



Cherokee
County
School
District

Teaching &
Learning
Standards

HUMAN ANATOMY & PHYSIOLOGY

Science

Human Anatomy & Physiology

Science



Course Description

The Human Anatomy and Physiology Cherokee Teaching & Learning Standards are designed to continue student investigations that began in grades K-8 and high school biology. This curriculum is extensively performance and laboratory based. It integrates the study of the structures and functions of the human body, however rather than focusing on distinct anatomical and physiological systems (respiratory, nervous, etc.) instruction should focus on the essential requirements for life. Areas of study include organization of the body; protection, support and movement; providing internal coordination and regulation; processing and transporting; and reproduction, growth and development. Whenever possible, careers related to medicine, research, healthcare, and modern medical technology should be emphasized throughout the curriculum. Case studies concerning diseases, disorders, and ailments (i.e. real-life applications) should be emphasized.

Science standards integrate the three dimensions of **Science and Engineering Practices (SEPs)**, **Crosscutting Concepts (CCCs)**, and **Disciplinary Core Ideas (DCIs)** to provide a comprehensive framework that emphasizes active engagement, interdisciplinary connections, and core scientific principles. Together, they show how science standards engage *students* in obtaining, evaluating, and communicating information.

Science and Engineering Practices	Crosscutting Concepts	Disciplinary Core Ideas
Asking Questions (Science) and Defining Problems (Engineering)	Patterns	Engineering, Technology, and the Application of Science (TLS)
Developing and Using Models	Cause and Effect: Mechanism and Explanation	
Planning and Carrying Out Investigations	Scale, Proportion, and Quantity	Physical Science (P)
Analyzing and Interpreting Data	Systems and System Models	
Mathematics and Computational Thinking	Energy and Matter: Flows, Cycles, and Conservation	Life Science (L) Human Anatomy & Physiology (AP)
Constructing Explanations (Science) and Designing Solutions (Engineering)		
Engaging in Argument from Evidence	Structure and Function	Earth and Space Science (E)
Obtaining, Evaluating, and Communicating Information	Stability and Change	

Science and Engineering Practices are fundamental approaches that scientists and engineers use to investigate the natural world and solve practical problems. **Crosscutting Concepts** in science are overarching themes that bridge various disciplines, helping students and researchers see connections and deepen their understanding of the natural world. **Disciplinary Core Ideas** are fundamental concepts that students need to understand to develop a deep knowledge of science across various disciplines.

Thinking Like a Scientist

Thinking Like a Scientist standards represent scientific thinking skills that should be incorporated throughout the entire course.

Overarching Standard

TLS9-12: Refine scientific inquiry and problem-solving skills by designing and conducting investigations, applying scientific theories, and critically evaluating scientific literature.

Supporting Standards for Student Mastery

TLS9-12.a: Use specialized scientific terms and concepts to analyze and explain scientific phenomena.

TLS9-12.b: Design and conduct independent experiments with multiple variables.

TLS9-12.c: Engage in complex data collection using advanced tools and technology (e.g., sensors, probes, software, simulations). Apply statistical methods to interpret data and generate a variety of graph types.

TLS9-12.d: Critically evaluate and communicate complex findings through reports and presentations. Contribute to scientific discussions by constructing and defending scientific explanations. Use and critique evidence to strengthen scientific arguments and discussions.

Semester 1 (August – December)

Unit 1: Cellular Connections & Homeostasis (6-7 weeks)

In this introductory unit, students will explore the complex interactions between the endocrine and nervous systems and their roles in maintaining homeostasis within the human body. They will investigate how these systems work together to detect, interpret, and respond to internal and external stimuli, ensuring the body functions optimally. The unit will cover the orientation and structure of various body systems, including cells, tissues, organs, and how their specific structures relate to their functions. Students will also delve into the effects of aging, diseases, and disorders on these systems, gaining insights into how disruptions in homeostasis can impact overall health. Through developing models and explanations, students will enhance their understanding of how cellular connections and systemic interactions contribute to the body's equilibrium.

Overarching Standard for Unit 1

AP3: Obtain, evaluate, and communicate information to explain the coordination of information processing in the endocrine and nervous systems.

AP3.c: Ask questions about how the interdependence of the endocrine and nervous systems makes information processing (detection, interpretation, and response) possible.

(Clarification statement: Questions should address the homeostatic mechanisms, as well as the effects of and responses to aging, diseases, and disorders).

Supporting Standards for Student Mastery in Unit 1

AP1: Obtain, evaluate, and communicate information to analyze anatomical structures of the human body.

AP1.a: Develop and use models to demonstrate the orientation of structures and regions of the human body.

AP1.b: Construct an explanation about the relationship between a body structure (i.e., cells, tissues, organs, and organ systems) and its function within the human body.

Unit 2: Homeostatic Systems for Temperature Regulation & Protection (7-8 weeks)

In this unit, students will delve into the intricate systems responsible for maintaining body temperature and protection through homeostatic mechanisms. They will examine how the endocrine and nervous systems collaborate to regulate and respond to temperature changes, ensuring the body maintains equilibrium. The unit will focus on the role of the integumentary system in protecting the body, eliminating waste products, and regulating temperature, while also exploring the functional relationships of the skeletal and muscular systems in support, movement, and protection. Students will develop and use models to understand how these systems interact to maintain homeostasis and will investigate how aging, diseases, and disorders can impact these processes. By analyzing hormonal regulation and feedback mechanisms, students will gain insights into how the body adapts to internal and external challenges to preserve a stable internal environment.

Overarching Standard for Unit 2

AP3: Obtain, evaluate, and communicate information to explain the coordination of information processing in the endocrine and nervous systems.

AP3.c: Ask questions about how the interdependence of the endocrine and nervous systems makes information processing (detection, interpretation, and response) possible.

(Clarification statement: Questions should address the homeostatic mechanisms, as well as the effects of and responses to aging, diseases, and disorders).

Supporting Standards for Student Mastery in Unit 2

AP2: Obtain, evaluate, and communicate information to analyze the structure and function of the integumentary, skeletal, and muscular systems.

AP2.a:

Construct an explanation about the relationship between the structures of the integumentary system and their role in protection, eliminating waste products, and regulating body temperature.

AP2.b: Develop and use models to relate the structure of the skeletal system to its functional role in movement, protection, and support.

AP2.c: Develop and use models to determine the relationship between structures of the muscular system and their role in movement and support.

AP2.d: Ask questions about how the interdependence of the integumentary, skeletal, and muscular systems makes support, protection, and movement possible.

(Clarification statement: Questions should address the homeostatic mechanisms, as well as the effects of and responses to aging, diseases, and disorders).

AP3.b: Analyze and interpret data to explain how the hormones of the endocrine system regulate physical and chemical processes to maintain a stable internal environment.

(Clarification statement: This should include positive and negative feedback mechanisms, e.g. heart rate, blood sugar, childbirth, temperature, growth, etc.)

Unit 3: Signaling Systems that Maintain Homeostasis (3-4 weeks)

In this unit, students will investigate the critical signaling systems that maintain homeostasis within the body, focusing on the roles of the endocrine and nervous systems. They will investigate how these systems coordinate to detect, interpret, and respond to internal and external changes, ensuring stability and balance. The unit will involve analyzing the structural and functional aspects of the nervous system, examining how its components contribute to efficient information processing. Students will also delve into the hormonal regulation by the endocrine system, studying both positive and negative feedback mechanisms that control various physiological processes such as heart rate, blood sugar levels, and body temperature. By evaluating how these systems interact and adapt to aging, diseases, and disorders, students will gain a comprehensive understanding of how homeostatic balance is achieved and maintained.

Overarching Standard for Unit 3

AP3: Obtain, evaluate, and communicate information to explain the coordination of information processing in the endocrine and nervous systems.

AP3.c: Ask questions about how the interdependence of the endocrine and nervous systems makes information processing (detection, interpretation, and response) possible.

(Clarification statement: Questions should address the homeostatic mechanisms, as well as the effects of and responses to aging, diseases, and disorders).*)*

Supporting Standards for Student Mastery in Unit 3

AP3.a: Ask questions to investigate how the structures of the nervous system support the function of information processing (detection, interpretation, and response).

AP3.b: Analyze and interpret data to explain how the hormones of the endocrine system regulate physical and chemical processes to maintain a stable internal environment.

(Clarification statement: This should include positive and negative feedback mechanisms, e.g. heart rate, blood sugar, childbirth, temperature, growth, etc.)*)*

Semester 2 (January – May)

Unit 3 Continued: Signaling Systems that Maintain Homeostasis (3-4 weeks)

In this unit, students will continue to investigate the critical signaling systems that maintain homeostasis within the body, focusing on the roles of the endocrine and nervous systems. They will investigate how these systems coordinate to detect, interpret, and respond to internal and external changes, ensuring stability and balance. The unit will involve analyzing the structural and functional aspects of the nervous system, examining how its components contribute to efficient information processing. Students will also delve into the hormonal regulation by the endocrine system, studying both positive and negative feedback mechanisms that control various physiological processes such as heart rate, blood sugar levels, and body temperature. By evaluating how these systems interact and adapt to aging, diseases, and disorders, students will gain a comprehensive understanding of how homeostatic balance is achieved and maintained.

Overarching Standard for Unit 3

AP3: Obtain, evaluate, and communicate information to explain the coordination of information processing in the endocrine and nervous systems.

AP3.c: Ask questions about how the interdependence of the endocrine and nervous systems makes information processing (detection, interpretation and response) possible.

(Clarification statement: Questions should address the homeostatic mechanisms, as well as the effects of and responses to aging, diseases, and disorders).

Supporting Standards for Student Mastery in Unit 3

AP3.a: Ask questions to investigate how the structures of the nervous system support the function of information processing (detection, interpretation, and response).

AP3.b: Analyze and interpret data to explain how the hormones of the endocrine system regulate physical and chemical processes to maintain a stable internal environment.

(Clarification statement: This should include positive and negative feedback mechanisms, e.g. heart rate, blood sugar, childbirth, temperature, growth, etc.)

Unit 4: Homeostatic Processes that Regulate Nutrients & Waste (9-10 weeks)

In this unit, students will investigate the homeostatic processes that regulate nutrients and waste within the body, focusing on how various systems work together to maintain internal stability. They will investigate the intricate roles of the cardiovascular and respiratory systems in acquiring oxygen, delivering nutrients, and removing waste products. By developing and using models, students will explore the functions of the digestive and urinary systems in processing matter to produce energy and eliminate metabolic byproducts. Additionally, students will analyze how these systems interact to ensure effective nutrient uptake and waste removal, while maintaining homeostasis. They will also examine the endocrine system's role in regulating these processes through hormonal feedback mechanisms and explore how aging, diseases, and disorders impact these vital functions. Through hands-on investigations and critical questioning, students will gain a comprehensive understanding of the complex coordination required to sustain a balanced internal environment.

Overarching Standard for Unit 4

AP3: Obtain, evaluate, and communicate information to explain the coordination of information processing in the endocrine and nervous systems.

AP3.c: Ask questions about how the interdependence of the endocrine and nervous systems makes information processing (detection, interpretation, and response) possible.

(Clarification statement: Questions should address the homeostatic mechanisms, as well as the effects of and responses to aging, diseases, and disorders).

Supporting Standards for Student Mastery in Unit 4

AP3.b: Analyze and interpret data to explain how the hormones of the endocrine system regulate physical and chemical processes to maintain a stable internal environment.

(Clarification statement: This should include positive and negative feedback mechanisms, e.g. heart rate, blood sugar, childbirth, temperature, growth, etc.)

AP4: Obtain, evaluate, and communicate information to analyze the processing of matter and energy in the cardiovascular, respiratory, digestive and urinary systems.

AP4.a: Plan and carry out an investigation to explore the structures and role of the cardiovascular and respiratory systems in obtaining oxygen, transporting nutrients, and removing waste.

AP4.b: Develop and use models to explain the relationship between the structure and function of the digestive and urinary systems as they utilize matter to derive energy and eliminate waste.

AP4.c: Ask questions about the interdependence of the cardiovascular, respiratory, urinary, and digestive systems.

(Clarification statement: Questions should address the homeostatic mechanisms, as well as the effects of and responses to aging, diseases, and disorders).

Unit 5: Growth, Development & Homeostasis (4-5 weeks)

In this unit, students will explore the processes of growth, development, and homeostasis throughout the human lifespan, with a focus on the interactions between the endocrine and nervous systems. They will investigate how the reproductive system facilitates the production of eggs and sperm, fertilization, and the development of offspring, examining the hormonal regulations that support these processes. Students will develop and use models to describe human embryology and gestation, gaining insight into the stages of development from conception to birth. Additionally, they will explore how these systems contribute to growth and development and how homeostatic mechanisms adapt to the changing needs of the body throughout life. Through critical questioning and model-based investigations, students will understand how the body maintains balance and adapts to various factors, including aging, diseases, and disorders.

Overarching Standard for Unit 5

AP3: Obtain, evaluate, and communicate information to explain the coordination of information processing in the endocrine and nervous systems.

AP3.c: Ask questions about how the interdependence of the endocrine and nervous systems makes information processing (detection, interpretation, and response) possible.

(Clarification statement: Questions should address the homeostatic mechanisms, as well as the effects of and responses to aging, diseases, and disorders).

Supporting Standards for Student Mastery in Unit 5

AP5: Obtain, evaluate, and communicate information to analyze the role of the reproductive system as it pertains to the growth and development of humans.

AP5.a: Ask questions to gather and communicate information about how the structures of the reproductive system allow for production of egg and sperm, fertilization, and the development of offspring.

(Clarification statement: Regulation of the functions by hormones should be addressed in this standard.)

AP5.b: Develop and use models to describe the stages of human embryology and gestation.

AP5.c: Ask questions about how the reproductive system makes growth and development possible.

(Clarification statement: Questions should address the homeostatic mechanisms, as well as the effects of and responses to aging, diseases, and disorders).