

**Science Standard  
Catalina Foothills School District  
High School: Anatomy and Physiology**

Anatomy and Physiology is a hands-on laboratory course that helps students discover the wonders of the human body. The structures and functions of the major body systems will be explored from a cellular to organismal level. Students will gain extensive knowledge of the human body through lecture, research and reading, and laboratory investigations. The course applies to any student interested in discovering the inner workings of the human organism.

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**SCIENTIFIC INQUIRY**

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**SCIENTIFIC INQUIRY: GENERATING SCIENTIFIC QUESTIONS**

A&P.1a.1 Frames testable questions showing evidence of observations and connections to prior knowledge.

A&P.1a.2 Develops a testable question appropriate to the scientific domain being investigated.

**SCIENTIFIC INQUIRY: FORMULATING HYPOTHESES**

A&P.1b.1 Develops a testable hypothesis based upon evidence of scientific principles, probability and/or modeling.

A&P.1b.2 Clearly distinguishes relationships between variables (required: cause and effect or correlation) within a testable hypothesis).

**SCIENTIFIC INQUIRY: DESIGNING INVESTIGATIONS**

A&P.1c.1 Specifies the parameters of measurement.

A&P.1c.2 Describes suitable controls for the investigation.

A&P.1c.3 Designs procedures that appropriately address the hypothesis.

A&P.1c.4 Maintains workshop and equipment hygiene.

**SCIENTIFIC INQUIRY: DATA COLLECTION**

A&P.1d.1 Creates and demonstrates safe and ethical procedures (including use of equipment and instrumentation).

A&P.1d.2 Uses units of measurement with appropriate degree of accuracy.

A&P.1d.3 Creates procedures that appropriately and adequately address the hypothesis (*for example: adequate sample size, multiple trials*).

A&P.1d.4 Creates a suitable method of recording data.

**SCIENTIFIC INQUIRY: ANALYSIS**

A&P.1e.1 Interprets data to describe relationships between variables (for example: positive, negative, no relationship).

A&P.1e.2 Incorporates mathematical analysis, where appropriate.

A&P.1e.3 Critiques the investigation for possible sources of error and suggests corrections.

### **CONCLUSIONS AND EXTENSIONS**

A&P.1f.1 Makes evidence-based predictions (for example: extrapolations and interpolations).

A&P.1f.2 Evaluates whether the data support the hypothesis.

### **COMMUNICATION**

A&P.1g.1 Uses suitable media to inform an audience about an investigation.

A&P.1g.2 Applies appropriate ethics (for example: language, style, citations).

A&P.1g.3 Articulates the role of living organisms in bioscience research.

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## **INTERACTION OF SCIENCE AND SOCIETY**

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A&P.2.1 Describes the interaction of science, human curiosity, and societal needs (for example: medical research).

A&P.2.2 Critically analyzes the science concepts behind societal issues (for example: effect of disease on body and public health).

A&P.2.3 Designs and conducts original research in a chosen career field.

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## **SYSTEMS THINKING (CFSD Deep Learning Proficiency – DLP)**

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### **SYSTEMS THINKING: CHANGE OVER TIME**

A&P.3a.1 Explains how a system's components change over time (for example: human development).

### **SYSTEMS THINKING: INTERDEPENDENCIES**

A&P.3b.1 Explains the causal relationships in a system as being either positive or negative feedback relationships (for example: hormonal regulation).

### **SYSTEMS THINKING: SYSTEM-AS-CAUSE**

A&P.3c.1 Explains reasons why specific behaviors result from the organization of a system (for example: effect of neural transmitters on human behavior).

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## **CELLULAR STRUCTURE & FUNCTION**

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A&P.4.1 Compares and contrasts methods of transport (required: osmosis, diffusion, active transport, passive transport).

A&P.4.2 Describes the response of a cell in various environments throughout the body.

A&P.4.3 Compares and contrasts cellular structures within various tissue types.

A&P.4.4 Articulates understanding of cell biology techniques.

A&P.4.5 Demonstrates understanding of microbiology skills.

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## **MACROMOLECULES**

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A&P.5.1 Compares the properties and functions of proteins, lipids, nucleic acids, carbohydrates, water, atoms, molecules, and macromolecules.

A&P 5.2 Describes the spatial relationship and interaction of an organism's components from atom to organism.

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## **HISTOLOGY**

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A&P.6.1 Compares tissue types, structures and functions (epithelial, connective, muscular, nervous).

A&P.6.2 Classifies each tissue type.

A&P.6.3 Compares fiber types (collagen, elastic, reticular).

A&P.6.4 Explains the purpose of each tissue in areas throughout the body.

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## **DISEASE AND DISORDERS**

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A&P.7.1 Explains the effects of diseases and disorders on a part, system, and/or organism as a whole.

A&P.7.2 Connects the effects of a disease or disorder to various systems and their reactions.

A&P.7.3 Applies genetic effects on the overall performance of body systems.

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## **ORGANIZATION AND HOMEOSTATIS**

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A&P.8.1 Infers the function of a body part (organ, tissue, etc.) based on its structure.

A&P.8.2 Explains the interaction of the components within a body system and between systems to maintain homeostasis.

A&P.8.3 Determines the effects of disorders or malfunctions of a body part on the homeostasis of the part, system, and/or organism.

A&P.8.4 Describes how organs can perform functions in multiple body systems.

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## **MEDICAL TERMINOLOGY**

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A&P.9.1 Compares terms based on their context within the body system.

A&P 9.2 Applies terms correctly based on information provided.

A&P 9.3 Defines terms associated with disease and body systems.

A&P 9.4 Determines locations of organs, symptoms, etc., using directional terms, planes and sections.

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## **PROTECTION, SUPPORT, AND MOVEMENT: INTEGUMENTARY SYSTEM**

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A&P.10.1 Analyzes the pathologies of the integumentary system and how the system works to repair itself.

A&P.10.2 Relates the structures of the integumentary system to maintenance of body temperature and safe boundaries.

A&P.10.3 Explains the effects of the sun and aging on the integumentary system.

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## **PROTECTION, SUPPORT, AND MOVEMENT: SKELETAL SYSTEM**

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A&P.11.1 Applies the functions of bone cells to the formation, growth and remodeling of bone tissue.

A&P.11.2 Differentiates variations in skeletal structure between male and females and age-related changes.

A&P.11.3 Categorizes joint types based on their range of motion.

A&P.11.4 Explains how bone structure relates to the five functions of bone (required: support, protection, movement, storage and blood cell formation).

A&P.11.5 Constructs a skeleton based on an understanding of bone type and function.

A&P.11.6 Describes the purpose of various compounds and minerals in bone formation (e.g., calcium, vitamins).

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## **PROTECTION, SUPPORT, AND MOVEMENT: MUSCULAR SYSTEM**

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A&P.12.1 Explains anabolic and catabolic processes involved in exercise, muscle growth, and atrophy. Outlines the sliding filament theory and its key structures. Applies understanding of muscle types to the functioning of various organs. Describes key structures and events that take place within the neuromuscular junction.

A&P.12.2 Applies understanding of muscle types to the functioning of various organs.

A&P.12.3 Describes key structures and events that take place within the neuromuscular junction.

A&P.12.4 Explains anabolic and catabolic processes involved in exercise, muscle growth, and atrophy.

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## **INTEGRATION AND REGULATION: NERVOUS SYSTEM**

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A&P.13.1 Explains the sequence of events, and the role of neurons, effectors, and receptors, from stimulus to response in a reflex arc.

A&P.13.2 Explains anatomy of the neuron and the conduction of a nerve impulse from one neuron to the other.

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## **INTEGRATION AND REGULATION: SPECIAL SPECIES**

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A&P.14.1 Describes the functions of sensory organs of smell and taste.

A&P.14.2 Explains the physiological basis of olfactory (smell) and gustatory (taste) discrimination.

A&P.14.3 Articulates the roles of the structures of the ear in hearing and equilibrium.

A&P.14.4 Explains the functions of the internal and accessory structures of the eye.

A&P.14.5 Outlines the pathways of the senses to the brain.

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### **INTEGRATION AND REGULATION: ENDOCRINE SYSTEM**

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A&P.15.1 Describes how hormones help to maintain homeostasis.

A&P.15.2 Compares endocrine versus exocrine glands, the hormones excreted, and their effects on the other body systems.

A&P.15.3 Explains negative feedback and its role in regulating blood levels of hormones.

A&P.15.4 Differentiates between the actions of steroid hormones and nonsteroid hormones.

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### **INTEGRATION AND REGULATION: CARDIOVASCULAR SYSTEM**

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A&P.16.1 Explains the pathway of blood flow through the cardiovascular system.

A&P.16.2 Compares the types of blood vessels based on their structure and function.

A&P.16.3 Explains the function(s) of the heart valves.

A&P.16.4 Applies knowledge of diffusion to gas exchange through the body.

A&P.16.5 Describes factors that affect heart rate and blood pressure.

A&P.16.6 Explains the mechanism of blood clot formation.

A&P.16.7 Differentiates between the ABO and Rh blood groups.

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### **INTEGRATION AND REGULATION: LYMPHATIC SYSTEM AND BODY DEFENSES**

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A&P.17.1 Describes the functions of the structures of the lymphatic system.

A&P.17.2 Explains the functional relationship between the lymphatic system and the cardiovascular and immune systems.

A&P.17.3 Describes the role of white blood cells, antigens, and antibodies in the immune response.

A&P.17.4 Describes the mechanism of a vaccination.

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### **INTEGRATION AND REGULATION: DIGESTIVE SYSTEM**

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A&P.18.1 Describes the function of the six basic nutrients (carbohydrates, protein, lipids, water, vitamins, minerals).

A&P.18.2 Describes the enzymatic breakdown of food substrates and where this process occurs in the body.

A&P.18.3 Explains how the microvilli, villi, lacteals, and capillaries work together in absorption in the small intestine.

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## **ABSORPTION AND EXCRETION: URINARY SYSTEM**

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A&P.19.1 Explains the metabolic processes, which produce human wastes (for example: urea, carbon dioxide, salt, water).

A&P.19.2 Applies understanding of active transport, passive transport, and nephron anatomy to the process of urine formation.

A&P.19.3 Explains the detoxification function of the liver in converting ammonia into urea.

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## **INTEGRATION AND REGULATION: RESPIRATORY SYSTEM**

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A&P.20.1 Applies the knowledge of diffusion to explain the pathway of gas exchange between the blood and the lungs, and the blood and the body tissues (internal vs. external respiration).

A&P.20.2 Explains the key phases involved in inhalation and exhalation.

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## **REPRODUCTION: REPRODUCTIVE SYSTEM**

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A&P.21.1 Describes the hormonal feedback loop of the male reproductive system.

A&P.21.2 Describes the hormonal feedback loop of the female reproductive system.

A&P.21.3 Explains the difference between gametogenesis of males and females.

A&P.21.4 Explains the events that place from fertilization to differentiation.

Note: This is a CTE/JTED course.