UNIT TERMINAL OBJECTIVE

1-2 At the completion of this unit, the EMT-Critical Care Technician student will be understand basic anatomy and physiology and how it relates to the foundations of medicine.

COGNITIVE OBJECTIVES

At the completion of this unit, the EMT-Critical Care Technician student will be able to:

1-2.1 Define anatomy, physiology, and pathophysiology. (C-1)
1-2.2 Name the levels of organization of the body from simplest to most complex, and explain each. (C-1)
1-2.3 Define homeostasis. (C-1)
1-2.4 State the anatomical terms for the parts of the body. (C-1)
1-2.5 Identify terminology to describe the location of body parts with respect to one another. (C-1)
1-2.6 Review the body cavities and the major organs within each. (C-1)
1-2.7 Identify the anatomical planes. (C-1)
1-2.8 Identify areas of the abdomen and underlying organs. (C-1)
1-2.9 Define each of the cellular transport mechanisms and give an example of the role of each in the body: diffusion, osmosis, facilitated diffusion, active transport.(C-1)
1-2.10 Define metabolism, anabolism, catabolism. (C-1)
1-2.11 Describe how glucose is converted to energy during cellular respiration. (C-1)
1-2.12 Describe the general characteristics of each of the four major categories of tissues. (C-1)
1-2.13 Name the three major layers of the skin. (C-1)
1-2.14 Describe the functions of the skeleton. (C-1)
1-2.15 Explain how bones are classified. (C-1)
1-2.16 Explain how joints are classified. (C-1)
1-2.17 Describe the structure and function of muscles. (C-1)
1-2.18 List the three types of muscles. (C-1)
1-2.19 State the functions of the nervous system. (C-1)
1-2.20 Name the divisions of the nervous system. (C-1)
1-2.21 Explain the structure of neurons. (C-1)
1-2.22 Describe the types of nerves. (C-1)
1-2.23 Describe the role of polarization, depolarization, repolarization in nerve impulse transmission. (C-1)
1-2.24 Identify the components of the central nervous system. (C-1)
1-2.25 State the function of the meninges and cerebrospinal fluid. (C-1)
1-2.26 Identify the divisions of the autonomic nervous system and define their functions. (C-1)
1-2.27 Discuss the regulator processes of hormonal secretion. (C-1)
1-2.28 State the functions of hormones. (C-1)
1-2.29 State the function of the hormones of the pancreas. (C-1)
1-2.30 State the functions of epinephrine and norepinephrine and explain their relationship to the sympathetic division of the autonomic nervous system. (C-1)
1-2.31 Describe the characteristics of blood and its composition. (C-1)
1-2.32 Explain the function of red blood cells, white blood cells and platelets. (C-1)
1-2.33 State the importance of blood clotting. (C-1)
1-2.34 Describe the location of the heart. (C-1)
1-2.35 Describe the function of the pericardium. (C-1)
1-2.36 Identify the major vessels and chambers of the heart. (C-1)
1-2.37 Identify the valves of the heart, and explain their functions. (C-1)
1-2.38 Describe coronary circulation, and explain its purpose. (C-1)
1-2.39 Describe the cardiac cycle. (C-1)
1-2.40 Explain how heart sounds are created. (C-1)

1-2.41 Name the parts of the cardiac conduction pathway. (C-1)
1-2.42 Explain the relationship between stroke volume, heart rate, and cardiac output. (C-1)
1-2.43 Explain how the nervous system regulates heart rate and force of contraction. (C-1)
1-2.44 Describe the structure of arteries and veins, and relate their structure to function. (C-1)
1-2.45 Describe the structure of capillaries, and explain the exchange processes that take place in capillaries. (C-1)
1-2.46 Describe the pathway and purpose of pulmonary circulation. (C-1)
1-2.47 Describe the pathway and purpose of systemic circulation. (C-1)
1-2.48 Define blood pressure. (C-1)
1-2.49 Explain the factors that maintain and regulate blood pressure. (C-1)
1-2.50 Describe the functions of the lymphatic system. (C-1)
1-2.51 Describe the immune response. (C-1)
1-2.52 State the function of the respiratory system. (C-1)
1-2.53 Describe the structure and functions of the components of the respiratory system. (C-1)
1-2.54 Describe normal inhalation and exhalation. (C-1)
1-2.55 Differentiate between ventilation and respiration. (C-1)
1-2.56 Explain the diffusion of gases across the alveolar-capillary junction. (C-1)
1-2.57 Describe how oxygen and carbon dioxide are transported in the blood. (C-1)
1-2.58 Explain the nervous and chemical mechanisms that regulate respiration. (C-1)
1-2.59 Describe the functions of the digestive system, and name its major divisions. (C-1)
1-2.60 Describe the water compartments and the name for the fluid in each. (C-1)
1-2.61 Explain how water moves between compartments. (C-1)
1-2.62 Explain the regulation of the intake and output of water. (C-1)
1-2.63 Describe the three buffer systems in body fluids. (C-1)
1-2.64 Explain why the respiratory system has an effect on pH, and describe respiratory compensating mechanisms. (C-1)
1-2.65 Explain the renal mechanisms for pH regulation of extracellular fluid. (C-1)
1-2.66 Describe the effects of acidosis and alkalosis. (C-1)

AFFECTIVE OBJECTIVES

After the completion of this unit, the EMT-Critical Care Technician student will be able to:

1-2.67 Appreciate how anatomy and physiology are the foundation of medicine. (A-2)

PSYCHOMOTOR OBJECTIVES

None identified for this unit.

DECLARATIVE

I. Introduction
   A. Define
      1. Anatomy
      2. Physiology
      3. Pathophysiology

II. Organization of the body
   A. Cells
   B. Tissues
   C. Organs
   D. Organ systems
      1. Integumentary system
      2. Skeletal system
      3. Muscular system
      4. Nervous system
      5. Respiratory system
      6. Circulatory system
      7. Lymphatic system
      8. Digestive system
      9. Excretory system
      10. Endocrine system
      11. Reproductive system
   E. Homeostasis
   F. Anatomical terminology
      1. Descriptive terms for body parts and areas
      2. Normal anatomical position
      3. Body cavities
         a. Cranial cavity
         b. Spinal cavity
         c. Thoracic cavity
         d. Abdominal cavity
         e. Pelvic cavity
      4. Body planes
         a. Frontal/ coronal plane
         b. Sagittal plane
         c. Transverse plane
      5. Abdominal quadrants
         a. Right upper (RUQ)
            (1) Liver
            (2) Gallbladder
         b. Left upper (LUQ)
            (1) Liver
            (2) Spleen
            (3) Stomach
         c. Right lower (RLQ)
            (1) Intestines
         d. Left lower (LLQ)

(1) Intestines

III. Cells
- A. Cellular transport mechanisms
  1. Diffusion
  2. Osmosis
  3. Facilitated diffusion
  4. Active transport
- B. Cellular metabolism
  1. Anabolism
  2. Catabolism
  3. Cellular respiration

IV. Tissues
- A. Epithelial tissue and glands
- B. Connective tissue
  1. Blood
  2. Adipose tissue
  3. Fibrous and elastic connective tissue
  4. Bone
  5. Cartilage
- C. Muscle tissue
  1. Skeletal muscles
  2. Smooth muscles
  3. Cardiac muscles
- D. Nerve tissue

V. Integumentary system
- A. Function of the skin
- B. Skin layers
  1. The epidermis
  2. The dermis
  3. Subcutaneous tissue

VI. Skeletal system
- A. Functions of the skeleton
- B. Classifications of bones
  1. Long bones
  2. Short bones
  3. Flat bones
  4. Irregular bones
- C. The skeleton
  1. Axial
  2. Appendicular
- D. Joints
  1. Immovable joints
  2. Slightly movable joints
  3. Freely movable joints

VII. The muscular system
- A. Structure
- B. Function
- C. Types
  1. Skeletal
  2. Smooth
  3. Cardiac

VIII. The nervous system
- A. Function
  1. Voluntary activity
  2. Involuntary activity
- B. Nervous system divisions
  1. Central nervous system
  2. Peripheral nervous system
- C. Neurons
  1. Structure
     a. Cell body
     b. Dendrites
     c. Axons
  2. Synapses
     a. Neurotransmitter
     b. Inactivators
  3. Types of neurons
     a. Sensory neurons
     b. Receptors
     c. Motor neurons
- D. Nerve types
  1. Sensory
  2. Motor
- E. The nerve impulse
  1. Polarization
  2. Depolarization
  3. Repolarization
- F. The central nervous system
  1. The spinal cord
  2. Brain
     a. Ventricles
     b. Medulla
     c. Pons
     d. Midbrain
     e. Cerebellum
     f. Hypothalamus
     g. Thalamus
     h. Cerebrum
     i. Frontal lobes
     j. Parietal lobes
     k. Temporal lobes
     l. Occipital lobes

3. Meninges and cerebral spinal fluid
4. The autonomic nervous system
   a. Sympathetic division
      (1) Function
      (2) Neuro transmitter
   b. Parasympathetic division
      (1) Function
      (2) Neuro transmitter
   c. Neuro receptors
      (1) Alpha
      (2) Beta

IX. The endocrine system
   A. Regulation of hormonal secretion
   B. Function of hormones
   C. Pancreatic hormones
      1. Insulin
      2. Glucagon
   D. Adrenal hormones
      1. Epinephrine
      2. Norepinephrine

X. Blood
   A. Characteristics of blood
      1. Amount
      2. Color
      3. pH
      4. Viscosity
   B. Plasma
   C. Blood cells
      1. Red blood cells
         a. Function
         b. Production and maturation
         c. Blood types
      2. White blood cells
         a. Functions
      3. Platelet
         a. Site of production
         b. Function
      4. Blood clotting

XI. The heart
   A. Location
   B. Pericardial membranes
      1. Parietal pericardium
      2. Visceral pericardium/ epicardium
      3. Serous fluid
   C. Chambers, vessels, and valves
      1. Right atrium

a. Vena cavae
(1) Superior vena cava
(2) Inferior vena cava
b. Tricuspid valve

2. Left atrium
a. Pulmonary veins
b. Mitral valves/ bicuspid

3. Right ventricle
a. Pulmonary artery
b. Pulmonary semilunar valve

4. Left ventricle
a. Aorta
b. Aortic semilunar valve

5. Coronary vessels

D. The cardiac cycle
1. Systole
2. Diastole

E. Heart sounds

F. Cardiac conduction pathway
a. Sinoatrial node
b. Atrioventricular node
c. Bundle of His
d. Bundle branches
e. Purkinje fibers

G. Cardiac output
1. Heart rate
a. Baroreceptor
b. Chemoreceptor

2. Stroke volume
a. Starling's law of the heart

3. Neural regulation of heart function
a. Parasympathetic
b. Sympathetic

XII. The vascular system

A. Arteries

B. Veins
1. Valves

C. Capillaries

D. Exchange in the capillaries
1. Gas exchange
2. Fluid exchange

E. Pathways of circulation
1. Pulmonary circulation
2. Systemic circulation

F. Blood pressure
1. Maintenance of systemic blood pressure
2. Regulation of blood pressure

XIII. The lymphatic system and immunity
- A. Functions
- B. Immunity
  1. Antigens and antibodies
  2. Antibody response

XIV. Respiratory system
- A. Function
- B. Anatomy
  1. Nose and nasal cavities
  2. Pharynx
  3. Larynx
  4. Trachea and bronchial tree
  5. Lungs and pleural membranes
  6. Alveoli
- C. The mechanics of breathing
  1. Inhalation
  2. Exhalation
- D. Ventilation versus respiration
- E. Exchange of gases
  1. Diffusion of gases
- F. Transportation of gases in the blood
- G. Regulation of respiration
  1. Nervous control
  2. Chemical control

XV. The digestive system
- A. Functions
- B. Major divisions

XVI. Fluids and electrolytes
- A. Water compartments
  1. Intracellular
  2. Extracellular
  3. Interstitial
  4. Intravascular
  5. Extravascular
- B. Fluid balance
- C. Electrolytes
  1. Intake
  2. Output
  3. Regulation
- D. Acid-base balance
  1. Respiratory compensation for metabolic changes
  2. Metabolic compensation
     a. Buffer system
     b. Renal system
  3. Effects of pH changes
     a. Acidosis

b. Alkalosis