

# **INTRODUCTION TO HEALTH SCIENCE**

CIP Code: Health Science, Introduction 51.0001

Units of Credit: 0.5

Levels: 9-12

Skill Certificate: Introduction to Health Science Available

**Introduction to Health Science Description:** This semester course is designed to create an awareness of career possibilities in health care and inform students of the educational options available for health science and health technology programs. Instruction includes beginning anatomy and physiology, medical terminology, medical ethics, diseases, and disorders. The course prepares students for the Medical Anatomy/Physiology course and/or for a variety of health technology programs.

## **Standards and Objectives**

### **STANDARD 1 INTRODUCTION**

Students will explore the fundamental aspects of Healthcare.

**OBJECTIVE 1:** Compare and contrast the history of medicine with current trends.

- a. Create a historical timeline.
- b. Identify current trends in healthcare.

**OBJECTIVE 2:** Investigate the various aspects of health insurance.

- a. Describe health insurance (premium, copay, deductible, etc.)
- b. Compare and contrast government funded healthcare programs and private health insurance (Medicaid, Medicare, etc.).

**OBJECTIVE 3:** Summarize basic professional standards and characteristics of healthcare workers.

- a. Demonstrate proper hygiene of a healthcare worker.
- b. Describe proper dress of a healthcare worker.
- c. Discuss proper behavior in a healthcare setting (honesty, empathy, dependable, life-long learner, and teamwork).

**OBJECTIVE 4:** Discuss desirable attitudes and behaviors when providing healthcare to diverse patients.

- a. Describe how cultural differences impact the delivery of healthcare.
- b. Describe the importance of treating patients as individuals (i.e., gender, race, age, religion, etc.).

**OBJECTIVE 5:** Compare and contrast the health science career pathways.

- a. Explore careers associated with the Diagnostic Services Pathway.
  - Audiologist
  - Clinical Lab Technician/Technologist
  - Diagnostic Medical Sonographer
  - Electrocardiographic (ECG) Technician

- Optician/Ophthalmologist/Ophthalmic Assistant/Ophthalmic Technologist/Optometrists
  - Pathologist
  - Radiologic Technologist/Radiologist
  - Speech-Language Pathologist
- b. Explore careers associated with the Therapeutic Services Pathway.
- Acupuncturist
  - Anesthesiologist/Assistant/Anesthesia Technologist/Technician
  - Art/Music/Dance Therapist(s)
  - Athletic Trainer
  - Certified Nursing Assistant/Licensed Practical Nurse/Registered Nurse
  - Chiropractor/Chiropractic Assistant
  - Dental Assistant/Hygienist
  - EMT/Paramedic
  - Home Health Aide
  - Medical Assistant
  - Nurse Practitioner
  - Occupational Therapist/Assistant
  - Pharmacist/Pharmacy Technician
  - Recreation Therapist
  - Respiratory Therapist
  - Veterinarian/Veterinarian Assistant/Veterinarian Technician
- c. Explore careers associated with the Health Informatics Pathway.
- Admitting Clerk
  - Clinical Account Manager
  - Clinical Account Technician
  - Ethicist
  - Health Educator
  - Healthcare Administrator
  - Medical Coder
  - Medical Information Technologist
  - Medical Transcriptionist
  - Risk Manager
- d. Explore careers associated with the Support Services Pathway.
- Biomedical/Clinical Engineer/Technician
  - Central Service Manager/Technician
  - Dietetic Technician
  - Environmental Health Advocate
  - Food Safety Specialist
  - Industrial Hygienist
  - Interpreter
  - Mortician/ Funeral Director
  - Social Worker
  - Transport Technician

- e. Explore careers associated with the Biotechnology Research and Development Pathway.
  - Biomedical Chemist
  - Biomedical Manufacturing Technician
  - Cell Biologist
  - Crime Scene Investigator
  - Forensic Pathologist
  - Microbiologist
  - Pharmaceutical/Clinical Project Manager
  - Pharmacologist
  - Quality Control Technician
  - Toxicologist

**OBJECTIVE 6:** Demonstrate knowledge of medical law and medical ethics.

- a. Differentiate between medical law and medical ethics.
- b. Describe scope of practice for healthcare workers.
- c. Explain the importance of expressed consent and implied consent.
- d. Define legal implications and how they relate to healthcare (battery, invasion of privacy, and malpractice/negligence).
- e. Describe HIPPA and how it relates to a patients right to privacy.

**OBJECTIVE 7:** Identify how math is used in the medical field.

- a. Demonstrate use of the 24-hour clock/military time.
- b. Demonstrate competency in basic math skills as they relate to healthcare (averages, ratios, fractions, percentages, addition, subtraction, multiplication, and division).
- c. Demonstrate the ability to convert units of height, weight, and temperature.
- d. Demonstrate the ability to use the metric system.

**OBJECTIVE 8:** Describe anatomical position and the role it plays in human anatomy.

- a. Define anatomical position.
- b. Identify body planes and directional terms (sagittal, mid-sagittal, coronal/frontal, transverse/horizontal, superior, inferior, anterior, posterior, medial, lateral, proximal, distal, superficial, and deep).

## **STANDARD 2 SUPPORT SYSTEMS**

Students will explore aspects of the body systems related to support.

### **SKELETAL SYSTEM**

**OBJECTIVE 1:** Identify the basic functions of the skeletal system.

- a. Describe how the skeletal system provides structure/support.
- b. Describe how the skeletal system provides means for muscle attachment and movement.
- c. Describe how the skeletal system stores minerals (i.e., calcium).
- d. Describe hematopoiesis (blood cell production) and where it occurs.

**OBJECTIVE 2:** Explore the basic structure of the skeleton.

- a. Identify the following bones.
  - Cranium (frontal, parietal, occipital, temporal, maxillae, mandible)
  - Vertebrae (cervical, thoracic, lumbar, sacrum, coccyx).
  - Ribs
  - Sternum
  - Humerous
  - Radius
  - Ulna
  - Carpels
  - Metacarpels
  - Phalanges (fingers)
  - Pelvis
  - Femur
  - Patella
  - Tibia
  - Fibula
  - Tarsals
  - Metatarsals
  - Phalanges (toes)
- b. Describe articulation and identify the location of joints (i.e, suture, shoulder, elbow, wrist, hip, knee, etc.).
- c. Describe the function of ligaments.

**OBJECTIVE 3:** Describe the diseases and disorders associated with the skeletal system.

- a. Compare and contrast open and closed fractures.
- b. Describe the causes, signs and symptoms, and treatment of scoliosis.
- c. Describe the causes, signs and symptoms, and treatment of osteoarthritis.
- d. Describe the causes, signs and symptoms, and treatment of osteoporosis.
- e. Describe the causes, signs and symptoms, and treatment of sprain.

**MUSCULAR SYSTEM**

**OBJECTIVE 4:** Describe the basic functions of the muscular system.

- a. Define thermogenesis.
- b. Identify how muscles produce movement (i.e., muscle contractions).
- c. Explain how muscles maintain posture.
- d. Explain how muscles protect internal organs.
- e. Explain how smooth muscle controls the volume of our hollow body organs.

**OBJECTIVE 5:** Explore the basic structure of the skeletal system.

- a. Identify the location of the following muscles.
  - Biceps brachii
  - triceps brachii
  - trapezius

- deltoid
  - diaphragm
  - pectoralis major
  - latissimus dorsi
  - rectus abdominus
  - gastrocnemius
  - hamstrings
  - quadriceps
  - gluteus maximus.
- b. Differentiate between cardiac, smooth, and skeletal muscles (appearance, location, and control).
  - c. Describe the function of tendons.

**OBJECTIVE 6:** Describe the diseases and disorders associated with the muscular system.

- a. Describe the causes, signs and symptoms, and treatment of tendonitis.
- b. Describe the causes, signs and symptoms, and treatment of muscular dystrophy.
- c. Describe the causes, signs and symptoms, and treatment of strain.
- d. Describe the causes, signs and symptoms, and treatment of spasm (i.e., Charlie horse).

## **INTEGUMENTARY SYSTEM**

**OBJECTIVE 7:** Describe the basic functions of the integumentary system.

- a. Identify how skin protects against infection.
- b. Explain that the skin produces vitamin D.
- c. Explain how the skin functions as a sensory organ.
- d. Explain how skin regulates body temperature.
- e. Identify how the skin protects against UV light.

**OBJECTIVE 8:** Identify the layers of the skin and appendages.

- a. Describe the layers of the skin (epidermis, dermis, and subcutaneous layer).
- b. Describe the appendages of the skin (nails, sweat (sudoriferous) glands, oil (sebaceous) glands, and hair).

**OBJECTIVE 9:** Describe the diseases and disorders associated with the integumentary system.

- a. Describe the causes, signs and symptoms, and treatment of acne.
- b. Describe the causes, signs and symptoms, and treatment of fungal infections (i.e., athlete's foot, ringworm, and jock itch).
- c. Describe the causes, signs and symptoms, treatment, prevention, and detection (ABCDE method) of skin cancer (i.e., basal cell carcinoma, squamous cell carcinoma, and melanoma).

### **03 TRANSPORTATION SYSTEMS**

Students will explore aspects of the body systems related to transportation.

#### **CIRCULATORY SYSTEM**

**OBJECTIVE 1:** Describe the basic functions of the circulatory system.

- a. Identify how the circulatory system transports the following nutrients and wastes.
- b. Identify how the circulatory system transports heat.
- c. Identify how the circulatory system transports oxygen to body cells and carbon dioxide away from body cells.
- d. Identify how the circulatory system transports hormones.
- e. Identify how the circulatory system transports antibodies.

**OBJECTIVE 2:** Identify the basic structures and functions of the heart, blood vessels, and blood.

- a. Describe the basic structures and functions of the heart (right atrium, right ventricle, left atrium, left ventricle, and valves)
- b. Explain the flow of blood through the heart.
- c. Compare and contrast the differences between arteries, capillaries, and veins.
- d. Identify the components of blood and the function of each component (red blood cells, white blood cells, platelets, and plasma).

**OBJECTIVE 3:** Describe the diseases and disorders associated with the circulatory system.

- a. Describe the causes, signs and symptoms, and treatment of anemia.
- b. Describe the causes, signs and symptoms, and treatment of heart attack.
- c. Describe the causes, signs and symptoms, and treatment of high blood pressure.
- d. Describe the causes, signs and symptoms, and treatment of atherosclerosis.

#### **RESPIRATORY SYSTEM**

**OBJECTIVE 4:** Identify the basic functions of the respiratory system.

- a. Describe how the nose warms, moistens, and filters air.
- b. Describe how sound production is related to the respiratory system.
- c. Describe the process of carbon dioxide-oxygen gas exchange.

**OBJECTIVE 5:** Identify basic structures of the respiratory system.

- a. Describe the structures and functions of the nose and nasal cavity (structure: bony framework, cartilage, skin, mucous membrane, cilia, nostrils, and septum, function: warms, moistens, and filters air).
- b. Identify the location and function of the following structures.
  - pharynx
  - epiglottis
  - larynx

- trachea
- bronchi
- bronchioles
- lungs
- alveoli

**OBJECTIVE 6:** Describe the diseases and disorders associated with the respiratory system.

- a. Describe the causes, signs and symptoms, and treatment of the common cold.
- b. Describe the causes, signs and symptoms, and treatment of pneumonia.
- c. Describe the causes, signs and symptoms, and treatment of lung cancer.
- d. Describe the causes, signs and symptoms, and treatment of asthma.
- e. Describe the causes, signs and symptoms, and treatment of bronchitis.
- f. Describe the causes, signs and symptoms, and treatment of tuberculosis.
- g. Describe the causes, signs and symptoms, and treatment of influenza.
- h. Describe the causes, signs and symptoms, and treatment of emphysema.

## **IMMUNE SYSTEM**

**OBJECTIVE 7:** Describe the basic function and structures of the immune system.

- a. Identify the basic function of the immune system (provides protection against diseases).
- b. Identify the basic structures of the immune system (tonsils, lymph nodes, and white blood cells).

**OBJECTIVE 8:** Describe the diseases and disorders associated with the immune system.

- a. Describe the causes, signs and symptoms, and treatment of the human immunodeficiency virus (HIV).
- b. Describe the causes, signs and symptoms, and treatment of acquired immune deficiency syndrome (AIDS).
- c. Describe the causes, signs and symptoms, and treatment of lupus.
- d. Describe the causes, signs and symptoms, and treatment of mononucleosis.

## **04 REGULATORY SYSTEMS**

Students will explore aspects of the body systems related to regulation.

### **NERVOUS SYSTEM**

**OBJECTIVE 1:** Identify the basic functions of the nervous system.

- a. Describe how the sensory nerves detect stimuli (pressure, temperature, taste, smell, light, etc.) and send the message in the form of an impulse to the control centers (spinal cord/brain).
- b. Describe how the nervous system receives and interprets incoming nerve impulses and determines appropriate responses.

- c. Explain how the motor nerves carry out the response of the control center (spinal cord/brain).

**OBJECTIVE 2:** Identify the basic structures and their functions.

- a. Describe the structures of the brain and their functions (cerebrum, cerebellum, and brain stem).
- b. Describe the structure and function of the spinal cord.
- c. Describe the location and function of cerebrospinal fluid.
- d. Describe the location and function meninges.
- e. Describe the structure (cell body, dendrites, and axon) and function of sensory and motor nerves.

**OBJECTIVE 3:** Describe the diseases and disorders associated with the nervous system.

- a. Describe the causes, signs and symptoms, and treatment of the meningitis.
- b. Describe the causes, signs and symptoms, and treatment of epilepsy.
- c. Describe the causes, signs and symptoms, and treatment of concussion.
- d. Describe the causes, signs and symptoms, and treatment of stroke.

## **SPECIAL SENSES**

**OBJECTIVE 4:** Describe the special senses.

- a. Identify the sense of smell (chemoreceptors).
- b. Identify the sense of taste (chemoreceptors).
- c. Identify the sense of hearing (mechanoreceptors).
- d. Identify the sense of vision (photoreceptors).
- e. Identify the sense of touch (mechanoreceptors).

**OBJECTIVE 5:** Identify the basic structures of the special sense organs and their functions.

- a. Describe the structure and function of the ear (outer ear (auricle and external auditory canal), middle ear (tympanic membrane, Eustachian tube (auditory tube) and auditory ossicles), and inner ear (cochlea)).
- b. Describe the structure and function of the eye (eyelid, conjunctiva, sclera, cornea, iris, pupil, lens, and retina).
- c. Describe the structure and function of the nose (olfactory receptor).
- d. Describe the structure and function of the mouth/tongue (taste buds).
- e. Describe the structure and function of the skin (nerve endings).

**OBJECTIVE 6:** Describe the diseases and disorders of the special senses.

- a. Describe the causes, signs and symptoms, and treatment of pinkeye (conjunctivitis).
- b. Describe the causes, signs and symptoms, and treatment of middle ear infection (otitis media).
- c. Describe the causes, signs and symptoms, and treatment of deafness.
- d. Describe the causes, signs and symptoms, and treatment of near-sightedness (myopia).



- e. Describe the causes, signs and symptoms, and treatment of far-sightedness (hyperopia).
- f. Describe the causes, signs and symptoms, and treatment of presbyopia.

## **ENDOCRINE SYSTEM**

**OBJECTIVE 7:** Identify the basic functions of the endocrine system.

- a. Describe how the endocrine system regulates body processes.
- b. Describe how the endocrine system regulates growth, development, and maturation.

**OBJECTIVE 8:** Identify the location of the following glands and the function of the hormones they release.

- a. Pituitary gland—located in the brain, releases growth hormone (GH) and oxytocin.
- b. Thyroid gland—located in the neck, releases thyroxine.
- c. Pancreas—located behind the stomach, releases insulin and glucagon.
- d. Adrenal glands—located on top of the kidneys, releases cortisol, adrenaline, and noradrenaline.

**OBJECTIVE 9:** Describe the diseases and disorders of the endocrine system.

- a. Describe the causes, signs and symptoms, and treatment of type 1 diabetes (juvenile diabetes).
- b. Describe the causes, signs and symptoms, and treatment of type 2 diabetes (diabetes mellitus).
- c. Describe the causes, signs and symptoms, and treatment of gigantism.
- d. Describe the causes, signs and symptoms, and treatment of dwarfism.
- e. Describe the causes, signs and symptoms, and treatment of hypothyroidism.
- f. Describe the causes, signs and symptoms, and treatment of hyperthyroidism.

## **05 MAINTENANCE SYSTEMS**

Students will explore aspects of the body systems related to maintenance.

### **DIGESTIVE SYSTEM**

**OBJECTIVE 1:** Describe the basic functions of the digestive system.

- a. Define ingestion.
- b. Define digestion (chemical and mechanical).
- c. Define absorption.
- d. Define excretion.

**OBJECTIVE 2:** Describe the location and basic functions of the digestive organs.

- a. Mouth—chemical and mechanical digestion.
- b. Pharynx (throat)—passageway.
- c. Esophagus (between pharynx and stomach)—passageway.
- d. Stomach (between pharynx and small intestine)—storage, absorption, chemical and mechanical digestion.

- e. Small intestines (between stomach and large intestines)—chemical digestion and absorption.
- f. Large intestines (between small intestine and rectum)—absorption of water and formation of feces.
- g. Rectum (between large intestine and anus)—temporary storage for solid waste (feces).
- h. Anus (final portion of the digestive track)—excretion of feces.

**OBJECTIVE 3:** Describe the diseases and disorders of the digestive system

- a. Describe the causes, signs and symptoms, and treatment of Crohn's disease.
- b. Describe the causes, signs and symptoms, and treatment of celiac disease.
- c. Describe the causes, signs and symptoms, and treatment of appendicitis.
- d. Describe the causes, signs and symptoms, and treatment of inguinal hernia.

**URINARY SYSTEM**

**OBJECTIVE 4:** Describe the basic functions of the urinary system.

- a. Explain how the urinary system regulates the volume and composition of blood.
- b. Explain how the urinary system excretes body wastes.

**OBJECTIVE 5:** Identify the basic organs, location, and functions of the urinary system.

- a. Kidneys—located in the upper left and right quadrant. The functions are to filter blood and produce urine.
- b. Ureters—tubes located between the kidney and the bladder. The function is to transport urine from the kidney to the bladder.
- c. Bladder—located in the pelvic cavity. The function is to store urine.

**OBJECTIVE 6:** Describe the diseases and disorders of the urinary system.

- a. Describe the causes, signs and symptoms, and treatment of kidney stones.
- b. Describe the causes, signs and symptoms, and treatment of kidney failure.
- c. Describe the causes, signs and symptoms, and treatment of bladder infection (UTI).

**06 REPRODUCTIVE SYSTEM**

Students will explore aspects of the human reproductive systems.

**OBJECTIVE 1:** Describe the functions of the reproductive system.

- a. Explain the production of gametes (egg and sperm) by the gonads.
- b. Explain the production of hormones to help in the maturation process.

**OBJECTIVE 2:** Describe the structures, location, and function of the female reproductive system.

- a. Ovaries—located in the pelvic cavity. Produces and releases the egg (ovulation) and releases estrogen.

- b. Uterine tubes—located in the pelvic cavity. Tube for the eggs to travel to the uterus. Most common site for fertilization of the egg.
- c. Uterus—located in the pelvic cavity. Consists of the fundus, body, and cervix. Site for menstruation (endometrium), development of the embryo, and expulsion of the fetus.
- d. Vagina—located in the pelvic cavity. Passage way for menstruation, female copulatory organ, birth canal.

**OBJECTIVE 3:** Describe the structures, location, and the function of the male reproductive system.

- a. Testes—located in the scrotum. Produces sperm and testosterone.
- b. Scrotum—located inferior to the penis. Encloses and protects the testes and maintains an optimal temperature for sperm production.
- c. Epididymis—located superior/posterior to the testes. Storage and maturation of sperm.
- d. Vas deferens—located between the epididymis and the urethra. Transportation of sperm.
- e. Prostate gland—located inferior to the bladder and around the urethra. Secrets alkaline fluid.
- f. Urethra—located inferior to the bladder surrounded by the penis. Passageway for sperm and urine.

**OBJECTIVE 4:** Describe the diseases and disorders of the reproductive system.

- a. Describe the causes, signs and symptoms, and treatment of premenstrual syndrome (PMS).
- b. Describe the causes, signs and symptoms, and treatment of endometriosis.
- c. Describe the causes, signs and symptoms, and treatment of breast cancer.
- d. Describe the causes, signs and symptoms, and treatment of cervical cancer.
- e. Describe the causes, signs and symptoms, and treatment of benign prostatic hypertrophy.
- f. Describe the causes, signs and symptoms, and treatment of testicular cancer.
- g. Describe the causes, signs and symptoms, and treatment of sexually transmitted infections (STI/STD).