

Course Description

This is an introductory course in human anatomy and physiology tailored for the student interested in health related programs and fields. The laboratory work includes animal dissection that reinforces the understanding of the principles and concepts of human anatomy and physiology.

Prerequisite: Biology

Length of Course: 1 year

Year in School Taken: 11,12

Course Goals and/or Major Student Outcomes

Students will become effective communicators who read critically and extensively for a variety of purposes. Students will gather, analyze and apply information learned to real life situations.

Course Objectives

The Student will have an understanding of the structural and functional levels of the human body, from the molecular level to organ system.

The student will be able to analyze and identify the anatomy and physiology of the skeletal system, articulations and the muscular system.

The student will study the nervous system and its role in maintenance of homeostasis, the role of receptors in providing information about the internal and external environment, and the significance of hormones in maintaining overall homeostasis.

Students will explore and understand how the body maintains and regulates itself on a daily basis through the mechanisms of cellular metabolism, circulation, respiration, digestion, excretion and endocrine systems.

Students will learn the anatomy and physiology of reproduction, maturation of reproductive cells, fertilization and embryonic development.

Course Outline

Students will study the following topics:

- I. Levels of Organization
 - a. Introduction to Human Anatomy and Physiology
 - i. Maintenance of life, requirements of organization, homeostasis
 - ii. Levels of organization
 - iii. Organization of the human body – body cavities, thoracic and abdominopelvic membranes, organ systems
 - iv. Anatomical Terminology
 - v. **LAB**
 1. Body organization and terminology
 - b. Chemical Basis of Life
 - i. Matter, atoms, molecules, compounds, formulas, chemical reactions, acids and bases
 - ii. Chemical constituents of cells – inorganic and organic substances
 - iii. **LAB**
 1. Care and use of the microscope
 - c. Cells
 - i. Cellular Structure

- ii. Movements through the membrane
 - iii. The Cell cycle – mitosis, cell differentiation, cell death
 - iv. Cellular Metabolism – anabolism, catabolism, enzyme action, glycolysis, aerobic respiration, ATP molecules, metabolic pathways, nucleic acids and protein synthesis
 - v. **LABS**
 - 1. Cellular Structure
 - 2. Movements through Cell Membranes
 - 3. The Cell Cycle
- d. Tissues
- i. Epithelial Tissues – general characteristics, simple squamous, simple cuboidal, simple columnar, pseudostratified columnar, stratified squamous, stratified cuboidal, stratified columnar, transitional epithelium, glandular epithelium
 - ii. Connective Tissues – general characteristics, loose, adipose, dense, cartilage, bone, blood
 - iii. Muscle Tissues – general characteristics, skeletal, smooth, cardiac
 - iv. Nervous Tissues
 - v. **LABS**
 - 1. Epithelial Tissues
 - 2. Connective Tissues
 - 3. Muscle and Nervous Tissues
- II. Support and Movement
- a. Skin and the integumentary system
 - i. Types of membranes
 - ii. Skin and its tissues – epidermis, skin color, dermis, subcutaneous layer
 - iii. Accessory organs of the skin – hair follicles, sebaceous glands, nails, sweat glands
 - iv. Regulation of body temperature
 - v. Healing of wounds and common skin disorders
 - vi. **LAB**
 - 1. Integumentary System
 - b. Skeletal System
 - i. Bone structure – parts of a long bone, microscopic structure
 - ii. Bone development and growth – intramembranous bones, endochondral bones, homeostasis of bone tissue
 - iii. Bone function – support and protection, body movement, blood cell formation, storage of inorganic salts
 - iv. Skeletal Organization – skull, vertebral column, thoracic cage, pectoral girdle, upper limb, pelvic girdle, lower limb, joints
 - v. **LABS**
 - 1. Structure of Bone
 - 2. Organization of the Skeleton
 - 3. The Skull
 - 4. Vertebral Column and Thoracic Cage
 - 5. Pectoral Girdle and Upper Limb
 - 6. Pelvic Girdle and Lower Limb
 - 7. The Joints
 - c. Muscular System
 - i. Structure of Skeletal Muscle – connective tissue coverings, skeletal muscle fibers, neuromuscular junction, motor units

- ii. Skeletal muscle contraction – role of myosin and actin, stimulus for contraction, energy sources for contraction, oxygen supply and cellular respiration, oxygen debt, muscle fatigue, heat production
 - iii. Muscular responses – threshold stimulus, all-or-none response, recording a muscle contraction, summation, recruitment of motor units, sustained muscle contraction
 - iv. Smooth muscle, cardiac muscle, skeletal muscle actions
 - v. Major skeletal muscles
 - vi. **LABS**
 - 1. Skeletal Muscle Structure
 - 2. Muscle of the face, head, and neck
 - 3. Muscles of the chest, shoulder, and upper limb
 - 4. Muscles of the abdominal wall and pelvic outlet
 - 5. Muscles of the hip and lower limb
- III. Integration and Coordination
- a. Nervous System
 - i. General functions of the nervous system
 - ii. Neuron structure
 - iii. Types of neurons and neurological cells
 - iv. Cell membrane potential
 - v. Nerve impulse
 - vi. The synapse
 - vii. Impulse processing
 - viii. Types of nerves and nerve pathways
 - ix. Meninges and spinal cord
 - x. Brain
 - xi. Peripheral Nervous System and Autonomic Nervous System
 - xii. **LABS**
 - 1. Nervous Tissue and Nerves
 - 2. The Reflex Arc and Reflexes
 - 3. The Meninges and Spinal Cord
 - 4. The Brain and Cranial Nerves
 - 5. Dissection of the Sheep Brain
 - b. Somatic and Special Senses
 - i. Receptors and sensations
 - ii. Somatic senses and special senses
 - iii. Sense of smell, taste, hearing, equilibrium, sight
 - iv. **LABS**
 - 1. The Ear and Hearing
 - 2. The Eye
 - 3. Visual Tests and Demonstrations
 - c. Endocrine System
 - i. Hormone Action – steroid, nonsteroid, prostaglandins
 - ii. Control of hormonal secretions
 - iii. Pituitary gland, thyroid gland, parathyroid glands, adrenal glands, pancreas, pineal gland, thymus gland, reproductive glands, digestive glands, other hormone producing organs
 - iv. Stress and health
 - v. **LAB**
 - 1. The Endocrine System
- IV. Transport

- a. Blood
 - i. Blood and blood cells
 - ii. Blood plasma
 - iii. Homeostasis
 - iv. Blood groups and transfusions including clinical terms relating to blood
 - v. **LABS**
 - 1. Blood Cells
 - 2. Blood Testing – A demonstration
 - 3. Blood Typing
 - b. Cardiovascular System
 - i. Structure of the Heart
 - ii. Heart Actions - cardiac cycle and regulation, heart sounds, cardiac muscle fibers
 - iii. Blood vessels
 - iv. Blood pressure
 - v. Paths of circulation – pulmonary and systemic circuit
 - vi. Arterial and Venous Systems
 - vii. **LABS**
 - 1. Structure of the heart
 - 2. The Cardiac Cycle
 - 3. Blood Vessels
 - 4. Pulse rate and blood pressure
 - 5. Major arteries and veins
 - c. Lymphatic System and Immunity
 - i. Lymphatic pathways – lymphatic capillaries, vessels, trunks, and collecting ducts
 - ii. Tissue fluid and lymph
 - iii. Lymph movement
 - iv. Lymph nodes
 - v. Thymus and spleen
 - vi. Body defense against infection – nonspecific and specific defenses
 - vii. **LAB**
 - 1. The Lymphatic System
- V. Absorption and Excretion
- a. Digestion and Nutrition
 - i. General characteristics of the Alimentary Canal
 - ii. Mouth, cheeks, lips, tongue, palate, teeth
 - iii. Salivary glands
 - iv. Pharynx and esophagus
 - v. Stomach, pancreas, liver, small intestine, large intestine
 - vi. Nutrition and nutrients – carbohydrates, lipids, proteins, vitamins, minerals, adequate diets
 - vii. **LABS**
 - 1. Organs of the Digestive System
 - 2. Action of a Digestive Enzyme
 - b. Respiratory System
 - i. Organs of the Respiratory System – nose, nasal cavity, paranasal sinuses, pharynx, larynx, trachea, bronchial tree, lungs
 - ii. Breathing mechanism
 - iii. Control of breathing
 - iv. Alveolar gas exchanges

- v. Gas transport
- vi. **LABS**
 - 1. Organs of the Respiratory System
 - 2. Breathing and Respiratory Volumes and Capacities
- c. Urinary System
 - i. Kidneys
 - ii. Urine formation
 - iii. Urine elimination
 - iv. **LABS**
 - 1. Structure of the Kidney
 - 2. Urinalysis
- d. Water, Electrolyte, and Acid-Base Balance
 - i. Distribution of Body Fluids
 - ii. Water Balance
 - iii. Electrolyte Balance
 - iv. Acid-Base Balance
- VI. Human Life Cycle
 - a. Reproductive Systems
 - i. Organs of the Male Reproductive System and Hormonal Control of Male Reproductive Functions
 - ii. Organs of the Female Reproductive System and Hormonal Control of Female Reproductive Functions
 - iii. Mammary Glands
 - iv. **LABS**
 - 1. Male Reproductive System
 - 2. Female Reproductive System
 - b. Pregnancy, Growth, and Development
 - i. Transport of sex cells and fertilization
 - ii. Prenatal period – early embryonic development, hormonal changes during pregnancy, embryonic stage, fetal stage, fetal blood and circulation, birth process
 - iii. Postnatal period – milk production and secretion, neonatal period

Texts & Supplemental Instructional Materials

Hole's Essentials of Human Anatomy and Physiology, 7th edition, by Shier, Butler, and Lewis
Glencoe McGraw-Hill, 2000

ISBN: 0072907746

Lab Manual ISBN: 0072907762

****Note**** the Hole's Essentials text and lab manual were used to write the course, display copy is available to preview at the Ceres Learning Center

The Dynamic Human

WCB/McGraw-Hill, 1999

ISBN: 0072354763

Understanding Human Anatomy and Physiology, 5th edition, by Mader
McGraw-Hill, 2005
ISBN: 0072932805 (hardcover), 0072464372 (softcover)

Essentials of Anatomy and Physiology, 3rd edition, by Seeley, Stephens, and Tate
Glencoe McGraw-Hill, 1999
ISBN: 0697394816

Anatomy and Physiology, 5th edition, by Seeley, Stephens, and Tate
Glencoe McGraw-Hill, 2000
ISBN: 007231351X

Synopsis of Human Anatomy and Physiology, De Graaf, Fox, and LaFleur by Seeley, Stephens,
and Tate
Glencoe McGraw-Hill, 1997
ISBN: 0697042960

Key Assignments

Evaluation of student performance is based on individual abilities, interests, and talents. Methods by which student progress is assessed will be through a variety and/or combination of methods. The methods available include but are not limited to the following:

- Projects
- Portfolios
- Quizzes, tests, and exams
- Student demonstrations
- Student performances
- Laboratory assignments and exams
- Student work samples
- Written Examinations

Instructional Methods and/or Strategies

Evaluation of student performance is based on individual abilities, interests, and talents. Methods by which student progress is assessed will be through a variety and/or combination of methods. The methods available include but are not limited to the following:

- Monthly review of work by education specialist (credentialed teacher)
- Portfolios
- Parent facilitator and education specialist observation
- Student demonstrations
- Student performances
- Student grades
- Student work samples
- Written Examinations
- Projects and Laboratory Assignments including virtual physiology lab CD-Rom tools and A.D.A.M. online (www.adam.com) supplemental activities

Assessment Methods and/or Tools

Evaluation of student performance is based on individual abilities, interests, and talents. Methods by which

student progress is assessed will be through a variety and/or combination of methods. The methods available include but are not limited to the following:

- Projects
- Portfolios
- Quizzes, tests, and exams
- Student demonstrations
- Student performances
- Laboratory assignments and exams
- Student work samples
- Written Examinations