

# Strands & Standards

## MEDICAL ANATOMY & PHYSIOLOGY



### COURSE DESCRIPTION

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.

#### License Type

CTE, Secondary Education 6-12,  
or Elementary Education

#### Required Endorsement

Medical Anatomy & Physiology

Intended Grade Level: 10-12

Units of Credit: 1.0

Core Code: 36.01.00.00.110

CE Core Code: 36.01.00.13.110

Prerequisite: None

Skill Certification: 702

Test Weight: 1.0

# Strands & Standards

## PERFORMANCE OBJECTIVES

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.**

## **STRAND 1** 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
- Cellular
- Tissue
- Organ
- System
- Organism

**Standard 3** Describe the following:

- Metabolism
  - Anabolic process
  - Catabolic process

**Standard 4** Apply directional terms used in human anatomy.

- Posterior/Anterior
- Medial/Lateral
- Proximal/Distal
- Superficial/Deep
- Superior/Inferior

**Standard 5** Apply commonly used planes to divide the body.

- Sagittal
- Midsagittal
- Transverse (horizontal)
- Frontal (coronal)

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

- Dorsal Cavity
  - Vertebral-spinal cord
  - Cranial-brain
- Ventral Cavity
  - Thoracic-heart, lungs

- Mediastinum-heart, bronchi, esophagus, thymus
- Pericardial-heart
- Pleural-lungs
- Abdominopelvic Cavity-liver, spleen, intestines, kidneys, stomach
  - Abdominal-liver, spleen, intestines, kidneys, stomach
  - Pelvic-intestines, urinary bladder, sex organs

- Standard 7** Identify the major organ(s) in each abdominal quadrant.
- RUQ-right upper quadrant-liver, gallbladder, right kidney
  - RLQ-right lower quadrant-cecum, appendix, right ovary
  - LUQ-left upper quadrant-spleen, stomach, left kidney
  - LLQ-lower left quadrant-left ovary

- Standard 8** Examine the relationship between homeostasis and stress.

- Standard 9** Differentiate between negative and positive feedback mechanisms. Give examples of each.
- Be able to describe the following:
    - Childbirth
    - Breast feeding
    - Blood clotting

## **STRAND 2 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
    - Nucleus
    - Electrons
    - Protons
    - Neutrons
  - Ion
    - Electrolyte

- Standard 2** Identify the four major elements in the body.
- Carbon
  - Hydrogen
  - Oxygen
  - Nitrogen

- Standard 3** Differentiate between:
- Compound
  - Molecule

- Standard 4** Differentiate between:
- Cation
  - Anion

- Standard 5** Describe the characteristics of bonds. (no longer place any emphasis on which is the strongest type)
- Ionic
  - Covalent
  - Hydrogen

- 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.

- Neutral pH=7.0
- Average pH of blood=7.35 to 7.45

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

- Universal solvent
- Transport
- Lubricant
- Heat capacity
- Chemical reactions

**Standard 10** Distinguish between:

- Inorganic compounds-do not contain carbon, small molecules, usually form ionic bonds
- Organic compounds-usually contain carbon, large molecules, form covalent bonds, flammable

**Standard 11** Describe the structures and functions of the following and give an example of each:

- Carbohydrates
- Proteins
- Lipids
- Nucleic acids
  - RNA
  - DNA
- Amino acids

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

- $ATP \leftrightarrow ADP + P + ENERGY$

### **STRAND 3 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.

- Nucleus
- Cytosol
- Organelles
- Cell membrane

**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.

- Passive processes
  - Diffusion
  - Osmosis
  - Facilitated diffusion
  - Dialysis
  - Filtration
- Active processes
  - Phagocytosis
  - Exocytosis

- Active transport

**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 the following structures within the cell.

- Nucleolus
- DNA
- RNA
- Gene
- Chromatin
- Chromosome
- Ribosomes
- Rough endoplasmic reticulum
- Smooth endoplasmic reticulum
- Golgi complex
- Vesicle (vacuole)
- Lysosomes
- Peroxisomes
- Mitochondria
- Cytoskeleton
  - Microfilaments
  - Intermediate filaments
  - Microtubules
- Centrosomes
- Centrioles
- Cellular surface variants
  - Microvilli (absorption)
  - Cilia (transports products along the surface of the cell, “crowd surfers”)
  - Flagella (transports the cell)

**Standard 8** Compare and contrast:

- Mitosis
- Meiosis

## **STRAND 4 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.

- Epithelial-strategies for tissue identification (arrangement & cell shape)
- Connective-adipose, cartilage, dense fibrous, blood, bone
- Muscular-skeletal, smooth, cardiac
- Nervous

**Standard 2** Contrast the following:

- Exocrine glands
- Endocrine glands

**Standard 3** Differentiate between the four basic types of membranes.

- Mucous
- Serous
- Synovial
- Cutaneous

- Standard 4** Describe the structures and functions of the integumentary system components.
- Skin
  - Glands
  - Hair
  - Nails
- Standard 5** Describe the major layers of skin.
- Epidermis
  - Dermis
  - Subcutaneous (hypodermis)
- Standard 6** Describe the functions of the following:
- Sudoriferous (sweat) glands
  - Sebaceous (oil) glands
- Standard 7** Identify the following diseases and disorders of the integumentary system.
- Skin cancers
    - Basal cell carcinoma
    - Squamous cell carcinoma
    - Malignant melanoma
  - Decubitus ulcers
  - Eczema
  - Lesion
  - Burns
    - 1<sup>st</sup> degree
    - 2<sup>nd</sup> degree
    - 3<sup>rd</sup> degree

## **STRAND 5 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.
- Periosteum
  - Diaphysis
  - Epiphysis
  - Medullary cavity
  - Red marrow
  - Yellow marrow
  - Articular cartilage
  - Endosteum
  - Compact bone
  - Spongy bone
- Standard 4** Identify the four shapes of bones with characteristics and examples of each.
- Long
  - Short
  - Flat
  - Irregular
- Standard 5** Describe and locate the following bone markings.
- Foramen
  - Meatus

- Sinus
- Fossa
- Condyle
- Tuberosity
- Trochanter
- Tubercle
- Process

**Standard 6** Describe and differentiate between the following terms:

- Suture
- Fontanel

**Standard 7** Contrast the axial and appendicular skeletons.

**Standard 8** Locate the following bones.

- Mandible
- Maxilla
- Zygomatic
- Frontal
- Parietal
- Occipital
- Sphenoid
- Ethmoid
- Hyoid
- Temporal
- Clavicle
- Scapula
- Sternum
- Ribs
- Pubic bone
  - Ilium
  - Ischium
  - Pubis
- Femur
- Patella
- Tibia
- Fibula
- Tarsals
- Metatarsals
- Phalanges
- Humerus
- Ulna
- Radius
- Carpals
- Metacarpals
- Vertebrae

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

- Cervical
- Thoracic
- Lumbar
- Sacral
- Coccygeal

**Standard 10** Explain the structural and functional classifications of articulations.

- Fibrous
- Synovial

- Cartilaginous
- Amphiarthrotic
- Diarthrotic
- Synarthrotic

**Standard 11** Differentiate between ligaments and tendons.

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

- Herniated disk
- Osteoarthritis
- Osteoporosis
- Scoliosis
- Kyphosis
- Lordosis
- Spina bifida
- RA (Rheumatoid arthritis)

## **STRAND 6 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.

- Elasticity
- Excitability (irritability)
- Extensibility
- Flexibility

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

- Skeletal
- Smooth
- Cardiac

**Standard 4** Contrast thick and thin myofilaments.

- Actin
- Myosin

**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
- Insertion

**Standard 8** Explain the role of the following:

- Prime movers (agonists)
- Antagonists
- Synergist
- Fixators

**Standard 9** Describe the locations and functions of the following skeletal muscles:

- Biceps brachii
- Triceps brachii
- Brachialis
- Flexors
- Extensors
- Pronator
- Supinator



- Rotator cuff
  - Supraspinatus
  - Infraspinatus
  - Teres minor
  - Subscapularis
- Sternocleidomastoid
- Trapezius
- Deltoid
- Diaphragm
- Rectus abdominis
- Pectoralis major
- Latissimus dorsi
- External oblique
- Gastrocnemius
- Tibialis anterior
- Soleus
- Hamstrings
  - Semimembranosus
  - Semitendinosus
  - Biceps femoris
- Quadriceps
  - Rectus femoris
  - Vastus lateralis
  - Vastus medialis
  - Vastus intermedius
- Gluteus maximus
- Gluteus medius
- Sartorius
- Gracilis
- Masseter

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

- Fibromyalgia
- Muscular dystrophy
- Medial tibial stress syndrome
- Compare and contrast the following, describe the three degrees of injury:
  - Sprain
  - Strain

## **STRAND 7    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.

- Sensory
- Integration
- Motor

**Standard 2** Describe the general organization of the nervous system.

- Central Nervous System (CNS)
  - Spinal nerves
    - 31 pairs
  - Cranial nerves
    - I-XII
  - Subdivisions
    - Autonomic Nervous System (ANS)
      - Sympathetic

- Parasympathetic
- Somatic Nervous System

- Standard 3** List the functions and structures of neurons and neuroglial cells.
- Neuron
  - Astrocytes
  - Microglia
  - Oligodendrocytes
  - Ependymal cells
  - Schwann cells
  - Satellite cells
- Standard 4** Contrast white and gray matter of nervous tissue.
- Standard 5** Describe the location and function of CSF.
- Ventricles
    - Choroid Plexus
  - Subarachnoid space
- Standard 6** Identify the structures responsible for the maintenance and protection of the central nervous system.
- Meninges
    - Dura mater
    - Arachnoid mater
    - Pia mater
- Standard 7** Identify the four principle parts of the brain.
- Cerebrum
  - Cerebellum
  - Brain stem
  - Diencephalon
- Standard 8** Describe the functions of the three structures of the brain stem.
- Medulla oblongata
  - Pons
  - Midbrain
- Standard 9** Describe the structures and functions of the diencephalon.
- Thalamus
  - Hypothalamus
- Standard 10** Describe the locations and functions of the four lobes of the cerebrum.
- Frontal
  - Parietal
  - Temporal
  - Occipital
- 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.
- Reflex
  - Reflex arc
  - Receptor
  - Sensory neuron
  - Association (interneuron) neuron
  - Motor neuron
  - Effector

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

- ALS
- Alzheimer's
- Bacterial meningitis
- Cerebral palsy
- Epilepsy
- Multiple sclerosis
- Guillain-Barre syndrome
- Parkinson's
- Cerebral Vascular Accident (CVA)-stroke

**Standard 15** Describe the principle anatomical structures of the eye.

- Accessory structures
  - Eyelid
  - Conjunctiva
  - Lacrimal apparatus
  - Extrinsic muscles
- Layers of the eyeball
  - Fibrous tunic
    - Sclera
    - Cornea
  - Vascular tunic
    - Choroid
    - Ciliary body
    - Iris
    - Lens
    - Pupil
  - Nervous tunic
    - Retina

**Standard 16** Describe the principle anatomical structures of the ear.

- Outer ear
  - Auricle
  - Auditory canal
- Middle ear
  - Tympanic cavity
  - Tympanic membrane
  - Auditory (Eustachian) tube
  - Auditory ossicles
    - Malleus
    - Incus
    - Stapes
- Inner ear
  - Bony labyrinth
  - Membranous labyrinth
  - Semicircular canals
  - Vestibule
  - Cochlea
  - Organ of Corti

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

- Ametropia-abnormal refracted light
  - Myopia
  - Hyperopia
  - Presbyopia
- Cataracts
- Conjunctivitis
- Strabismus
- Glaucoma

- Macular degeneration
- Vertigo
- Tinnitus
- Middle ear infection (Otitis Media)
- Deafness
  - Conductive
  - Sensorineural

## **STRAND 8 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.

- Hypothalamus
  - Growth Hormone Releasing Hormone (GHRH)-targets anterior pituitary
  - Thyrotropin Releasing Hormone (TRH)-targets anterior pituitary
  - Corticotropin Releasing Hormone (CRH)-target anterior pituitary
  - Antidiuretic Hormone (ADH)
    - Produced in hypothalamus
    - Stored in posterior pituitary
  - Oxytocin Hormone (Oxt)
    - Produced in hypothalamus
    - Stored in posterior pituitary
- Pituitary Gland-found in the hypophyseal fossa “Sella Turcica”
  - Anterior Pituitary (adenohypophysis)
    - Human Growth Hormone (HGH)
      - Targets cells stimulating growth
    - Thyroid Stimulating Hormone (TSH)
      - Targets thyroid gland
    - Adrenocorticotropic Hormone (ACTH)
      - Targets adrenal cortex
  - Posterior Pituitary (neurohypophysis)
    - Antidiuretic Hormone (ADH)
      - Neural stimulus releases ADH to target kidneys for water retention
    - Oxytocin Hormone (Oxt)
      - Neural stimulus releases Oxt to target uterus for child birthing
      - Neural stimulus releases Oxt to target breast tissue for milk letdown
- Thyroid Gland-found inferior to the Larynx
  - Thyroxine (T4)
    - Targets cells increasing metabolism
  - Triiodothyronine (T3)
    - Targets cells increasing metabolism
- Adrenal Gland-found atop the kidneys
  - Adrenal Cortex
    - Adrenocorticotropic Hormone (ACTH)
      - Stimulates the release of cortisol
    - Cortisol
      - Anti-inflammatory by suppressing white blood cells
  - Adrenal Medulla-sympathetic stimulus for sustained “Fight or Flight”
    - Epinephrine-adrenaline increasing cell metabolism
    - Norepinephrine-noradrenaline increasing cell metabolism

- Pancreas Gland-Exocrine/Endocrine gland in LUQ posterior to the stomach
  - Insulin
    - Released from Beta cells to target cells to decrease blood sugar
  - Glucagon
    - Released from Alpha cells to break down glycogen to increase blood sugar

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

- Dwarfism
- Gigantism
- Acromegaly
- Hypothyroidism
  - Myxedema
  - Cretinism-congenital hypothyroidism
- Hyperthyroidism(Graves' disease)
  - Goiter
  - Exophthalmos
- Diabetes mellitus
  - Type I
  - Type II
- Diabetes insipidus
- Cushing's syndrome

## **STRAND 9 BLOOD-Students will describe the components and functions associated with blood.**

**Standard 1** Identify the components of blood and their functions.

- Erythrocytes
- Leukocytes
- Thrombocytes
- Plasma

**Standard 2** Describe erythrocytes, including the structure of hemoglobin.

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

- Granulocytes
  - Neutrophils
  - Basophils
  - Eosinophils
- Agranulocytes
  - Monocytes
  - Lymphocytes

**Standard 4** Describe the process of hemostasis.

- Vascular spasm
- Platelet plug formation
- Coagulation

**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.

- Anemias
  - Nutritional
  - Pernicious
  - Hemorrhagic

- Hemolytic
- Sickle cell
- Aplastic
- Hemolytic disease of the newborn
- Hemophilia
- Leukemia
- Mononucleosis
- Polycythemia

## **STRAND 10 LYMPHATIC SYSTEM-Students will describe the structures and functions of the lymphatic system.**

- Standard 1** Identify the components of the lymphatic system.
- Tonsils
  - Spleen
  - Thymus
  - Lymph nodes
  - Bone marrow
  - Lymph vessels
- 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.
- AIDS
  - Measles
  - Mumps
  - Rubella
  - Tetanus

## **STRAND 11 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.
- Epicardium
  - Myocardium
  - Endocardium
- Standard 3** Identify the chambers of the heart.
- Atria
  - Ventricles
- Standard 4** Locate the great blood vessels of the heart.
- Superior vena cava
  - Inferior vena cava
  - Pulmonary trunk
  - Pulmonary arteries
  - Pulmonary veins
  - Aorta
  - Branches of the aorta

- Standard 5** Identify the valves of the heart.
- Tricuspid
  - Pulmonary semilunar
  - Bicuspid (mitral)
  - Aortic semilunar
- Standard 6** Trace blood flow through the heart.
- Standard 7** Identify the components of the conduction system of the heart and trace the pathway.
- SA node
  - AV node
  - AV bundle
  - Bundle branches
  - Purkinje fibers
- 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.
- Heart rate
  - Stroke volume
- 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.
- Aneurysm
  - Arteriosclerosis
  - Atherosclerosis
  - Cerebrovascular accident/stroke
  - Coronary artery disease
  - Hypertension
  - Murmur
  - Myocardial infarction

**STRAND 12 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.
- Nose/mouth
  - Pharynx
  - Larynx
  - Trachea
  - Bronchi
  - Bronchioles
  - Alveolar duct
  - Alveoli
- Standard 3** Identify the three regions of the pharynx.
- Nasopharynx
  - Oropharynx

- Laryngopharynx

**Standard 4** Identify the following anatomical features of the larynx.

- Epiglottis
- Glottis
- Hyoid bone
- Thyroid cartilage
- Cricoid cartilage
- True vocal cords
- False vocal cords

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

- Apex
- Base
- Lobes
- Visceral pleura
- Parietal pleura
- Pleural cavity

**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.

- Tidal volume
- Vital capacity

**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.

- Chronic Obstructive Pulmonary Disorder
  - Emphysema
- Influenza
- Lung cancer
- Pneumonia
- SIDS
- Tuberculosis
- Cystic Fibrosis
- Respiratory Syncytial Virus (RSV)
- Respiratory distress

## **STRAND 13 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
  - Mouth
  - Pharynx
  - Esophagus
  - Stomach
  - Small intestines
  - Large intestines
  - Rectum



- Anus
- Accessory structures
  - Salivary glands (parotid)
  - Pancreas
  - Gallbladder
  - Liver

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

**Standard 5** Identify the following parts of a typical tooth.

- Crown
- Neck
- Root
- Gingiva
- Periodontal ligament
- Enamel
- Dentin
- Pulp
- Root canal

**Standard 6** Define the following.

- Deglutition
- Mastication
- Maceration
- Segmentation
- Peristalsis
- Haustral churning

**Standard 7** Identify the anatomical features of the stomach.

- Fundus
- Body
- Pylorus
- Rugae
- Cardiac sphincter
- Pyloric sphincter

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

- Chief cells
  - Pepsinogen
- Parietal cells
  - Hydrochloric acid
- Goblet cells
  - Mucus

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

- Pancreatic Islets
- Acini Cells

**Standard 10** Describe the function of bile (emulsification).

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

- Duodenum
- Jejunum
- Ileum

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

- Cecum
- Colon
  - Ascending

- Transverse
- Descending
- Sigmoid
- Rectum
- Anal canal

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

- Appendicitis
- Cirrhosis
- Colorectal cancer
- Gallstones
- Hepatitis
- Obesity
- Ulcers
- Celiac disease
- Crohn's disease
- Irritable Bowel Syndrome (IBS)

## **STRAND 14 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.

- Kidneys
- Ureters
- Bladder
- Urethra

**Standard 3** Identify the gross anatomy of the kidney

- Renal cortex
- Renal medulla
- Renal pyramids
- Renal pelvis
- Renal capsule
- Calyces

**Standard 4** Identify the microscopic structures of the nephron.

- Renal corpuscle
- Glomerulus
- Glomerular (Bowman's) capsule
- Afferent arteriole
- Efferent arteriole
- Renal tubule
  - Proximal convoluted tubule
  - Descending limb
  - Nephron loop
  - Ascending limb
  - Distal convoluted tubule
  - Collecting duct
- Peritubular capillaries

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

- Filtration
- Reabsorption
- Secretion

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

- Glucose
- Ketones
- Erythrocytes
- Leukocytes
- Bilirubin
- Microbes
- Albumin

**Standard 7** Describe the methods of fluid intake and output.

- Intake
  - Oral
    - Liquid
    - Solid
  - Intravenous
  - Metabolic
- Output
  - Micturition
  - Voiding
  - Sweat
  - Feces
  - Exhaled vapor

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

- Cystitis
- Glomerulonephritis
- Incontinence
- Kidney stones
- Polyuria
- Renal failure
- Urinary tract infections (UTI)

## **STRAND 15 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.

- External
  - Penis
  - Scrotum
  - Testes
- Internal
  - Epididymis
  - Ductus deferens
  - Ejaculatory duct
  - Urethra
- Accessory
  - Seminal vesicles
  - Prostate
  - Bulbourethral gland

**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.

- External
  - Vulva

- Labia majora
- Clitoris
- Labia minora
- Mons pubis
- Vestibule
- Internal
  - Ovaries
  - Uterus
  - Uterine tubes
  - Vagina
- Accessory
  - Mammary glands
  - Perineum

**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.

- Perimetrium
- Myometrium
- Endometrium
  - Stratum functionalis
  - Stratum basalis
- Fundus
- Cervix

**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.

- Fertilization
- Zygote
- Implantation
- Embryo
- Fetus

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

- Stage 1-dilation and effacement
- Stage 2-delivery and birth
- Stage 3-placental expulsion

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

- Reproductive cancers
  - Breast
  - Testicular
  - Cervical
  - Ovarian
  - Prostate
  - Uterine
- Endometriosis
- Impotence
- Polycystic Ovarian Syndrome
- Sexually Transmitted Infections (STI)
  - Gonorrhea
  - Syphilis

- Genital herpes
- Chlamydia
- Trichimoniiasis
- Genital warts
- Human Papilloma Virus (HPV)

### SKILL CERTIFICATE TEST POINTS BY STANDARD

Test Name	Test #	Number of Test Points by Standard															Total Points	Total Questions
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15		
Medical Anatomy & Physiology	702	11	3	3	8	9	10	10	5	7	3	5	7	7	8	8	104	71