

# Medical Anatomy and Physiology

*This full-year course provides students with an in-depth study of healthcare careers including actual clinical experience in a variety of areas. Instruction includes intermediate anatomy & physiology, medical terminology, diseases and disorders, medical ethics and first aid. The class is designed to prepare students for the Advanced Health Science course and/or for a variety of health technology programs.*

**Grade Level: 11-12**

**2 Periods, Full year**

*(This course includes Medical Terminology and Case studies for Weber State University concurrent enrollment credit.)*

**State Certification Skills Test #702**

***BODY PLAN AND ORGANIZATION - Students will explore and describe the body plan, organization, and homeostasis.***

Standard 1 Contrast the sciences of anatomy and physiology

Standard 2 Describe the six levels of structural organization of the human body and give an example of each level. Chemical

Standard 3 Describe the following: Metabolism o Anabolic process o Catabolic process

Standard 4 Apply directional terms used in human anatomy.

Standard 5 Apply commonly used planes to divide the body.

Standard 6 Identify the body cavities and locate the following organs within each cavity.

Standard 7 Identify the major organ(s) in each abdominal quadrant.

Standard 8 Examine the relationship between homeostasis and stress.

Standard 9 Differentiate between negative and positive feedback mechanisms.

***BASIC PRINCIPLES OF BODY CHEMISTRY - Students will explain basic principles of body chemistry.***

Standard 1 Review the following terms and concepts. States of Matter, Elements, Basic components of the atom, Ion

Standard 2 Identify the four major elements in the body.

Standard 3 Differentiate between: Compound, Molecule

Standard 4 Differentiate between: Cation, Anion





## DAVIS ESSENTIAL SKILLS & KNOWLEDGE

Standard 5 Describe the characteristics of bonds.

Standard 6 Define pH.

Standard 7 Categorize the following based on the pH of a solution: Acidic, Basic, Neutral

Standard 8 Distinguish between “neutral” pH and the “average” pH range of the blood.

Standard 9 Describe the properties of water and how it is utilized in the human body.

Standard 10 Distinguish between: Inorganic compounds and Organic compounds

Standard 11 Describe the structures and functions of Carbohydrates, Proteins, Lipids, Nucleic acids, Amino acids

Standard 12 Describe how the body produces energy during cellular respiration.

### ***CELLS - Students will describe basic concepts of structures and functions of cells.***

Standard 1 Identify the four principle parts of a generalized animal cell and their functions.

Standard 2 Describe the structure and function of the cell membrane.

Standard 3 Describe a selectively permeable membrane and factors which influence permeability.

Standard 4 Contrast intracellular and extracellular fluid in terms of location and composition.

Standard 5 Describe each of the following cellular transport processes and classify them as active or passive.

Standard 6 Review the osmotic effects that occur when a cell is placed in the following: Isotonic solution, Hypotonic solution, Hypertonic solution

Standard 7 Describe the function of structures within the cell.

Standard 8 Compare and contrast: Mitosis and Meiosis

### ***HISTOLOGY & INTEGUMENTARY SYSTEM - Students will describe basic concepts of structures and functions of histology, and the integumentary system.***

Standard 1 Identify the general characteristics and functions of each of the four principle types of tissues.

Standard 2 Contrast the following: Exocrine glands and Endocrine glands

Standard 3 Differentiate between the four basic types of membranes.

Standard 4 Describe the structures and functions of the integumentary system components.

Standard 5 Describe the major layers of skin.

Standard 6 Describe the functions of the following: Sudoriferous (sweat) glands and Sebaceous (oil) glands

Standard 7 Identify diseases and disorders of the integumentary system.





***SKELETAL SYSTEM - Students will describe the structures and functions of the skeletal system and its components.***

Standard 1 Identify the general functions of the skeletal system.

Standard 2 Identify the roles of the following in bone growth and ossification: Osteoblasts, Osteocytes, Osteoclasts

Standard 3 Describe the features of a long bone.

Standard 4 Identify the four shapes of bones with characteristics and examples of each.

Standard 5 Describe and locate bone markings.

Standard 6 Describe and differentiate between the following terms: Suture, Fontanel

Standard 7 Contrast the axial and appendicular skeletons.

Standard 8 Locate bones in the body.

Standard 9 Contrast the average number, location, and function of each of the five groups of vertebrae.

Standard 10 Explain the structural and functional classifications of articulations.

Standard 11 Differentiate between ligaments and tendons.

Standard 12 Identify the following diseases and disorders of the skeletal system.

***MUSCULAR SYSTEM - Students will describe the structures and functions of the muscular system and its components.***

Standard 1 Identify the general functions of the muscular system.

Standard 2 Describe the four characteristics of muscle tissue.

Standard 3 Contrast the general location, microscopic appearance, control, and functions of the three specific types of muscle tissue.

Standard 4 Contrast thick and thin myofilaments.

Standard 5 Describe the sliding-filament theory of muscle contraction.

Standard 6 Describe what occurs at the neuromuscular junction.

Standard 7 Define the following terms: Origin and Insertion

Standard 8 Explain the role of the following: Prime movers (agonists), Antagonists, Synergist, Fixators

Standard 9 Describe the locations and functions of skeletal muscles:

Standard 10 Identify the following diseases and disorders of the muscular system.





## DAVIS ESSENTIAL SKILLS & KNOWLEDGE

### ***NERVOUS SYSTEM/SPECIAL SENSES - Students will describe the structures and functions of the nervous system and special senses.***

Standard 1 Restate the three broad functions of the nervous system.

Standard 2 Describe the general organization of the nervous system.

Standard 3 List the functions and structures of neurons and neuroglial cells.

Standard 4 Contrast white and gray matter of nervous tissue.

Standard 5 Describe the location and function of CSF.

Standard 6 Identify the structures responsible for the maintenance and protection of the central nervous system.

Standard 7 Identify the four principle parts of the brain.

Standard 8 Describe the functions of the three structures of the brain stem.

Standard 9 Describe the structures and functions of the diencephalon

Standard 10 Describe the locations and functions of the four lobes of the cerebrum.

Standard 11 Explain the major functions of the cerebellum.

Standard 12 Sequence the major events when the nerve impulse (action potential) is initiated and transmitted through a neuron. All or None Principle

Standard 13 Explain the role of each of the components of a reflex arc.

Standard 14 Identify the following diseases and disorders of the nervous system.

Standard 15 Describe the principle anatomical structures of the eye.

Standard 16 Describe the principle anatomical structures of the ear. Outer ear o Auricle

Standard 17 Identify the following diseases and disorders associated with special senses.

### ***ENDOCRINE SYSTEM - Students will describe the structures and functions associated with the endocrine system.***

Standard 1 Identify the general functions of the endocrine system.

Standard 2 Describe a “hormone” and how it functions in the body.

Standard 3 Describe the locations, secretions, and functions of the major endocrine glands. Know the hormones and their target.

Standard 4 Identify the following diseases and disorders of the endocrine system.

### ***BLOOD - Students will describe the components and functions associated with blood.***

Standard 1 Identify the components of blood and their functions.

Standard 2 Describe erythrocytes, including the structure of hemoglobin.





## DAVIS ESSENTIAL SKILLS & KNOWLEDGE

Standard 3 Define leukocyte and list the two major groups with their cell types and their function.

Standard 4 Describe the process of hemostasis.

Standard 5 Contrast a thrombus and an embolus.

Standard 6 Identify the antigens found on the erythrocytes and the antibodies that determine the ABO blood types and the Rh factor.

Standard 7 Identify the following diseases and disorders associated with the blood.

### ***LYMPHATIC SYSTEM - Students will describe the structures and functions of the lymphatic system.***

*Standard 1* Identify the components of the lymphatic system.

*Standard 2* Describe how lymph is moved through the body.

*Standard 3* Contrast antigens and antibodies.

*Standard 4* Describe the general roles of T-cells and B-cells in the immune response.

*Standard 5* Distinguish between active and passive immunity and natural vs. artificial acquisition of immunity.

*Standard 6* Identify the following diseases and disorders associated with the lymphatic system.

### ***CARDIOVASCULAR SYSTEM - Students will describe the structures and functions of the cardiovascular system.***

*Standard 1* List the general functions of the cardiovascular system.

*Standard 2* Describe the layers of the heart.

*Standard 3* Identify the chambers of the heart.

*Standard 4* Locate the great blood vessels of the heart.

*Standard 5* Identify the valves of the heart.

*Standard 6* Trace blood flow through the heart.

*Standard 7* Identify the components of the conduction system of the heart and trace the pathway.

*Standard 8* Sequence the principle events of the cardiac cycle in terms of systole and diastole.

*Standard 9* Define cardiac output and identify factors that influence it.

*Standard 10* Contrast the structures and functions of arteries, capillaries, and veins.

*Standard 11* Define pulse and identify the general location of arteries where pulse may be felt.

*Standard 12* Describe blood pressure and how to measure it.

*Standard 13* Contrast pulmonary and systemic circulation.

*Standard 14* Identify the following diseases and disorders of the cardiovascular system.





### ***RESPIRATORY SYSTEM - Students will describe the structures and functions associated with the respiratory system.***

Standard 1 Identify the general functions of the respiratory system.

Standard 2 Sequence the organs of the respiratory system in the order which air will pass through them from the exterior.

Standard 3 Identify the three regions of the pharynx.

Standard 4 Identify the following anatomical features of the larynx.

Standard 5 Identify the coverings of the lungs and the gross anatomical features of the lungs.

Standard 6 Identify the site at which gas exchange occurs in the lungs (alveoli).

Standard 7 Identify the volumes and capacities of air exchanged during ventilation.

Standard 8 Differentiate between the following. Ventilation, External respiration, Internal respiration

Standard 9 Describe the effects of carbon dioxide on ventilation.

Standard 10 Identify the following diseases and disorders of the respiratory system.

### ***DIGESTIVE SYSTEM - Students will describe the structures and functions associated with the digestive system.***

Standard 1 Identify the general functions of the digestive system.

Standard 2 Contrast chemical and mechanical digestion.

Standard 3 Differentiate between the following. Alimentary canal structures

Standard 4 Describe the functions of saliva and salivary amylase in digestion.

Standard 5 Identify the following parts of a typical tooth.

Standard 6 Define the following.

Standard 7 Identify the anatomical features of the stomach.

Standard 8 Identify the basic components and functions of gastric juice.

Standard 9 Identify the location and digestive functions of the pancreas.

Standard 10 Describe the function of bile (emulsification).

Standard 11 Identify the three sections of the small intestine and describe the functions.

Standard 12 Identify the structures and sections of the large intestine and describe the functions.

Standard 13 Identify the following diseases and disorders of the digestive system.





## DAVIS ESSENTIAL SKILLS & KNOWLEDGE

### ***URINARY SYSTEM - Students will describe the structures and functions associated with the urinary system.***

Standard 1 Identify the general functions of the urinary system.

Standard 2 Identify the four major organs of the urinary system.

Standard 3 Identify the gross anatomy of the kidney Renal cortex

Standard 4 Identify the microscopic structures of the nephron.

Standard 5 Describe the three basic physiological processes and the structures involved in urine formation.

Standard 6 Identify abnormal constituents of urine and possible causes of each.

Standard 7 Describe the methods of fluid intake and output.

Standard 8 Identify the following diseases and disorders associated with the urinary system.

### ***REPRODUCTIVE SYSTEM - Students will describe the structures and functions associated with the reproductive system.***

Standard 1 Identify the general functions of the reproductive system.

Standard 2 Describe the anatomy of the male genitalia.

Standard 3 Identify the function of the testes.

Standard 4 Identify the functions of testosterone in the male.

Standard 5 Describe the anatomy of the female reproductive structures.

Standard 6 Identify the functions of the ovaries.

Standard 7 Identify the structures and functions of the uterine tubes, including fimbriae and infundibulum.

Standard 8 Describe the structures and function of the uterus.

Standard 9 Define the menstrual cycle including the ovarian and uterine cycles and changes that occur during menopause.

Standard 10 Describe the physiological effects of estrogens, progesterone, and relaxin.

Standard 11 Contrast the general outcomes of spermatogenesis vs. oogenesis

Standard 12 Define the following sequence of events that occur during human development.

Standard 13 Identify the principle events associated with the three stages of labor.

Standard 14 Identify the following diseases and disorders of the reproductive system.

### ***PERFORMANCE SKILLS***





## DAVIS ESSENTIAL SKILLS & KNOWLEDGE

1. Students will explore careers in healthcare. Students will participate in a minimum of three career exploration experiences to investigate a variety of health care careers related to therapeutic services, diagnostic services, health informatics, support services, and biomedical research and development pathways. NOTE: Electronically delivered career exploration experiences are permissible.
2. Students will provide an oral and/or written report for each career exploration.
3. Students will select a topic and defend their position on a current medical ethics dilemma.

