

# BIO-1050: HUMAN BIOLOGY

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## Cuyahoga Community College

**Viewing: BIO-1050 : Human Biology**

**Board of Trustees:**

10/26/2023

**Academic Term:**

Fall 2024

**Subject Code**

BIO - Biology

**Course Number:**

1050

**Title:**

Human Biology

**Catalog Description:**

Designed for non-science majors. Considers concept of homeostasis of the human body. Basic structure and function of body systems and diseases of these systems studied. To fulfill laboratory science requirements, students should enroll in related laboratory course.

**Credit Hour(s):**

3

**Lecture Hour(s):**

3

**Lab Hour(s):**

0

**Other Hour(s):**

0

## Requisites

**Prerequisite and Corequisite**

ENG-0995 Applied College Literacies, or appropriate score on English Placement Test; or departmental approval.

Note: ENG-0990 Language Fundamentals II taken prior to Fall 2021 will also meet prerequisite requirements.

## Outcomes

**Course Outcome(s):**

Use the facts and principles of the scientific method to analyze questions arising in daily life as they relate to theories of modern science, while demonstrating the importance of reproducibility, intrinsic variation, and limitations of data and forming evidence-based conclusions.

**Essential Learning Outcome Mapping:**

Critical/Creative Thinking: Analyze, evaluate, and synthesize information in order to consider problems/ideas and transform them in innovative or imaginative ways.

**Objective(s):**

- a. List the steps of the scientific method in sequential order.
- b. Explain what objective and subjective means as related to observations.
- c. Define hypothesis and differentiate between a hypothesis and prediction.
- d. Explain the difference between experimental treatments and control treatments, and differentiate between the types of controls.
- e. Define the different types of experimental variables.

- f. Evaluate historic physiological experiments that outline the importance of reproducibility, and of intrinsic variations and limitations in gathered data.
- g. Demonstrate the use of the scientific method to solve problems in daily activities.

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**Course Outcome(s):**

Compare and contrast anatomy and physiology, describe the organization of the human body, and explain how scientific principles are formulated, evaluated, and either modified or validated in the context of human health.

**Objective(s):**

- a. Define the terms anatomy and physiology.
- b. Demonstrate the relationship between anatomy and physiology using specific examples.
- c. List, from simplest to most complex, the major levels of organization in the human body.
- d. Name the 11 organ systems and their basic functions.
- e. Identify the major organs of the human body
- f. Describe how the process of science and scientific principles have been used in human modern medicine advancement.

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**Course Outcome(s):**

Describe the process of homeostasis and explain how the various body systems work together to maintain homeostasis by using current models and theories to describe, explain, and predict outcomes.

**Objective(s):**

- a. Define the term homeostasis.
- b. Define the components of a negative feedback loop in a specific example of homeostasis including the receptor, afferent directional information flow, control center, efferent directional information flow, and effector.
- c. Give examples of variables in the body regulated by homeostasis.
- d. Compare and contrast the processes of positive and negative feedback.
- e. Predict the response of the body to factors that disrupt the internal homeostatic parameters.

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**Course Outcome(s):**

Apply the fundamental knowledge of cell theory and membrane biology to human physiology, and use this information to solve problems of cell homeostasis deviations.

**Objective(s):**

- a. State the parameters of the cell theory.
- b. Identify the three main parts of all human cells and list the general functions of each.
- c. Describe the structure of the plasma membrane.
- d. List the types and functions of proteins associated with the plasma membrane.
- e. Illustrate the phospholipid bilayer and describe the structure of a phospholipid.
- f. Explain why the plasma membrane is semipermeable and give examples of substances that can and cannot permeate the lipid bilayer.
- g. Predict the net direction of movement of a substance across a cell membrane given the concentration of the substance inside and outside the cell and the permeability of the substance across the membrane.

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**Course Outcome(s):**

Describe, differentiate between, and identify the four basic tissues that make up the human body, and use scientific principles to understand the impact of science on modern and contemporary human health.

**Objective(s):**

- a. Define tissue.
- b. List the four main types of tissue that make up the human body.
- c. Compare and contrast the fundamental characteristics of the tissue types.

- d. Identify unknown tissues by describing their structure, function and location in the body.
- e. Recognize the importance of tissue identification on problem-solving modern and current human health issues.

**Course Outcome(s):**

Apply the fundamental knowledge of the integumentary system to its role in homeostasis by gathering, analyzing, and communicating information from credible evidence-based scientific sources.

**Objective(s):**

- a. Define the term integument and describe the major functions of the integumentary system.
- b. Identify and describe the two components of the cutaneous membrane and state which tissue type makes up each.
- c. Identify and describe the five layers of the epidermis.
- d. Describe the process of epidermal growth and keratinization.
- e. Identify and describe the dermis and the composition of the tissue layer underneath the skin.
- f. Identify and describe the accessory structures of the integumentary system, including the hair, arrector pili muscle, nails, and glands.
- g. Explain how the integumentary system maintains homeostasis of body temperature.
- h. Predict how damage to the skin could disrupt homeostasis in the body.

**Course Outcome(s):**

Apply the fundamental knowledge of the skeletal system and articulations to their role in homeostasis.

**Objective(s):**

- a. Describe the major functions of the skeletal system.
- b. Describe the composition of compact bone and spongy bone tissue.
- c. Identify the major structural components of a long bone relative to the function of the bone in the body.
- d. Identify the major bones of the axial and appendicular skeleton, and the location of each in the body.
- e. Identify examples of the six synovial joints in the human body.
- f. Describe and demonstrate the movements at the six synovial joints in the human body.
- g. Describe disorders of the skeletal system.

**Course Outcome(s):**

Apply the fundamental knowledge of the muscular system to explain homeostasis.

**Objective(s):**

- a. Describe the major functions of the muscular system.
- b. List the three types of muscle found in the human body, and compare and contrast them in regards to location, structure and function.
- c. Describe the cellular structure of the skeletal muscle fiber including the specialized organelles, transverse tubules, and myofilaments.
- d. Explain the anatomy of the myofibril and sarcomere.
- e. Describe the sliding filament theory of muscle contraction.
- f. Identify the components and describe the anatomy of the neuromuscular junction.
- g. Explain the changes in permeability of the sarcolemma to sodium and potassium during an action potential by describing the opening and closing of voltage-gated ion channels.
- h. Describe how intracellular calcium release couples with excitation of the muscle fiber leading to its eventual contraction.
  - i. List the sequence of events that occur during the contraction cycle of a skeletal muscle fiber.
  - j. Describe how a muscle obtains energy for muscle contraction and explain factors that lead to muscle fatigue.
- k. Define origin, insertion and action as they relate to skeletal muscles.
  - l. Identify the major muscles of the human body.
- m. Describe disorders of the muscular system.

**Course Outcome(s):**

Apply the fundamental knowledge of the nervous system to explain homeostasis.

**Objective(s):**

- a. Describe the major functions of the nervous system.
- b. Describe the hierarchical organization of the nervous system including the central, peripheral, sensory, motor, somatic, and autonomic nervous systems.
- c. List the parts of the nervous system that constitute the central nervous system (CNS) and those that constitute the peripheral nervous system (PNS).
- d. Define afferent and efferent as these terms relate to components of the PNS and information flow to and from the CNS.
- e. Describe the two types of cells found in nervous tissue and state their function.
- f. Identify and state the function of the parts of a neuron including the dendrite, axon hillock, axon, and axon terminal.
- g. Classify neurons based on structure (unipolar, bipolar or multipolar) and function (motor, sensory or interneuron).
- h. Describe the location of a motor, sensory, and interneuron within the nervous system.
- i. Define the term myelin and explain its function.
- j. Define membrane potential and explain its significance in nervous system function.
- k. Describe how the diffusion of ions across the plasma membrane is regulated by gated ion channels.
- l. Define excitation, depolarization, re-polarization, as they relate to changes in membrane potential.
- m. Describe how an action potential passes from the presynaptic membrane to the postsynaptic membrane.
- n. Define the components and function of the central nervous system.
- o. Compare and contrast white matter and gray matter in the central nervous system anatomically and functionally.
- p. Identify the major regions of the brain and describe the function of each.
- q. Describe the effect of drugs and drug abuse on the nervous system.

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**Course Outcome(s):**

Apply the fundamental knowledge of the special senses to explain homeostasis.

**Objective(s):**

- a. List the five special senses in the human body and describe the location of the specialized sensory organ housing the sensory receptors for each.
- b. Describe signal transduction in the retinal cells during light and dark.
- c. Trace the pathway of visual input from the retina to the occipital lobe.
- d. Describe the part of the inner ear that detects sound waves and equilibrium.
- e. Trace the pathway of a sound wave from the outer ear to the cochlea.
- f. Describe how a sound wave inside the cochlea activates a hair cell.
- g. Describe how the amplitude and frequency of a sound wave traveling in the cochlea will determine the volume and pitch of a sound.
- h. Explain how odorants activate olfactory receptors.
  - i. Explain how dissolved chemicals activate taste receptors.
  - j. List the five primary taste sensations and describe how each is transduced at the molecular level by the receptor.
- k. Predict how loss of any of the special senses would disrupt homeostasis.

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**Course Outcome(s):**

Apply the fundamental knowledge of the endocrine system to explain homeostasis.

**Objective(s):**

- a. Explain the difference between an endocrine and exocrine gland.
  - b. Compare and contrast the nervous and endocrine systems as the two major control systems in the body.
  - c. Describe the characteristics of hormones and how they are classified.
  - d. List the three signals that can trigger hormone secretion.
  - e. Describe how hormone levels in the blood are regulated via positive or negative feedback.
  - f. Describe the two basic types of hormone receptors and how they generally alter cell function when a hormone is bound.
  - g. List the major structures of the endocrine system.
  - h. Analyze symptoms and hormone levels to diagnose common endocrine disorders.
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**Course Outcome(s):**

Apply basic knowledge of the cardiovascular system structures and functions to explain homeostasis and to predict outcomes of disruption within the system.

**Objective(s):**

- a. Relate the electrical and mechanical events of the cardiac cycle to heart anatomy.
- b. Describe the functions of blood vessels.
- c. Compare and contrast the structure of arteries, arterioles, capillaries, veins, and venules, and relate their structure to their functions.
- d. Describe the exchange of materials in capillary beds by diffusion.
- e. Define systolic and diastolic pressure.
- f. List the functions of blood.
- g. Describe the composition of blood.
- h. Describe the structures and functions of the formed elements: red blood cells, granular leukocytes (basophils, eosinophils, and neutrophils), agranular leukocytes (lymphocytes and monocytes), and platelets.
  - i. Describe disorders of each formed element.
  - j. Define hematopoiesis and describe the origin and production of the different formed elements.
- k. Describe the chemical composition and biological functions of plasma.
  - l. Describe the ABO and Rh blood grouping systems, transfusion reactions, and hemolytic disease of the newborn.
- m. Describe the functions of the heart.
- n. Explain the location of the heart and its major blood vessels.
- o. Describe the structures of the heart wall, chambers, and valves.
- p. Outline the flow of blood through the heart, systemic, and pulmonary circulation, naming the correct chambers, valves, and vessels in chronological order.
- q. Explain the functions of the cardiac conducting pathway.
  - r. Describe the main electrical events that occur during a normal electrocardiogram (ECG).
- s. Explain common heart sounds and relate their timing to ECG events.

**Course Outcome(s):**

Apply basic knowledge of the lymphatic/immune system to explain homeostasis and to predict the outcomes of disruption within the system.

**Objective(s):**

- a. Describe the functions of the lymphatic system.
- b. List the structures of the lymphatic system.
- c. Describe the location, structure, and function of primary immune tissues (red bone marrow and thymus).
- d. Describe the location, structure, and function of secondary immune tissues and organs including tonsils, lymph nodes, spleen, and appendix.
- e. Describe mechanisms of innate immunity including physical barriers, chemical mediators, and cells.
- f. Describe the inflammatory response.
- g. Describe mechanisms of cell-mediated adaptive immunity, including the cells and molecules necessary.
- h. Describe mechanisms of antibody-mediated adaptive immunity, including the general structure of antibodies and the five classes of antibodies.
- i. Explain the four ways to acquire adaptive immunity: natural passive, natural active, artificial passive, and artificial active adaptive immunity.
- j. List disorders of the immune system.

**Course Outcome(s):**

Apply fundamental knowledge of the respiratory system to explain homeostasis and to predict outcomes of disrupted structure and/or function.

**Objective(s):**

- a. Describe the functions of the respiratory system.
- b. Describe the location, structure, and function of the components of the respiratory system, beginning at the nose and ending at the alveoli.
- c. Define ventilation, external respiration, and internal respiration and describe events involved in each process.

- d. Apply gas laws to inspiration, expiration, and movement of gases.
- e. Distinguish between the different types of pulmonary air volumes and capacities.
- f. Define partial pressure and explain factors that affect movement of oxygen and carbon dioxide in the body.

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**Course Outcome(s):**

Apply fundamental knowledge of the urinary system to explain homeostasis and to predict outcomes of disrupted structure and/or function.

**Objective(s):**

- a. Describe functions of the urinary system.
- b. Describe the location, structure, and functions of the components of the urinary system, beginning at the kidney and ending at the urethra.
- c. Explain the location, structure, and functions of each region of a nephron.
- d. Explain the blood supply to and from the kidney.
- e. Discuss the process of urine formation.
- f. Relate the structure of the kidney to its mechanisms to concentrate urine.
- g. Compare how different hormones affect urine concentration and volume.
- h. List the physical characteristics and normal chemical composition of urine and compare it to the normal chemical composition of plasma and filtrate.

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**Course Outcome(s):**

Apply fundamental knowledge of the digestive system to explain homeostasis and to predict outcomes of disrupted structure and/or function.

**Objective(s):**

- a. Describe the functions of the gastrointestinal tract.
- b. Describe the location, structure, and functions of the components of the gastrointestinal tract, beginning at the mouth and ending at the anus.
- c. Describe the histology of the gastrointestinal tract and name a function of each layer.
- d. Describe the location, structure, and functions of the accessory organs of the digestive system, including salivary glands, liver, gallbladder, and pancreas.
- e. Compare and contrast chemical and mechanical digestion.
- f. Define a nutrient, describe the functions of the classes of nutrients, and state the enzyme(s) necessary to digest it, if applicable.
- g. Describe the chemical composition and functions of the major secretions of the gastrointestinal tract and accessory organs, including saliva, bile, gastric acid, and pancreatic juices.
- h. Define the various movements of the gastrointestinal tract.

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**Course Outcome(s):**

Apply fundamental knowledge of the reproductive system to explain homeostasis and to predict outcomes of disrupted structure and/or function.

**Objective(s):**

- a. Describe the functions of the male and female reproductive tracts.
- b. Compare and contrast the location, structures, and functions of the components of the male and female reproductive systems.
- c. Describe the processes of spermatogenesis and oogenesis.
- d. Describe the endocrine system's regulation of the anatomy and physiology of the male reproductive systems, including maturation at puberty, formation of sperm, and sex act.
- e. Describe the sex hormones secreted by cells of the male and female reproductive systems, and their major effects on the body.
- f. Describe the events in the ovarian and uterine cycles, including how hormones from the brain control the ovarian cycle and how hormones from the ovaries control the uterine cycle.
- g. List the paths of sperm production and release in the male; oocyte production and release in the female; ejaculated sperm in the female; and fertilized oocyte in the female.
- h. Discuss the structure and development of mammary glands and the endocrine system's control during lactation.

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**Methods of Evaluation:**

- a. Examinations
- b. Quizzes
- c. Participation in group learning activities
- d. Written reports
- e. Assignments/projects

**Course Content Outline:**

- a. Introduction
  - i. Scientific method
  - ii. Definitions
    - 1. Anatomy
    - 2. Physiology
  - iii. Levels of organization
    - 1. Chemicals
    - 2. Cells
    - 3. Tissues
    - 4. Organs
    - 5. Systems
    - 6. Organisms
  - iv. Life processes
    - 1. Metabolism
    - 2. Homeostasis
  - v. Homeostasis
    - 1. Definition
    - 2. Methods of maintaining
      - a. Positive feedback
      - b. Negative feedback
- b. Cell Structure
  - i. Cell (plasma) membrane
    - 1. Structure
      - a. Phospholipid bilayer
      - b. Proteins
    - 2. Functions
  - ii. Cytoplasm
- c. Tissues
  - i. Epithelial tissue
    - 1. Characteristics
    - 2. Types
      - a. Squamous
      - b. Cuboidal
      - c. Columnar
  - ii. Connective tissue
    - 1. Characteristics
    - 2. Types
      - a. Connective tissue proper
      - b. Loose (areolar)
      - c. Adipose
      - d. Dense (collagenous)
      - e. Elastic
      - f. Reticular
      - g. Cartilage
      - h. Hyaline
        - i. Fibrocartilage
      - j. Bone
      - k. Blood
  - iii. Muscular

1. Characteristics
2. Types
  - a. Smooth
  - b. Skeletal
  - c. Cardiac
- iv. Nervous
  1. Characteristics
  2. Types
    - a. Neurons
    - b. Neuroglia
- d. Integumentary System
  - i. Functions
  - ii. Skin
    1. Epidermis
    2. Dermis
    3. Hypodermis
  - iii. Accessory structures
- e. Skeletal system
  - i. Functions
  - ii. Histology
    1. Composition of osseous tissue
      - a. Cell types
      - b. Intercellular matrix
    2. Types of bony tissue
      - a. Compact bone
      - b. Spongy bone
    3. Gross anatomy of bones
      - a. Long bones
      - b. Short bones
      - c. Flat bones
      - d. Irregular bones
    4. Bone growth
    5. Fractures
    6. Axial skeleton
      - a. Skull
      - b. Hyoid bone
      - c. Vertebral column
      - d. Ribs
    7. Appendicular skeleton
      - a. Pectoral girdle
      - b. Upper extremity
      - c. Pelvic girdle
      - d. Lower extremity
- f. Articulations
  - i. Synovial
    1. Structure
    2. Types
      - a. Ball and socket
      - b. Condylloid
      - c. Hinge
      - d. Pivot
      - e. Saddle
      - f. Gliding
- g. Muscular system
  - i. Characteristics
  - ii. Functions
  - iii. Types
  - iv. Anatomy of skeletal muscle
    1. Connective tissue
    2. Histology



- a. Cell structure
- b. Myofilaments
- c. Sarcomere
- 3. Physiology of muscle contractions
  - a. Sliding filament theory
  - b. Structure and function of neuromuscular junction (NMJ)
  - c. Energy for muscle contraction
  - d. Agonist, antagonist, synergist
- h. Nervous system
  - i. Organization
    - 1. Central nervous system (CNS)
    - 2. Peripheral nervous system (PNS)
  - ii. Histology
    - 1. Neuroglia
    - 2. Neurons
      - a. Structure
        - i. Axons
        - ii. Dendrites
        - iii. Cell body
      - b. Classification
        - i. Structure
        - ii. Function
      - c. Physiology
        - i. Nerve impulse
          - 1. Resting potential
          - 2. Action potential
          - 3. Repolarization
          - 4. Salutatory transmission
          - 5. Speed of transmission
        - ii. Conduction across a synapse
          - 1. Role of neurotransmitter
  - d. Brain
    - i. Brain stem
      - 1. Medulla oblongata
      - 2. Pons
      - 3. Midbrain
    - ii. Diencephalon
      - 1. Thalamus
      - 2. Hypothalamus
    - iii. Cerebrum (telencephalon)
      - 1. Cortex
      - 2. Hemispheres
      - 3. White matter
      - 4. Limbic system
    - iv. Cerebellum
    - v. Neurotransmitters
    - vi. Cranial nerves
- i. Senses
  - i. Vision
    - 1. Anatomy of the eye
      - a. Accessory structures
      - b. Fibrous tunic
      - c. Vascular tunic
      - d. Nervous tunic
      - e. Lens
      - f. Cavities and chambers
    - 2. Physiology of vision
      - a. Refraction
      - b. Stimulation of the photoreceptors

- i. Rods
    - ii. Cones
  - ii. Hearing and equilibrium
    - 1. Anatomy of the ear
      - a. External ear
      - b. Middle ear
      - c. Inner ear
    - 2. Physiology of hearing
      - a. Stimulation of the receptors
      - b. Pitch versus frequency
      - c. Hearing disorders
    - 3. Physiology of equilibrium
- j. Endocrine system
  - i. General features
    - 1. Functions
    - 2. Definitions
    - 3. Endocrine versus nervous system
    - 4. Regulation of hormonal secretion
    - 5. Hormone transport and metabolism
    - 6. Types of hormones
- k. Cardiovascular system
  - i. Blood
    - 1. Functions
    - 2. Composition
    - 3. Formed elements
      - a. Red blood cells (RBC, erythrocytes)
        - i. Structure
        - ii. Hemoglobin
        - iii. Life span
        - iv. Numbers
        - v. Disorders
      - b. White blood cells (WBC, leukocytes)
        - i. General characteristics
        - ii. Granular leukocytes
          - 1. Neutrophils
          - 2. Eosinophils
          - 3. Basophils
        - iii. Agranular leukocytes
          - 1. Lymphocytes
          - 2. Monocytes
        - iv. Disorders
      - c. Platelets (thrombocytes)
        - i. Structure
        - ii. Function
        - iii. Disorders
      - d. Plasma
        - i. Water
        - ii. Solutes
      - e. Blood types
        - i. A,B,O groups
        - ii. Rh factor
        - iii. Compatible/incompatible transfusions
        - iv. Maternal/fetal incompatibility
  - ii. Heart
    - 1. Function
    - 2. Location
    - 3. Structures
      - a. Chambers
      - b. Walls

- c. Valves
- d. Blood circulation pathway
- 4. Physiology
  - a. Conduction system
  - b. Electrocardiogram (ECG)
  - c. Cardiac Cycle
    - i. Atrial diastole
    - ii. Atrial systole
    - iii. Ventricular systole
    - iv. Ventricular diastole
    - v. Timing
- iii. Blood vessels
  - 1. Arteries
    - a. Structure
    - b. Function
  - 2. Capillaries
    - a. Structure
    - b. Function
  - 3. Veins
    - a. Structure
    - b. Function
    - c. Compared to arteries
  - 4. Circulatory routes
    - a. Systemic circulation
    - b. Pulmonary circulation
- I. Lymphatic system
  - i. Functions
  - ii. Structures
    - 1. Lymph
    - 2. Vessels
      - a. Lacteals
    - 3. Lymphatic organs and tissues
      - a. Primary lymphatic organs
        - i. Red bone marrow
        - ii. Thymus
      - b. Secondary lymphatic organs and tissues
        - i. Lymph nodes
        - ii. Spleen
    - 4. Innate immunity
      - a. Physical barriers
        - i. Skin
        - ii. Tears
        - iii. Saliva
        - iv. Urine
        - v. Mucous membranes
        - vi. Resident bacteria
      - b. Chemical barriers
        - i. Oil secretions
        - ii. Lysozyme in saliva, tears, sweat
        - iii. Acidity of stomach and vagina
      - c. Phagocytic white blood cells
        - i. Neutrophils
        - ii. Macrophages
      - d. Inflammatory response
  - 5. Adaptive immunity
    - a. B cells
      - i. Function
      - ii. Plasma cells
      - iii. Memory cells
    - b. T cells

- i. Function
      - ii. Cytotoxic cells
      - iii. Helper cells
      - iv. Memory cells
    - c. Apoptosis
    - d. Antibodies
      - i. Structure
      - ii. Function
  - 6. Immunity
    - a. Active
      - i. Natural infection
      - ii. Vaccine
    - b. Passive
      - i. Antibodies
      - ii. Mother to fetus
  - 7. Disorders of immune system
    - a. Allergies
    - b. Tissue rejection
    - c. Autoimmune diseases
    - d. Immunodeficiency diseases
- m. Respiratory system
- i. Respiratory organs
    - 1. Nose
    - 2. Pharynx
    - 3. Larynx
    - 4. Trachea
    - 5. Bronchi
    - 6. Lungs
  - ii. Physiology of respiration
    - 1. Breathing
      - a. Inspiration
      - b. Expiration
      - c. Airway resistance
    - 2. Air volumes and capacities
      - a. Air volumes
      - b. Lung capacities
    - 3. Gas laws
    - 4. External respiration
    - 5. Internal respiration
    - 6. Transport of respiratory gases
      - a. Oxygen
      - b. Carbon dioxide (CO<sub>2</sub>)
- n. Urinary system
- i. Kidney
    - 1. Gross anatomy
      - a. Cortex
      - b. Medulla
      - c. Pelvis
    - 2. Nephron
      - a. Structure
      - b. Types
      - c. Blood flow
    - 3. Physiology of the nephron
      - a. Filtration
      - b. Reabsorption
      - c. Secretion
      - d. Regulation of urine concentration
    - 4. Ureters

- a. Anatomy
- b. Physiology
- 5. Urinary bladder
- 6. Urethra
- 7. Urine
  - a. Normal properties
  - b. Urinalysis: tests for urinary function
- 8. Fluids, electrolytes, acids and bases
  - a. Fluids and electrolytes
    - i. Fluid balance
    - ii. Electrolytes
    - iii. Movement of body fluids
    - iv. Imbalances
  - b. Acid/base balance
    - i. Buffers
    - ii. Respiratory regulation of pH
    - iii. Urinary control of pH
    - iv. Acid/base imbalances
- o. Digestive system
  - i. Digestion types
    - 1. Mechanical digestion
    - 2. Chemical digestion
    - 3. Digestive end products
  - ii. Digestive processes
  - iii. Organization
    - 1. Gastrointestinal (GI) tract
    - 2. Accessory organs
  - iv. Histology
    - 1. Tunica mucosa
    - 2. Submucosa
    - 3. Muscularis
    - 4. Serosa
  - v. Sphincters
  - vi. Mouth
    - 1. Anatomy
    - 2. Salivary glands
      - a. Functions of saliva
    - 3. Teeth
      - a. Anatomy
    - 4. Digestion in the mouth
      - a. Mechanical
      - b. Chemical
  - vii. Esophagus
    - 1. Anatomy
    - 2. Physiology
  - viii. Stomach
    - 1. Anatomy
    - 2. Histology
      - a. Rugae
      - b. Gastric pits
      - c. Muscularis
    - 3. Digestion
      - a. Mechanical
      - b. Chemical
  - ix. Pancreas
    - 1. Anatomy
    - 2. Histology
      - a. Pancreatic islets (islets of Langerhans)
      - b. Acini cells
  - x. Liver

1. Anatomy
2. Histology
3. Bile
  - a. Composition
  - b. Function
- xi. Small intestine
  1. Anatomy
  2. Histology
    - a. Modifications for absorption
    - b. Lymph nodes
  3. Intestinal juice
    - a. Composition
    - b. Control of secretions
  4. Digestion
    - a. Mechanical
    - b. Chemical
  5. Absorption
    - a. Carbohydrates and amino acids
    - b. Lipids (lacteals)
    - c. Water and electrolytes
    - d. Vitamins
- xii. Large intestine
  1. Anatomy
  2. Histology
  3. Physiology
    - a. Movement
    - b. Chemical digestion – none
    - c. Bacterial action
    - d. Absorption
    - e. Defecation
- p. Male reproductive system
  - i. Chromosomal basis of sex
  - ii. Embryonic differentiation of male and female reproductive systems
  - iii. Male reproductive organs
    1. Testes
      - a. Structure
      - b. Functions
        - i. Hormone secretions
        - ii. Spermatogenesis
    2. Epididymis
    3. Vas deferens
    4. Prostate gland
    5. Seminal vesicles
    6. Ejaculatory duct
    7. Bulbourethral gland
    8. Urethra
    9. Penis
      - a. Structure
      - b. Physiology
        - i. Erection
        - ii. Ejaculation
    10. Semen
      - a. Contributing organs
      - b. Composition
  - iv. Male hormones
    1. Follicle stimulating hormone (FSH)
    2. Luteinizing hormone (LH)
    3. Testosterone
- q. Female reproductive system

- i. Female reproductive organs
  - 1. Ovaries
    - a. Structure and location
    - b. Follicle development
    - c. Ovulation – mechanism
    - d. Hormone secretion – estrogen and progesterone
  - 2. Fallopian tubes
  - 3. Uterus
    - a. Structure and location
    - b. Cyclic changes in the endometrium
  - 4. Vagina
  - 5. External genitalia (vulva)
  - 6. Mammary glands
  - 7. Menstrual cycle
  - 8. Ovarian cycle
  - 9. Uterine cycle
  - 10. Endocrine control and feedback cycles
  - 11. Menstrual irregularities
  - 12. Menarche
- ii. Menopause
- iii. Female hormones
  - 1. FSH
  - 2. LH
  - 3. Estrogen
  - 4. Progesterone
  - 5. Inhibin
  - 6. Oxytocin
- iv. Birth control
  - 1. Surgical methods
  - 2. Chemical methods
  - 3. Barrier methods
  - 4. Completion of meiosis II by female gametes
  - 5. Union of male and female nuclei

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## **Instructional Services**

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