

Reading Public Schools

Instilling a joy of learning and inspiring the innovative leaders of tomorrow



Science Curriculum Guide

High School Human Anatomy & Physiology

Course Description

Anatomy & Physiology is a rigorous second year biology course designed to provide a comprehensive background for those students interested in the human body or contemplating majoring in biology or careers in medicine, nursing, physical therapy, or sports medicine. This course strives to develop in students a basic understanding of relationships between structure and function, diseases and homeostatic mechanisms of the human body. There will be thorough investigation into each system with a focus on preparing students with the study skills to explore the material further at the college level. The course involves class discussions, group work, projects, lab activities and case studies and is open to juniors and seniors.

Content Standards

- Develop the study skills necessary to be successful in a college level anatomy & physiology learning environment.
- Identify the characteristics of life of an organism with the understanding that 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.
- Describe the anatomical position and anatomical directional terminology as it applies to the human body, cavities, regions, and planes.
- Describe homeostasis and identify positive and negative feedback mechanisms that help maintain homeostasis in multiple body systems.
- Describe how atoms and molecules relate to cells and tissues in the human body.
- Explain the role of enzymes as catalysts that lower the activation energy of biochemical reactions. Identify factors, such as pH and temperature, and their effect on enzyme activity.
- Classify and state the defining characteristics of epithelial tissue, connective tissue, muscle tissue, and nervous tissue.
- Identify the functions of the integumentary system and the role it plays in maintaining the homeostasis of an individual
- Describe the structure and function of skin, hair, and nails and glands of the skin.
- Define the terms endocrine and exocrine.
- Describe the anatomy & physiology of bone tissue.
- Identify the major bones of the axial and appendicular skeleton.
- Describe the anatomy & physiology, including ultrastructure of muscle tissue.
- Describe the signal transmission across a neuromuscular junction
- Identify the major muscles of a human on a model or diagram.
- Describe the anatomy, histology, and physiology of the central and peripheral nervous systems and name the major divisions of the nervous system.
- Identify the general parts of a synapse and describe the physiology of signal transmission across a synapse.
- Describe the anatomy and physiology of the eye.
- Describe the functions of the digestive system and the role it plays in maintaining the homeostasis of an individual.

Science and Engineering Practices

The high school biology standards place particular emphasis on science and engineering practices of developing and using models; constructing explanations; engaging in argumentation from evidence; and obtaining, evaluating, and communicating information. Students are expected to:

- use multiple types of models, including mathematical models, to make predictions and develop explanations, analyze and identify flaws in the model, and communicate ideas that accurately represent or simulate the biological system.
- construct and revise explanations and claims based on valid and reliable evidence and apply scientific reasoning to evaluate complex real-world problems such as the effects of human activity on biodiversity and ecosystem health.
- find and interpret scientific literature to compare, integrate, and evaluate sources and communicate phenomena related to genetics, the functioning of organisms, and interrelationships between organisms, populations, and the environment.

Subject High School Anatomy & Physiology

| Units | Essential Questions | Key Activities <u>MAY</u> include... |
|---|--|--|
| The Human Body: An Introduction | <ul style="list-style-type: none"> • How is the human body organized? | Directional Terms Mad Libs Homeostasis Case Studies Unit Test |
| Chemistry Comes Alive & Cell Biology | <ul style="list-style-type: none"> • How do cells maintain balance within the human body? | Molecule Building Lab/Kits Cell Bio Review Manipulatives Enzyme Lab Unit Tests |
| Histology | <ul style="list-style-type: none"> • How does the specificity of a tissue affect the overall function in the human body? | Microscopes in Lab ; Identifying tissues Practice Test Histology Notebook Project Lab Practical Exam |
| Integumentary System | <ul style="list-style-type: none"> • How do the structures of the skin help regulate other parts of the human body? | Microscope Lab Colored Diagram Work Unit Test SOAP Note |
| Skeletal System | <ul style="list-style-type: none"> • How does the skeletal system help the body maintain homeostasis? • How does the endocrine system interact with the skeletal system? | Bone Histology Lab Skeletal Anatomy Lab Practical Exam (Axial & Appendicular) SOAP Note |
| Articulations | <ul style="list-style-type: none"> • How do we classify the joints in the body? • How do articulations assist in our everyday movement? | Articulation Poster Project Articulation Identification Practical Exam |
| Muscular System | <ul style="list-style-type: none"> • How does the muscular system help the body maintain homeostasis? • How does the nervous system interact with the muscular system? | Slow Twitch/Fast Twitch Lab Life Size Muscular Anatomy Model Chicken Wing Dissection Major Muscular Group Quest |
| Nervous System and Eye | <ul style="list-style-type: none"> • How does the human body receive, interpret, and send information throughout itself? • How does the anatomy of the eye allow us to see objects in our world? | Cow Eye Dissection SOAP Note |
| Digestive System | <ul style="list-style-type: none"> • How does the digestive system help the body maintain homeostasis? | Digestive System Lab Digestive System Poster SOAP Note Unit Test Fetal Pig Dissection |

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Science Curriculum Guide Overview

Curriculum Guide

Curriculum guides are public documents aligned with the Massachusetts Department of Education Curriculum Frameworks. They focus on the set of standards that students will learn within certain disciplines at appropriate grade levels. Each area of the curriculum is divided into general strands (broad categories) under which the standards fall. When we discuss “standards-based education” we mean that students are measured against their proficiency and growth towards meeting these standards. Curriculum Guides are intended for teachers, parents, and the wider school community as an overview document of the course of study for the year.

Content Standards

The Human Anatomy and Physiology curriculum at Reading Memorial High School is aligned with the 2016 Massachusetts Science and Technology/Engineering Curriculum Frameworks for Biology. Detailed information for the STE Framework can be found at: <http://www.doe.mass.edu/frameworks/scitech/2016-04.pdf>. The content standards describe what students should know and be able to do. They build from middle school and allow students to explain additional and more complex phenomena related to genetics, the functioning of organisms, and interrelationships between organisms, populations, and the environment.

Science and Engineering Practices

The integration of science and engineering practices in high school science courses gives students dynamic and relevant opportunities to refine and communicate science understandings to be well prepared for civic life, postsecondary education, and career success.

Essential Questions

Essential questions are questions that are not answerable with an easy answer or a simple instruction. The purpose of essential questions is to provide opportunities for inquiry into the learning and act as an umbrella to anchor the unit/lesson.

Key Activities

Key Activities identified in Curriculum Guides are not intended to be exhaustive, nor are they intended to be prescriptive. The activities identified may function as a menu of curriculum resources from which educators identify the most appropriate tools to utilize in their classrooms.