

# **Human Structure and Function**

**Twin Falls High School**

**A/B Schedule**

2008-2009

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**TEXT** Hole's Essentials of Human Anatomy and Physiology by David Shier

## **COURSE DESCRIPTION:**

This course is designed to give students an understanding of the basic structure and functions of the human systems. Students preparing for health-related careers and those interested in studying the principles of biology using the human species as an example will find this course valuable. Demonstrations and experiments will be used to illustrate the principles and concepts of the course including the problems of disease, nutrition, heredity, pollutions and overpopulation. Independent literature and electronic research will be required.

## **LINKS TO STUDENT EXPECTATIONS:**

- All students will develop skills to utilize technology to gather, to evaluate, to assimilate and to present information
- All student will utilize critical thinking skills to identify and to provide resources to solve a problem
- All students will be able to make decisions and solve problems using logical processes (e.g. scientific method, induction, deduction etc)
- All students will develop skills to promote a sense of confidence in tackling the rigors of standardized tests

## **INTERDISCIPLINARY CONNECTIONS:**

Human Structure is a course of study directly related to the other natural sciences and derives its concepts from them. Students must use clear written and oral expression so it has a direct relationship to language skills. Data must be evaluated quantitatively, directly related to math. The human condition in social interactions is a direct result of human biology.

## **ESSENTIAL QUESTIONS FOR THE COURSE:**

- What is the basic organization of the human body?
- What is the structural integrity of the human body?
- How is movement accomplished in the human body?
- What coordinates and controls the human body?
- How are the functions of the human body integrated?
- How do humans reproduce?

## **OBJECTIVES FOR THE COURSE:**

### 1. Introduction to Human Anatomy and Physiology

- To define the various levels of structural organization in the human body.
- To identify the various fields of study related to the human body.
- To identify the aspects of the human body.
- To list and describe major characteristics of life.
- To identify the locations of major body cavities.
- To identify the major requirements of organisms.
- To identify major organ systems and understand general functions.
- To properly understand terms relating to body position, body section, and body regions.

### 2. Chemical Basis of Life

- To understand the cellular nature of the human body.
- To identify the structure and functions of the various human tissues.
- To identify the relationship between atoms and molecules.
- To identify three types of chemical reactions.
- To identify the major groups of inorganic chemicals common in cells.
- To comprehend how living material depends on the study of chemistry.

### 3. Cells

- To understand how cells differ from one another.
- To identify each type of cytoplasmic organelle and explain its function.
- To comprehend how the structure of a cell membrane makes possible its function.
- To describe the characteristics of composite cells.
- To identify the parts of the cell nucleus and understand its function.
- To comprehend the cell cycle.
- To explain how cells divide and the process of cell specialization.

### 4. Cellular Metabolism

- To identify the role of genes in cellular metabolism.
- To identify anabolism and catabolism.
- To explain how enzymes control metabolic reactions.
- To comprehend cellular respiration and describe how energy becomes available for cellular activity.
- To identify metabolic pathways-carbohydrates, lipids, and proteins.
- To explain DNA and RNA's functions.
- To identify and understand the basis of genetic information

### 5. Tissues

- To identify four major tissues types and understand where each occurs in the body.
- To identify general characteristics and functions of epithelial tissues.

- To identify types of epithelial tissues
- To explain how glands are classified
- To identify and describe types of connective tissue
- To identify three major types of muscle tissues
- To identify and describe characteristics and functions of nervous tissue.

#### 6. Skin and Integumentary System

- To identify four major types of membranes
- To describe the structure of the layers of the skin
- To identify general function of the skin
- To identify and describe the accessory organs associated with skin
- To understand how the skin regulates body temperature
- To identify the process of healing wounds

#### 7. Skeletal System

- To identify general bone structure and the functions of its parts
- To distinguish between intramembranous and endochondral bones
- To identify the names of each major part of the skeletal system
- To identify and locate major features of the bones that comprise the skeletal system
- To identify and describe the three classes of joints
- To identify six types of synovial joints

#### 8. Muscular System

- To identify muscular actions
- To identify major parts of skeletal muscle fiber and describe its function
- To understand oxygen debt and its relation to muscle fatigue
- To distinguish between a twitch and a sustained contraction
- To identify the types of muscular contractions
- To identify the difference between multiunit smooth muscle and a visceral smooth muscle
- To identify the location and action of the major skeletal muscles of each body region

#### 9. Nervous System

- To identify the two types of cells that comprise the nervous tissue
- To identify two major groups of nervous system organs
- To identify the general functions of the nervous system
- To identify the types and functions of neuroglial cells
- To identify the general structure of a neuron
- To explain how to classify neurons
- To understand and explain a nerve impulse
- To identify the pathway of neuron information transfer

- To identify how the nervous system processes information
- To identify the coverings of the brain and spinal cord
- To identify the major functions of the spinal cord, the brain, the peripheral nervous system, and the autonomic nervous system

#### 10. Somatic and Special Senses

- To identify the differences between somatic senses and special senses
- To identify and explain the functions of five kinds of receptors
- To identify receptors associated with touch, pressure, temperature, and pain.
- To identify how the sense of pain is produced
- To identify the relationship between the sense of smell and taste
- To identify the mechanism for smell and taste
- To identify the parts and functions of the ear
- To identify the parts and functions of the eye
- To understand how the eye refracts light

#### 11. Endocrine System

- To identify and name the functions of hormones
- To distinguish among paracrine and autocrine secretions, and endocrine and exocrine glands
- To compare and contrast the endocrine system with the nervous system
- To identify how the nervous system controls secretion
- To identify and describe the location of major endocrine glands and identify the hormones secreted
- To identify general functions of the endocrine glands
- To define and describe stress and its effect on the body

#### 12. Blood

- To identify general characteristics and major functions of blood
- To identify among the formed elements of the blood
- To identify the control of red blood cell production
- To identify the five types and functions of white blood cells
- To identify the components and functions of blood plasma
- To understand and define hemostasis
- To understand and explain blood typing and its importance

#### 13. Cardiovascular System

- To identify the organs and their functions in the cardiovascular system
- To identify and describe the location and functions of major components in the heart
- To identify and understand the cardiac cycle
- To identify parts of an ECG pattern
- To identify the major structures and functions of blood vessels
- To understand and explain how blood pressure is produced and controlled

- To compare the pulmonary and systemic circuits of the cardiovascular system
- To identify and locate the major arteries and veins of the pulmonary and systemic circuits

#### 14. Lymphatic System and Immunity

- To identify general functions of the lymphatic system
- To identify the major pathways of the lymphatic system
- To understand and describe the function of tissue fluid and lymph form
- To identify and describe the functions of a lymph node
- To understand and describe how the thymus and spleen function
- To identify six nonspecific body defense mechanisms
- To identify and explain how two major lymphocytes are formed and activated
- To identify major types of immunoglobulins
- To distinguish between primary and secondary immune responses
- To distinguish between active and passive immunity
- To identify the process and components in relation to the immune mechanisms

#### 15. Digestion and Nutrition

- To identify the general functions and major organs of the digestive system
- To identify general characteristics of the alimentary canal
- To identify the structures and functions of the mouth
- To identify different type of teeth and their functions
- To identify the parts of a tooth
- To identify and describe the functions of enzymes and glands secrete in the digestive organ
- To understand and describe how digestive secretions are regulated
- To identify and explain how products are digested and absorbed
- To identify major sources of carbohydrates, lipids, and proteins and how cells utilize them
- To identify the general function of vitamins
- To identify and describe major minerals and trace elements
- To understand and describe an adequate diet

#### 16. Respiratory System

- To identify the location of organs and general function of the respiratory system
- To understand and explain the mechanisms of inspiration and expiration
- To identify each of the lung volumes and respiratory capacities
- To identify various factors and functions that control breathing
- To identify and describe the structure and function of the respiratory membrane
- To understand and explain the process of air and blood exchange and how blood transports these gases

### 17. Urinary System

- To identify and describe the organs and general functions of the urinary system
- To identify the structure, location, and function of the kidneys
- To identify the pathway of blood through major vessels within the kidneys
- To identify and describe the function of a nephron
- To understand and identify the process and factors of urine formation
- To describe the structure of the ureters, urinary bladder, and the urethra
- To identify the process and control of micturition

### 18. Water, Electrolyte, and Acid-Base Balance

- To identify the importance of the of water and electrolyte balance
- To understand and describe the distribution of body fluids
- To identify the routes of water as it enters and exits the body
- To identify and explain electrolyte balance
- To identify the major sources of hydrogen ions in the body
- To identify the difference between strong and weak acids and bases
- To identify the cause and effect of elevation and decrease of body fluid pH

### 19. Reproductive System

- To identify the general functions and of the male and female reproductive systems
- To identify and describe the functions and parts of the male reproductive system
- To identify the pathway of sperm cells
- To identify the hormonal control of the male reproductive system
- To identify and describe the functions and parts of the female reproductive system
- To identify the process of spermatogenesis and oogenesis
- To identify the hormonal control of the female reproductive system
- To identify the menstrual cycle
- To identify the mammary gland
- To identify major methods of birth control
- To identify general symptoms of sexual transmitted diseases

### 20. Pregnancy, Growth, and Development

- To distinguish among growth and development and prenatal and postnatal periods
- To define pregnancy and identify the process of fertilization
- To identify the difference between an embryo and a fetus
- To identify the formation and function of the placenta
- To identify hormonal changes during pregnancy
- To identify the major events of the embryonic stage and fetal stage of development
- To explain the birth process and the hormonal role
- To identify and explain cardiovascular and physiological adjustments required of the newborn

## **GRADING PROCEDURES:**

Understanding the lecture material is important. You are responsible for this material and you will be tested on the information covered in the lectures and reading assignments. There will be exams. All exams can be cumulative, since anatomical systems interact with each other. The major emphasis in these exams will be the understanding of concepts concerning certain aspects of anatomy and physiology of the human body.

Homework	20%
Exams	50%
Lab quizzes	10%
Participation	10%
Projects	20%
Lab Work	10%

## **ASSIGNMENTS:**

There will be regularly assigned reading assignments and some type of exercise-either group or individual to reinforce concepts discussed in lecture. Lab will meet once per week every other week on the 3-day B week. Each lab will have written exercises for completion. The class will be divided into groups of 2-3 students for labs-each group is responsible for turning in ONE completed lab assignment.

The text has an interactive online learning environment [www.mhhe.com/biosci/ap/holeessentials/](http://www.mhhe.com/biosci/ap/holeessentials/). Select Student Resources and then Online Learning-go to the chapter you are working on and select "case study"-answer the questions and print a copy. Write a one paragraph summary of your findings and how it relates to what we have been learning. You will be responsible for accessing this site and completing the assigned case study online. This is also a great place to access sample tests, review questions and to just practice.

Each lab group will be responsible for creating either a web page or a PowerPoint presentation on one of the essential questions for this class. This should be done at the level that you are teaching your classmates about this topic. Each lab group or each student will also be assigned a multi-system disease or condition and will be expected to create a professional poster in accordance with the scientific guidelines. (See attached description and example)

## **COURSE SYLLABUS:**

The class will have a detailed syllabus or lecture outline. You can use this to take notes in class and to keep up with lectures and materials. It will be an outline format of what you need to know for exams and for mastery of the subject. A chapter study guide will be provided prior to exams which will focus your study on the important questions. I would suggest purchasing a

three-ring binder to keep this in...you can then add study guide, outside assignments and your labs to this for review.

## **LABORATORY:**

The laboratory exercises have been selected to allow each student to examine and learn the major structures of the human body. The course follows a system by system approach to human anatomy. You should prepare for each laboratory session prior to coming to the lab by reading the assigned chapter in the lab manual, studying illustrations and completing the assigned exercises.

There will be unscheduled, short lab quizzes to test understanding. If you come to lab prepared and participate fully with your group these quizzes will be straight forward. Each lab session will start with an introduction and demonstration if indicated. Following the introduction, you will get with your group and work together to complete the lab and ONE full and complete report. You will have the use of any of the models, skeletons, texts, slides, charts and visual aides to accomplish your task.

**ALL TEACHING MATERIAL IS TO STAY IN THE LABORATORY AT ALL TIMES. PLEASE EXERCISE CARE AND CONSIDERATION WHEN USING THESE EXPENSIVE TEACHING AIDES.**