STRANDS AND STANDARDS
MEDICAL ANATOMY & PHYSIOLOGY

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CTE®

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, and medical ethics. The class is designed to prepare students for the Advanced Medical Anatomy and Physiology course and/or for a variety of health science programs.

Intended Grade Level	10-12
Units of Credit	1.0
Core Code	36.01.00.00.110
Concurrent Enrollment Core Code	36.01.00.13.110
Prerequisite	None
Skill Certification Test Number	702
Test Weight	1.0
License Area of Concentration	CTE and/or Secondary Education 6-12
Required Endorsement(s)	
Endorsement 1	Medical Anatomy & Physiology
Endorsement 2	Nurse Assistant
Endorsement 3	N/A

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 their interrelationship.

- Chemical
- Cellular
- Tissue
- Organ
- System
- Organism

Standard 3

Compare and contrast the types of metabolism:

- Anabolic
- Catabolic

Standard 4

Identify commonly used planes to divide the body based upon anatomical position.

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

Standard 5

Apply directional terms used in human anatomy.

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

Standard 6

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

- Dorsal Cavity
  - Vertebral (spinal) -spinal cord
  - Cranial-brain
- Ventral Cavity
  - Thoracic
    - Mediastinum-heart, bronchi, esophagus, thymus.
    - Pericardial-heart
    - Pleural-lungs

- Abdominopelvic Cavity
  - 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 effects of stress on homeostasis.

Standard 9

Differentiate between negative and positive feedback mechanisms to maintain homeostasis. Give examples of each.

- Positive feedback examples: childbirth, breast feeding, blood clotting, etc.
- Negative feedback examples: blood pressure, blood glucose, thermoregulation, etc.

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

Standard 2

Identify the four major elements in the body.

- Carbon
- Hydrogen
- Oxygen
- Nitrogen

Standard 3

Differentiate between:

- Compound
- Molecule

Standard 4

Describe the characteristics of bonds. (Do not place emphasis on which is the strongest type.)

- Ionic
- Covalent
- Hydrogen

Standard 5

Analyze ions in a solution (electrolytes) and differentiate between:

- Cation
- Anion

Standard 6

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

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

Standard 7

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 8

Describe the structures and functions of the following organic compounds and give an example of each:

- Carbohydrates
- Proteins (amino acids)
- Lipids
- Nucleic acids (RNA, DNA)

Standard 9

Define pH and identify the different solutions based on the pH scale.

- Acidic
- Basic (alkaline)
- Neutral
- Blood ph = 7.35 to 7.45

Standard 10

Describe how the body produces energy during cellular respiration.

- ATP ↔ ADP + P + ENERGY

STRAND 3

Cells-Students will describe basic structures and functions of cells.

Standard 1

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

- Nucleus
  - Nucleoulus
  - Chromosome
    - Chromatin
    - Gene (DNA, RNA)
- Cytoplasm
  - Cytosol

    - Organelles
        - Ribosome
        - Endoplasmic Reticulum (smooth, rough)
        - Golgi complex (body)
        - Lysosome
        - Mitochondria
        - Centrosome (centrioles)
- Cell membrane
    - Microvilli (absorption)
    - Cilia (transports products along the surface of the cell, “crowd surfers”)
    - Flagella (transports the cell)

Standard 2

Describe a selectively permeable membrane and factors which influence permeability.

Standard 3

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

Standard 4

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

- Passive processes
    - Simple diffusion
    - Facilitated diffusion
    - Filtration (dialysis)
    - Osmosis
- Active processes
    - Endocytosis (phagocytosis)
    - Exocytosis
    - Active transport (Sodium/Potassium pump)

Standard 5

Compare and contrast the osmotic effects that occur when a cell is placed in the following solutions:

- Isotonic
- Hypotonic
- Hypertonic

Standard 6

Compare and contrast:

- Mitosis
- Meiosis

STRAND 4

Histology & Integumentary System-Students will describe basic structures and functions of histology, and the integumentary system.

Standard 1

Identify and describe 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 – neurons, neuroglial cells

Standard 2

Differentiate between the four basic types of membranes.

- Mucous
- Serous
- Synovial
- Cutaneous

Standard 3

Identify and describe the structures and functions of the integumentary system components.

- Skin
- Glands
- Hair
- Nails

Standard 4

Identify the major layers of skin.

- Epidermis
- Dermis
- Subcutaneous (hypodermis)

Standard 5

Contrast the following:

- Exocrine glands (sudoriferous, sebaceous)
- Endocrine glands (hormones)

Standard 6

Explain the following diseases and disorders of the integumentary system.

- Skin cancers
  - Basal cell carcinoma
  - Squamous cell carcinoma
  - Malignant melanoma
- Decubitus ulcers
- Eczema
- Acne
- Lesion
- Burns
  - 1st degree
  - 2nd degree
  - 3rd degree

Performance Skills

- Students will explore careers in healthcare. Students will participate in a minimum of three caree 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.

- Students will provide an oral and/or written report for each career exploration.

STRAND 5

Skeletal System-Students will describe the structures and functions of the skeletal system and its components.

Standard 1

Describe 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

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

- Short
- Flat
- Irregular
- Long

Standard 4

Identify the features of a long bone.

- Periosteum
- Diaphysis
- Epiphysis
- Medullary cavity
- Red marrow
- Yellow marrow
- Articular cartilage
- Endosteum
- Compact bone
- Spongy bone

Standard 5

Define 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

Locate the following bones of the axial and appendicular skeletons.

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

Standard 8

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

- Cervical
- Thoracic
- Lumbar
- Sacral

- Coccygeal

Standard 9

Explain the structural and functional classifications of articulations.

- Structural:
  - Fibrous
  - Cartilaginous
  - Synovial
- Functional:
  - Synarthrotic
  - Amphiarthrotic
  - Diarthrotic

Standard 10

Differentiate between ligaments and tendons.

Standard 11

Explain the following diseases and disorders of the skeletal system.

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

STRAND 6

Muscular System-Students will describe the structures and functions of the muscular system and its components.

Standard 1

Describe the general functions of the muscular system.

Standard 2

Describe the four characteristics of muscle tissue.

- Elasticity
- Excitability (irritability)
- Extensibility
- Contractility

Standard 3

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

- Skeletal
- Smooth
- Cardiac

Standard 4

Identify the structures of the sarcomere.

- Actin (thin filament)
- Myosin (thick filament)

Standard 5

Describe what occurs at the neuromuscular junction.

- Nerve impulse (action potential)
- Ach release (neurotransmitter)
- Muscle contraction stimulated

Standard 6

Describe the sliding-filament model of muscle contraction.

Standard 7

Define the following terms:

- Origin
- Insertion

Standard 8

Review terms of movement:

- Flexion/extension
- Abduction/adduction
- Plantar flexion/dorsiflexion
- Rotation

Standard 9

Explain the role of the following:

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

Standard 10

Describe the locations and functions of the following skeletal muscles:

- Masseter
- Sternocleidomastoid
- Trapezius
- Biceps brachii
- Triceps brachii
- Deltoid
- Diaphragm
- Pectoralis major
- Latissimus dorsi
- Rectus abdominis
- External oblique
- Gastrocnemius
- Tibialis anterior
- Soleus

- Hamstrings
  - Semimembranosus
  - Semitendinosus
  - Biceps femoris
- Quadriceps
  - Rectus femoris
  - Vastus lateralis
  - Vastus medialis
  - Vastus intermedius
- Gluteus maximus
- Sartorius

Standard 11

Explain 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

Describe 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)
  - Brain
  - Spinal Cord
- Peripheral Nervous System (PNS)
  - Spinal nerves
    - 31 pairs
  - Cranial nerves
    - I-XII
  - Subdivisions
    - Autonomic Division
      - Sympathetic
      - Parasympathetic
    - Somatic Division

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

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

- Meninges
- Dura mater
- Arachnoid mater
- Pia mater

Standard 6

Describe the location and function of cerebrospinal fluid (CSF).

- Ventricles
- Subarachnoid space

Standard 7

Identify and describe the structures and functions of the brain.

- Cerebrum
  - Frontal
  - Parietal
  - Temporal
  - Occipital
- Cerebellum
- Brain stem
  - Medulla oblongata
  - Pons
  - Midbrain
- Diencephalon
  - Thalamus
  - Hypothalamus

Standard 8

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

Standard 9

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 10

Explain the following diseases and disorders of the nervous system.

- Amyotrophic Lateral Sclerosis (ALS)
- Alzheimer's Disease
- Bacterial meningitis
- Cerebral palsy
- Epilepsy
- Multiple Sclerosis
- Guillain-Barre syndrome
- Parkinson's Disease
- Cerebrovascular Accident (CVA)-stroke

Standard 11

Identify 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 12

Identify 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
    - Semicircular canals
        - Vestibule
        - Cochlea & Organ of Corti

Standard 13

Identify and describe the principle anatomical structures and functions associated with sense of taste and smell.

- Gustatory cells (taste buds)
- Olfactory bulb

Standard 14

Explain 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

Describe the general functions of the endocrine system.

Standard 2

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

Standard 3

Describe the location, secretion, and functions of the major endocrine glands.

- Hypothalamus
    - Antidiuretic Hormone (ADH)
        - Produced in hypothalamus
        - Stored in posterior pituitary
    - Oxytocin Hormone (OT)

        - 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); also known as vasopressin
            - Neural stimulus releases ADH to target kidneys for water retention
        - Oxytocin Hormone (OT)
            - Neural stimulus releases (OT)to target uterus for child birthing
            - Neural stimulus releases (OT)to target breast tissue for milk let down
- 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
            - Coping with long term stress
            - 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

Explain the following diseases and disorders of the endocrine system.

- Dwarfism
- Gigantism
- Acromegaly
- Hypothyroidism
    - Myxedema
    - Congenital hypothyroidism
- Hyperthyroidism (Graves’ disease)
    - Goiter

    - Exophthalamos
- 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 and describe the components of blood and their functions.

- Erythrocytes
    - Shapes
    - Function of hemoglobin
- Leukocytes
    - Granulocytes
        - Neutrophils
        - Basophils
        - Eosinophils
    - Agranulocytes
        - Monocytes
        - Lymphocytes
- Thrombocytes
- Plasma

Standard 2

Describe the process of hemostasis.

- Vascular spasm
- Platelet plug formation
- Coagulation

Standard 3

Contrast a thrombus and an embolus.

Standard 4

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

Standard 5

Explain 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 types of immunity.

- active
- passive
- natural
- artificial

Standard 6

Explain the following diseases and disorders associated with the lymphatic system.

- AIDS
- Measles
- Mumps
- Rubella
- Tetanus

Performance Skills

- Students will select a topic and defend their position on a current medical ethics dilemma.

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

Identify the layers of the heart.

- Epicardium
- Myocardium
- Endocardium

Standard 3

Identify the chambers of the heart.

- Atria
- Ventricles

Standard 4

Identify the valves of the heart.

- Tricuspid
- Pulmonary semilunar
- Bicuspid (mitral)
- Aortic semilunar

Standard 5

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 6

Trace blood flow through the heart.

Standard 7

Contrast pulmonary and systemic circulation.

Standard 8

Identify the components of the conduction system of the heart and trace the pathway.

- Sinoatrial (SA) node
- Atrioventricular (AV) node
- AV bundle (Bundle of His)
- Bundle branches
- Purkinje fibers

Standard 9

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

Standard 10

Define cardiac output (CO) and identify factors that influence it.

- Heart rate (HR)
- Stroke volume (SV)

Standard 11

Compare and contrast the structures and functions of arteries, capillaries, and veins.

Standard 12

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

Standard 13

Describe blood pressure and how to measure it.

Standard 14

Describe the following diseases and disorders of the cardiovascular system.

- Aneurysm
- Arteriosclerosis
- Atherosclerosis
- Cerebrovascular accident/stroke (CVA)
- Coronary artery disease
- Hypertension
- Murmur
- Myocardial infarction/heart attack (MI)

STRAND 12

Respiratory System-Students will describe the structures and functions associated with the respiratory system.

Standard 1

Describe the general functions of the respiratory system.

Standard 2

Identify and sequence the organs of the respiratory system in the order which air will pass through them from the exterior.

- Nose/mouth
- Pharynx
- Nasopharynx
- Oropharynx
- Laryngopharynx
- Larynx
- Trachea
- Bronchi
- Bronchioles
- Alveolar duct
- Alveoli

Standard 3

Identify the following structures associated with the larynx.

- Epiglottis
- Glottis
- Hyoid bone
- Thyroid cartilage

- Cricoid cartilage
- True vocal cords
- False vocal cords

Standard 4

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

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

Standard 5

Identify the volumes and capacities of air exchanged during ventilation.

- Tidal volume
- Vital capacity

Standard 6

Differentiate between the following.

- Ventilation
- Respiration
  - External
  - Internal

Standard 7

Describe the effects of carbon dioxide on ventilation.

Standard 8

Explain the following diseases and disorders of the respiratory system.

- Chronic Obstructive Pulmonary Disorder
  - Emphysema
  - Bronchitis
- Asthma
- Influenza
- Lung cancer
- Pneumonia
- Sudden Infant Death Syndrome (SIDS)
- Tuberculosis (TB)
- Cystic Fibrosis (CF)
- Respiratory Syncytial Virus (RSV)

STRAND 13

Digestive System-Students will describe the structures and functions associated with the digestive system.

Standard 1

Describe 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 - endocrine
- Acini Cells - exocrine

Standard 10

Describe the function of bile (emulsification).

Standard 11

Identify and describe the structures and functions of the three sections of the small intestine.

- Duodenum
- Jejunum
- Ileum

Standard 12

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

- Cecum
- Colon
  - Ascending
  - Transverse
  - Descending
  - Sigmoid
- Rectum
- Anal canal

Standard 13

Explain 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

Describe 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 in excessive levels

- Erythrocytes
- Leukocytes
- Bilirubin
- Microbes
- Albumin

Standard 7

Describe the methods of fluid intake and output.

- Intake
  - Oral
    - Liquid
    - Solid
  - Intravenous
  - Metabolic
- Output
  - Urination (micturition or voiding)
  - Sweat
  - Feces
  - Exhaled vapor

Standard 8

Explain the following diseases and disorders associated with the urinary system.

- 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

Describe the general functions of the reproductive system.

Standard 2

Identify and describe the structures and functions of the male genitalia.

- External
  - Penis
  - Scrotum
  - Testes
- Internal
  - Epididymis
  - Ductus deferens (vas deferens)
  - Ejaculatory duct
  - Urethra
- Accessory

- Seminal vesicles
- Prostate
- Bulbourethral gland (Cowper's gland)

Standard 3

Describe the functions of testosterone in the male.

Standard 4

Identify and describe the structures and functions of the female reproductive system..

- External
  - Vulva
  - Labia majora
  - Clitoris
  - Labia minora
  - Mons pubis
  - Vestibule
- Internal
  - Ovaries
  - Uterus
  - Uterine tubes (Fallopian tubes)
    - Infundibulum and fimbriae
    - Ampulla
    - Isthmus
  - Vagina
- Accessory
  - Mammary glands
  - Perineum

Standard 5

Describe the structures and function of the uterus.

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

Standard 6

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

Standard 7

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

Standard 8

Contrast the general outcomes of spermatogenesis vs. oogenesis

Standard 9

Explain the following sequence of events that occur during human development.

- Fertilization
- Zygote
- Implantation
- Embryo
- Fetus

Standard 10

Describe 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 11

Explain the following diseases and disorders of the reproductive system.

- Reproductive cancers
  - Breast
  - Testicular
  - Cervical
  - Ovarian
  - Prostate
  - Uterine
- Endometriosis
- Impotence
- Infertility
- Polycystic Ovarian Syndrome (POS)
- Sexually Transmitted Infections (STI)
  - Gonorrhea
  - Syphilis
  - Genital herpes
  - Chlamydia
  - Trichomoniasis
  - Genital warts
  - Human Papilloma Virus (HPV)

Workplace Skills

- Communication
- Problem Solving
- Teamwork
- Critical Thinking
- Dependability
- Accountability
- Legal Requirements/expectations

Skill Certification Test Points by Strand (test to be revised)

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