

Anatomy and Physiology



Industry Sectors: [Health Science and Medical Technology and Public Services](#)



Pathways: Patient Care, Mental & Behavioral Health, Emergency Response

Anatomy and Physiology is a complementary, rigorous course for students interested in biology, medicine, and related health sciences professions and occupations. Students will explore major concepts through lectures, readings, simulations, and lab exercises to learn about the human anatomical structures, systems, functions, and mechanics, as well correct laboratory procedures. A major feature of this course of study is in understanding the interactions between body systems as it relates to homeostasis. Threats to homeostasis, including aging and system/organ failure will also be studied.

Last Revised: August 11, 2017

Program Information	CTE Certification Elements
<p>Industries / Pathways: Health Science and Medical Technology Industry, Public Services Industry: Patient Care, Mental & Behavioral Health, and Emergency Response Pathways</p> <p>K-12 Subjects: Science, Physical/Health Education, Life Sciences</p> <p>Grade Levels: 9, 10</p> <p>CSU/UC Approval: Yes</p>	<p>Course Level: Concentrator</p> <p>CALPADS Pathway: HLT 198, HLT 195, PUB 233</p> <p>CALPADS Course Title: Anatomy and Physiology</p> <p>State Course ID: 7921, 7961, 8421</p> <p>Total Hours: 120</p> <p>Course Length: 1 Semester</p> <p>Local Course Number: PC5001, MH6001, ER7001</p>

Community College Course: No

Pathway Sequence(s) That Include This Course:

1. Patient Care Pathway Course Sequence:

Introduction to Health and Human Service Careers or Health Professions and Organizations
First Aid, Emergency Response and CPR
Career Explorations

Anatomy and Physiology

Introduction to Public Health or Health and Social Justice or Medical Terminology
Hospital/Clinical Internship (10th, 11th, 12th)
Realities of Nutrition or Substance Abuse and Public Health
CPR Recertification
Advanced Pre-nursing Seminar or Advanced Internship

2. Emergency Response Pathway Course Sequence:

Introduction to Health and Human Service Careers or Health Professions and Organizations
First Aid, Emergency Response and CPR
Career Explorations

Anatomy and Physiology

Fire Science and Technology I and II
Fire Technology Internship (Grades 10-11-12)
CPR Recertification
Fire Technology III

Board Approval: Pending Board Action on 12/7/17

Labor Market Demand: High

Course Type: Career-Technical Preparation

Program Information (continued)

3. Mental & Behavioral Health Pathway Course Sequence:

Introduction to Health and Human Service Careers or Health Professions and Organizations
First Aid, Emergency Response and CPR
Career Explorations

Anatomy and Physiology

Foundations of Mental & Behavioral Health Careers I or Health and Social Justice or Introduction to Public Health
Mental Health Internship (10th, 11th, 12th)
Foundations of Mental & Behavioral Health Careers II or Substance Abuse and Public Health or
Introduction to Social Work
CPR Recertification
Specialized Mental Health Seminar Project and Exhibition and/or Advanced Mental/Behavioral Health Internship

Competencies / Outcomes

The student demonstrates the ability to:

- Explain how anatomy and physiology are related.
- Name the levels of structural organization that make up the human body and explain how they are related.
- Identify and explain the differences between different human body systems.

- Define homeostasis and explain how the different body systems work together to maintain homeostasis.
- Explain the anatomical structure, location of all organs in each system, functions of each organ system and how structure relates to function.
- Use proper anatomical terminology to describe body direction, surfaces and body planes.
- Describe the developmental aspects of all the body systems.
- Describe the various body defenses.
- Explain common diseases that affect the body systems.
- Develop the skills of scientific inquiry while learning concepts in the classroom, lab, and field.
- Understand how biological and social concepts related to the content apply to everyday life and develop an increased knowledge of these concepts.

Standards

California's 2013 CTE Standards

1. CTE.HSMT.B.2.1 [Know basic human body structure and function in relationship to specific care between prevention, diagnosis, pathology, and treatment.](#)
2. CTE.HSMT.B.2.2 [Describe basic stages of growth and development.](#)
3. CTE.HSMT.B.2.3 [Recognize common disease and disorders of the human body.](#)
4. CTE.HSMT.B.2.4 [Compare normal function of the human body to the diagnosis and treatment of disease and disorders.](#)
5. CTE.HSMT.KPAS.5.4 [Interpret information and draw conclusions, based on the best analysis, to make informed decisions.](#)
6. CTE.HSMT.KPAS.5.5 [Know how to apply mathematical computations related to health care procedures \(metric and household, conversions and measurements\).](#)
7. CTE.HSMT.KPAS.2.8 [Understand and use correct medical terminology for common pathologies.](#)
8. CTE.HSMT.KPAS.4.3 [Use information and communication technologies to synthesize, summarize, compare, and contrast information from multiple sources.](#)
9. CTE.HSMT.KPAS.6.3 [Use health and safety practices for storing, cleaning, and maintaining tools, equipment, and supplies.](#)
10. CTE.HSMT.KPAS.7.5 [Apply high-quality techniques to product or presentation design and development.](#)
11. CTE.HSMT.KPAS.8.3 [Demonstrate ethical and legal practices consistent with Health Science and Medical Technology sector workplace standards.](#)
12. CTE.HSMT.B.3.2 [Analyze diagrams, charts, graphs, and tables to interpret health care results.](#)
13. CTE.HSMT.B.10.1 [Describe the infection control cycle with consideration of the various types of microorganisms.](#)
14. CTE.HSMT.B.11.1 [Describe basic emergency procedures used to respond to a hazardous spill.](#)

15. CTE.HSMT.B.11.2 [Explain how waste is handled, packaged, stored, and disposed of in accordance with federal, state, and local regulations including hazardous chemicals, biohazards, and radioactive materials.](#)
16. CTE.HSMT.B.11.3 [Adhere to the health care setting's waste management program \(e.g., recycling and reduction of regulated medical, solid, hazardous, chemical, and radioactive waste materials\).](#)
17. CTE.HSMT.B.11.4 [Apply protective practices and procedure for airborne and bloodborne pathogens for equipment and facilities and identify unsafe conditions for corrective action.](#)

Common Core Standards for Literacy in History/Social Studies, Science and Technical Subjects

Reading

1. RST.9-10.3 (9th and 10th) [Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks, attending to special cases or exceptions defined in the text.](#)
2. RST.11-12.3 (11th and 12th) [Follow precisely a complex multistep procedure when carrying out experiments, taking measurements, or performing technical tasks; analyze the specific results based on explanations in the text.](#)
3. RST.9-10.9 (9th-10th) [Compare and contrast findings presented in a text to those from other sources \(including their own experiments\), noting when the findings support or contradict previous explanations or accounts.](#)
4. RST.11-12.9 (11th and 12th) [Synthesize information from a range of sources \(e.g., texts, experiments, simulations\) into a coherent understanding of a process, phenomenon, or concept, resolving conflicting information when possible.](#)

Writing

1. WHST.9-10.4, WHST.11-12.4 (9-10 & 11-12) [Produce clear and coherent writing in which the development, organization, and style are appropriate to task, purpose, and audience.](#)

NGSS

1. CC.SF.C [Complex and microscopic structures and systems can be visualized, modeled, and used to describe how their function depends on the relationships among its parts, therefore complex natural structures/systems can be analyzed to determine how they function.](#)
2. CC.SSM.A [A system can be described in terms of its components and their interactions.](#)

Units

Unit 1: Introduction to the Human Body

Description

This unit introduces anatomy (structure) and physiology (function) and their conceptual relationship to one another. Topics include: organizational systems (molecular, cellular, tissue, organs, and organ systems) and resources needed to sustain life and maintain homeostasis. Discipline-specific directional and regional terminology are introduced, including basic chemistry and biochemistry vocabulary (e.g., meiosis, mitosis). These are foundational for the course of study.

Key Topics/Activities

Students work in teams to construct assigned body systems using functionally similar materials (e.g., balloons for respiratory system; plastic pipes for skeletal system). Each team presents their body system using correct directional and regional terminology to explain anatomy (structure) and physiology (function). Students will consolidate conceptual understandings with concomitant vocabulary and terminology.

Unit 2: Histology and Integumentary System

Description

Topics of study include histology and four major body tissues types (muscle, epithelial, connective, nervous) and membranes (mucous, serous, cutaneous, synovial). Integumentary system (epidermis, dermis, hypodermis) and its protective functions are integrated with histological features. Students examine these systems through the lens of organizational systems introduced in Unit 1.

Key Topics/Activities

Histology and Integumentary system are introduced through lecture and readings, then expanded through hands-on activities, including the A&P coloring book, student development of flashcards for study, and laboratory work. Students learn basic laboratory skills (general skills, lab ware care, safety, equipment). Students view tissue slides to identify structure and function, and learn how these influence cellular organization.

Unit 3: Musculoskeletal System

Description

Major topics focus on the skeletal and muscular systems and their interactions and associated functions. Axial and appendicular skeletons, joint types and associated functions, and muscle tissue types (smooth, skeletal, and cardiac) are featured. These systems are linked to movement, form, and stability. Key concepts include muscle movement (e.g., contraction), cellular organization features of musculoskeletal system, macroscopic physiology, and tied to previous knowledge of connective tissues. Preliminary associations with nervous system are introduced.

Key Topics/Activities

Students are introduced to major concepts through lecture, readings, and small group collaborative discussion. The major activity involved student teams assigned to a joint (e.g., wrist, elbow, shoulder, hip, knee, ankle), who build a working model of the joint using hardware materials to represent the interaction between skeletal and muscle systems. Teams then work with associated body parts, arm or leg, to consolidate their joints into a system. Teams present to the class using correct terminology related to this and previous units.

Unit 4: Nervous System

Description

The major focus is on the interaction between the central and peripheral nervous system and previously learned systems (especially musculoskeletal system). Foundational topical knowledge includes cellular structures (neurons and neuroglial support cells), organizational structures that allow for communication (e.g., axons, dendrites, synapses) and their functions (e.g., resting and action potentials). This unit extends further to how these communication systems interact with major body regions, systems, and functions (e.g., pain, movement).

Key Topics/Activities

Students first construct a model of the brain using a styrofoam wig stand to paint and label major structures. Students then complete a laboratory activity in which they dissect a sheep brain to locate major structures related to the brain lobes (frontal, parietal, occipital, temporal), cerebellum, brain stem, motor cortex, somatosensory cortex, and language centers (Wernicke's, Broca's). Students meet individually with the instructor using their model for an oral assessment of their knowledge of the anatomy and physiology of the central nervous system.

Unit 5: Endocrine System and Homeostasis

Description

The focus of this unit is to further consolidate and deepen understanding of the interactions between previously studied body systems and the effects of imbalances that result in disease and loss of homeostasis. The endocrine system is the lens for understanding homeostasis, especially the biochemical processes of hormones on other systems, and positive and negative feedback loops. Students learn the anatomical features of the endocrine system (e.g., pituitary, pineal, thyroid, and adrenal glands) and the functions of hormones. Students are introduced to the reproductive system (the focus of a later unit) to the extent that it interacts with hormones.

Key Topics/Activities

Introduction to major topics is accomplished through lectures, readings, and review of anatomy color book activities previously completed, as well as new information on the endocrine system. Students are assigned an endocrine disorder and prepare a website explaining the disorder, effects on body systems, and treatment. Students review each others' websites to prepare for a series of hosted formal seminars in which interactions with other body systems are discussed.

Unit 6: Cardiovascular and Respiratory System

Description

This unit deepens student knowledge of how body systems interact with one another, this time through a focus on the cardiovascular and respiratory systems as they transport nutrients and remove waste from tissues. Foundational concepts begin with the anatomy and physiology of the heart, blood vessels, respiratory tract, and their roles in circulation and respiration. Biochemical principles related to gas exchange and glucose are discussed. Prior knowledge of other systems are revisited through physiological aspects of the cardiovascular and respiratory systems. Students learn basic principles of interpreting quantitative data, such as respiratory volume rates, electrocardiograms, and systolic and diastolic blood pressure readings.

Key Topics/Activities

Students complete a laboratory session using self-generated and existing quantitative data to measure their own respiratory volumes using a spirometer. Existing data is provided using case study models that include respiratory graph to calculate tidal volume, total lung capacity, and inspiratory and expiratory reserve volumes. Students then present information to the class to project the impact on other body systems.

Unit 7: Reproductive System

Description

Topic focus of this unit expands and deepens knowledge first introduced in Unit 5 (Endocrine System) as it applies to the anatomy and physiology of human male and female reproductive systems. Modes of delivery include lecture, readings, and student-led investigation and research. Students learn about similarities between these systems, and examine the interactions with other systems, especially the nervous, respiratory, and circulatory systems. Other topics include biochemical elements of meiosis and mitosis, and hormonal influences on menstrual cycle, sperm production, fetal development, and childbirth.

Key Topics/Activities

Student teams research an assigned clinical application related to the reproductive system (e.g., menopause, breastfeeding, sexually transmitted disease, onset of puberty). Teams have a choice of possible presentation modes, including developing a public service announcement, creating an informational pamphlet, creating a screencast, or developing an infographic.

Unit 8: Digestive and Excretory System

Description

This final unit requires students to further synthesize the interrelationships between body systems in homeostasis, this time through ingestion, hydration, secretion, and osmoregulation. Foundational concepts of anatomical structures of the alimentary canal and their functions in these processes, and how they are impacted by metabolic actions. These functions are vital for all other systems, and as such students link these to their impact on each system previously studied in this course.

Key Topics/Activities

Students use a clinical application analysis (taught in the previous unit), using their knowledge of the interdependence of body systems to identify, diagnosis, and propose treatment in case studies. These case studies include data that have been encountered in previous units (e.g., imaging, electrocardiograms, blood pressure readings) to interpret results. These case studies are utilized in student teams, with a final complex example completed individually in a written essay.