & Fatigue Lab Report • Muscle Labeling Quiz • Muscular System Test • Movement Summative	• Respective chapters in the supplemental textbook • Vernier software and lab manual • Respective materials for each cooperative and lab activity • Edpuzzle • Kahoot

Unit III: Integration & Coordination

Unit Summary

In this unit, students will examine the structure and function of the nervous system, beginning with its general roles in maintaining homeostasis, receiving sensory input, integrating information, and coordinating responses. They will study the detailed structure of neurons, learn how neurons are classified, and explore the four types of neuroglial cells and their supportive functions. The unit will cover the principles of membrane polarization and the sequence of events leading to nerve impulse conduction, as well as how impulses are transmitted between neurons via excitatory and inhibitory postsynaptic potentials. Students will also analyze impulse processing in neuronal pools. The protective coverings of the brain and spinal cord will be described, alongside the formation and role of cerebrospinal fluid. Learners will explore the spinal cord's structure and functions, the components of a reflex arc, and the major regions of the brain and their functions, including distinctions among motor, sensory, and association areas of the cerebral cortex. The limbic system's roles in emotion and behavior will be discussed. The unit will also address the organization of the peripheral nervous system, classification of peripheral nerve fibers, and the autonomic nervous system, distinguishing between parasympathetic and sympathetic divisions. Finally, students will compare and contrast various brain dysfunctions and diseases to develop a comprehensive understanding of nervous system health and pathology.

Standards/Core Ideas/Performance Expectations/Progress Indicators

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Anatomy and Physiology Honors:*

- *2020 New Jersey Student Learning Standards: Science*

- HS-LS1.1-4, & 6- 7, HS-LS3.1 & 2, HS-ETS1.4
- *2023 New Jersey Student Learning Standards: Mathematics*
  - N.Q.A.1, G.MG.1, S.ID.1, S.IC.6, S.CP.7
- *2023 New Jersey Student Learning Standards: English Language Arts 11-12*
  - RI.CR.11–12.1., RI.CI.11–12.2., W.WR.11-12.5, W.SE.11–12.6., W.WP.11–12.4, SL.PI.11-12.4
- *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
  - 8.1.12.IC.1, 8.2.12.ED.1, 8.2.12.ITH.1
- *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills*
  - 9.4.12.CI.1, 9.4.12.CT.2, 9.4.12.IML.2

Unit Essential Questions	Unit Enduring Understandings
• How does the nervous system work to control the human body? • How is a nerve impulse a coordination of several chemical reactions? • How does the structure of the nervous system allow it to function properly? • How do the structures of the endocrine system allow it to function properly? • How does the endocrine system work to maintain homeostasis? • How does the endocrine system work with the nervous system?	• The nervous system rapidly transmits and processes information, enabling the body to perceive stimuli, coordinate voluntary and involuntary actions, and maintain overall physiological control. • A nerve impulse is a rapid, transient electrochemical event driven by a precise sequence of chemical reactions involving the movement of ions across the neuronal membrane, allowing for efficient communication throughout the nervous system. • The structures of the nervous system are interconnected in ways that facilitate rapid signal transmission, integration of information, and the execution of complex bodily functions. • The endocrine system's proper function relies on the specialized structures of its glands, which synthesize and secrete hormones directly into the bloodstream, enabling the regulation of physiological processes throughout the body. • The endocrine system maintains homeostasis by releasing hormones that act as chemical messengers, regulating a wide array of bodily functions such as metabolism, growth, reproduction, and stress responses to keep the internal environment stable. • The endocrine and nervous systems coordinate the body's responses to stimuli through both rapid electrical signals and slower, long-lasting hormonal messages to ensure overall physiological regulation and adaptation.

Evidence of Learning

Formative & Alternative Assessments:	Benchmark & Summative Assessments:	Resources Needed:
• Scorpion & Mouse Venom Case Study • Action Potential Simulation Activity • Frog Dissection • Concussion & CTE Activity • Nervous System Disorder Project • Individual student check ins with teacher	• Neuron Labeling Quiz • Nervous System Part 1 Test • Frog Dissection Lab Report • Brain Labeling Quiz • Nervous System Part 2 Test	• Respective chapters in the supplemental textbook • Vernier software and lab manual • Respective materials for each cooperative and lab activity • Edpuzzle • Kahoot • Dissection Materials

Unit IV: Transport

Unit Summary

This unit explores the cardiovascular and lymphatic systems, beginning with the general characteristics, composition, and functions of blood. Students will examine the types and functions of the formed elements, including erythrocytes, leukocytes, and platelets, as well as the life cycle and regulation of red blood cells. Using microscopy, they will differentiate between red and white blood cells, identifying specific leukocyte types and their roles in immunity. The unit covers the process of hemostasis, coagulation prevention, and the significance of the ABO and Rh blood groups in transfusion reactions. Students will study the cardiovascular system, identifying the organs involved and tracing the flow of blood through the heart, coronary circulation, and major vessels. The cardiac cycle, heart control mechanisms, electrocardiography, and blood vessel structure and function are also covered. They will learn how substances are exchanged at the capillary level and how blood pressure is produced, measured, and influenced by factors such as body position and exercise. The lymphatic system is explored in detail, including the formation and movement of lymph, lymph node structure and function, and the roles of the thymus and spleen. The unit concludes with a study of the immune system, distinguishing between innate and adaptive defenses, humoral and cell-mediated immunity, and primary and

secondary immune responses. Students will also examine types of immunity—active vs. passive—and discuss immunodeficiencies, allergies, and autoimmune disorders.

Standards/Core Ideas/Performance Expectations/Progress Indicators

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Anatomy and Physiology Honors:*

- *2020 New Jersey Student Learning Standards: Science*
  - HS-LS1.1-4, & 6- 7, HS-LS2.7-8, HS-LS3.1 & 2, HS-ETS1.4
- *2023 New Jersey Student Learning Standards: Mathematics*
  - N.Q.A.1, G.MG.1, S.ID.1, S.IC.6, S.CP.7
- *2020 New Jersey Student Learning Standards: Comprehensive Health and Physical Education*
  - N.J.S.A. 18A:7F-4.3, 2.2.12.PF.4
- *2023 New Jersey Student Learning Standards: English Language Arts 11-12*
  - RI.CR.11–12.1., RI.CI.11–12.2., W.WR.11-12.5, W.SE.11–12.6., W.WP.11–12.4, SL.PI.11-12.4
- *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
  - 8.1.12.IC.1, 8.2.12.ED.1, 8.2.12.ITH.1
- *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills*
  - 9.4.12.CI.1, 9.4.12.CT.2, 9.4.12.IML.2

Unit Essential Questions	Unit Enduring Understandings
• What are the functions and composition of blood? • Why does blood have a "type", and how important is this when transfusing blood? • What pathway does blood take throughout the body? • What is the structure and function of the heart muscle and blood vessels and lymphatic vessels? • How is the circulatory system and lymphatic system controlled? • How are the circulatory and lymphatic systems related?	• Blood is a vital fluid composed of specialized cells (red and white blood cells, platelets) suspended in plasma, collectively performing essential functions such as transporting gases, nutrients, hormones, and waste products, regulating body temperature, and protecting against disease. • Blood has specific types due to the presence or absence of unique antigens on red blood cell surfaces, and understanding these types is critically important for safe blood transfusions to prevent life-threatening immune reactions. • Blood circulates throughout the body in a continuous, closed loop, following distinct pathways through the heart, lungs, and systemic circulation to deliver oxygen and nutrients to tissues while removing waste products. • The heart and lymphatic vessels possess unique structures that enable their distinct functions in circulating blood and lymph, respectively, throughout the body. • The circulatory and lymphatic systems are controlled through a combination of nervous and hormonal regulatory mechanisms that adjust heart rate, blood pressure, vessel diameter, and fluid movement to meet the body's changing demands and maintain homeostasis. • The circulatory and lymphatic systems work together to maintain fluid balance, transport essential substances, and provide immune surveillance throughout the body.

Evidence of Learning

Formative & Alternative Assessments:	Benchmark & Summative Assessments:	Resources Needed:
• Blood Typing Activity • Blood Disorder Project • EKG Lab • Risk of Coronary Artery Disease Activity • Blood Pressure Lab • Blood Pressure & Reflexes Lab • Cardiovascular Disorder Project • Immune System Disorder Project • Fetal Pig Dissection • Individual student check ins with teacher	• Blood Typing Lab Report • Blood Test • Heart Labeling & Blood Flow Quiz • EKG Lab Report • Blood Pressure Lab Report • Cardiovascular System Test • Lymphatic System Test • Fetal Pig Dissection Lab Report	• Respective chapters in the supplemental textbook • Vernier software and lab manual • Respective materials for each cooperative and lab activity • Edpuzzle • Kahoot • Dissection Materials

Unit V: Absorption & Excretion

Unit Summary

In this unit, students will investigate the structure and function of the digestive, respiratory, and urinary systems. They will identify and describe the locations and general functions of the major digestive organs, analyze the structure of the alimentary canal wall, and explain how its contents are mixed and moved. Enzymatic secretions from digestive organs and glands will be explored along with their regulation and role in chemical digestion, while students will also differentiate between mechanical and chemical digestion in each organ. Additional topics include swallowing, vomiting, defecation mechanisms, absorption of digestive products, and the role of villi in the small intestine, bile's function, and digestive diseases, disorders, and diagnostic tests. In the respiratory system section, students will learn the functions and structure of each organ, the mechanics of inspiration and expiration, respiratory air volumes and capacities, and non-respiratory air movements. They will examine the respiratory center, its regulation of breathing, factors influencing its activity, the respiratory membrane's role in gas exchange, and common respiratory diseases and disorders. Finally, students will study the urinary system, naming its organs and their functions, describing kidney location, structure, and nephron anatomy, and tracing blood flow through renal vessels. Urine formation processes, regulation of glomerular filtration, micturition control, and urinary system diseases and disorders will be explored to provide a comprehensive understanding of body waste elimination and homeostasis.

Standards/Core Ideas/Performance Expectations/Progress Indicators

The state standards outlined below, and established by the New Jersey Department of Education, will guide instruction throughout this unit in *Anatomy and Physiology Honors:*

- *2020 New Jersey Student Learning Standards: Science*
  - HS-LS1.1-4, & 6- 7, HS-LS3.1 & 2, HS-ETS1.4
- *2023 New Jersey Student Learning Standards: Mathematics*
  - N.Q.A.1, G.MG.1, S.ID.1, S.IC.6, S.CP.7
- *2023 New Jersey Student Learning Standards: English Language Arts 11-12*
  - RI.CR.11–12.1., RI.CI.11–12.2., RI.CT.11–12.8.:W.WR.11-12.5, W.SE.11–12.6., W.WP.11–12.4, SL.PI.11-12.4
- *2020 New Jersey Student Learning Standards: Computer Science and Design Thinking*
  - 8.1.12.IC.1, 8.2.12.ED.1, 8.2.12.ITH.1
- *2020 New Jersey Student Learning Standards: Career Readiness, Life Literacies and Key Skills*
  - 9.4.12.CI.1, 9.4.12.CT.2, 9.4.12.IML.2

Unit Essential Questions	Unit Enduring Understandings
• What role does the digestive system play in maintaining homeostasis? • How do the structures of the digestive system allow it to function properly? • What mechanisms does the digestive system have for increasing surface area and what is the importance of this strategy? • How do the structures allow the respiratory system to function properly? • How does the respiratory system work to maintain homeostasis? • What structures are involved in the exchange of gases? • How does the urinary system work to maintain homeostasis? • How does the structure of the urinary system allow it to perform its function? • How does the urinary system work with other organ systems to play a larger systemic role in the body?	• The digestive system maintains homeostasis by breaking down food into absorbable nutrients, which are then utilized by cells for energy, growth, and repair, while also eliminating waste products. • The digestive system's proper function relies on the specialized structures of its organs each adapted for specific roles in mechanical and chemical digestion, absorption, and elimination. • The digestive system employs various structural mechanisms to dramatically increase its internal surface area, which maximizes the efficiency of nutrient absorption into the bloodstream. • The respiratory system's proper function is enabled by the specialized structures of its airways and lungs, which facilitate efficient gas exchange between the external environment and the bloodstream, ensuring adequate oxygen supply and carbon dioxide removal. • The respiratory system maintains homeostasis by regulating blood pH through the controlled exchange of oxygen and carbon dioxide. • The exchange of gases primarily occurs across the thin, highly permeable membranes of the alveoli in the lungs and the surrounding capillaries. • The urinary system maintains homeostasis by filtering blood to remove metabolic wastes, regulating fluid and electrolyte balance, and controlling blood pressure and red blood cell production. • The structures of the urinary system, particularly the kidneys, are specifically designed to filter blood, reabsorb essential substances, and excrete waste. • The urinary system works in conjunction with other organ systems (e.g., circulatory, endocrine, nervous) to influence blood pressure, red blood cell production, and nutrient balance across the entire body.

Evidence of Learning

Formative & Alternative Assessments:	**Benchmark & Summative Assessments:**	**Resources Needed:**
● Digestive System Case Study ● Celiac Disease Case Study ● Digestive System Disorder Project ● Lung Capacity Lab ● Mystery Pulmonary Disorder Diagnosis Activity ● Kidney Chain Activity ● Organ Transplant Activity ● Urinalysis Activity ● Cat Dissection ● Individual student check ins with teacher	● Digestive System Labeling Quiz ● Respiratory System Labeling Quiz ● Lung Capacity Lab Report ● Kidney & Nephron Labeling Quiz ● Urinalysis Lab Report ● Cat Dissection Lab Report ● End of Year Summary Table (Summative)	● Respective chapters in the supplemental textbook ● Vernier software and lab manual ● Respective materials for each cooperative and lab activity ● Edpuzzle ● Kahoot ● Dissection Materials

Section IX: Unit Reflection

The *Anatomy and Physiology Honors* instructional team must confer upon the completion of each instructional unit in the *Anatomy and Physiology Honors* curriculum and rate the degree to which the instructional units meet performance criteria established by the New Jersey Department of Education using the Unit Reflection Form. Completed unit reflection forms must be submitted to the Department Supervisor for approval upon completion of curriculum implementation with a complementing list of suggested modifications to the *Anatomy and Physiology Honors* curriculum.

Unit Reflection Form: *Anatomy and Physiology Honors*			
Lesson Activities:	**Strongly**	**Moderately**	**Weakly**
Foster student use of technology as a tool to develop critical thinking, creativity, and innovation skills;			
Are challenging and require higher-order thinking and problem-solving skills;			
Allow for student choice;			
Provide scaffolding for acquiring targeted knowledge/skills;			
Integrate modern, global perspectives, especially those regarding diversity, genocide, global issues, and historical ones regarding racial relations;			
Integrate 21st century skills;			
Provide opportunities for interdisciplinary connection and transfer of knowledge and skills;			
Are varied to address different student learning styles and preferences;			
Are differentiated based on student needs;			
Are student-centered, with the teacher acting as a facilitator and co-learner during the teaching and learning process;			
Provide means for students to demonstrate knowledge and skills and progress in meeting learning goals and objectives;			

Provide opportunities for student reflection and self-assessment;			
Provide data to inform and adjust instruction to better meet the varying needs of learners.			

Appendix
Writing Instruction and the RFH Community

Writing instruction should happen across the RFH Community. Writing across the curriculum is a philosophy that advances the belief that writing is a method of learning. Since all departments are committed to helping students learn, writing must be used as a methodology to advance student learning.

Each academic discipline has its own unique conventions, formats and structures. It is the responsibility of each department to agree upon domain-specific writing praxes, model them for students, and require them to utilize them on a consistent basis. Students must understand that acceptable writing in one domain may not be acceptable writing in another area. The development of domain-specific writing skills supports the overall development of the student writer because all writing is grounded in the writing situation: audience, context, purpose, subject, and writer. Representatives from the academic disciplines must share their domain-specific writing praxes with each other, identify intersections, and determine how to address perceived gaps that limit student learning.

Students must experience writing situations that help them learn how to think creatively and critically and communicate effectively in the academic disciplines. Writing instruction, regardless of the academic discipline, must always reinforce student understanding of the writing situation. When students experience writing situations, they must study examples of domain-specific writing in order to understand how writers communicate in discipline-related contexts. This does not mean information embedded in textbooks. Domain-specific writing is writing that is used to inform and influence readers as it draws them into an established circle of discourse. Students must use these non-fiction texts to develop the close reading skills that will shape their own writing. Focused engagement with domain-specific writing should not be limited to basic reading comprehension and topical understanding. It must also include the analysis of the writing situation that is represented in the text: audience, context, purpose, subject, and writer. The close reading of well-written texts—regardless of the domain—will show students the importance of writing mechanics, diction, and syntax. The development of close reading skills will also help the students grow in terms of their ability to construct and advance independent and original claims that are well-supported by evidence. Domain-specific writing is grounded in positioning of claims and the effective use of evidence.

The final written product is important; nevertheless, the learning that results in this production must not be devalued. The writing process is not limited to the basic steps of planning, drafting, revising, and editing/proofreading. It is a complex sequence of critical and creative thinking and writing that leads to the production of a text that provides evidence of learning and understanding. Students must ultimately develop the ability to self-assess the effectiveness of their writing as a representation of the writing situation. Without the use of models that evidence learning and understanding, students will not develop the ability to self-assess their own work—the true outcome of the writing process.

What types of writing situations should RFH students engage in?

RFH students should engage in writing situations across the curriculum that require them to:

- write to improve mechanical proficiency, diction usage, and syntactical sophistication
- write to narrate, describe, and reflect
- write to summarize and report
- write to classify and define
- write to explain how process leads to an outcome
- write to compare, contrast and evaluate
- write to speculate on cause and effect
- write to propose solutions and solve problems
- write to analyze

These writing situations should be positioned in a coordinated, developmental sequence that extends <u>across</u> the academic disciplines.

Upon Completion of Grade 12, RFH students must be ready to transition to the following writing situations:

- write to analyze

- write to persuade (argument)

The core foci of first-year college writing courses are analysis and argument. These courses orient the students to the demands and expectations of writing for the academic culture of college. At colleges/universities with carefully coordinated writing programs, students must demonstrate proficiency in analysis and argument before they transition to upper level courses that require them to engage in the following writing situation:

- write to investigate (research)