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# Human Anatomy and Physiology

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**Prerequisites:** Biology, Chemistry I recommended  
**Level:** 11TH-12TH (10th with permission from instructor)  
**Credit:** 1.0

## Course Description

Anatomy and Physiology deals with the structure and function of the human body at a level appropriate for those preparing to enter a medically related field of study in college or those wishing to acquire a basic understanding of how the anatomical structures and physiological processes of the human body interact. The class begins with a review of some basic biological principles, such as body organization, cell structure, and genetic principles. Extensive studies of the major organ systems are covered for the majority of the course. The major professions of the health field are briefly discussed in relation to availability, appropriate colleges, etc.

## Course Objectives

Students will know and apply concepts that explain how humans function, adapt, and change.

Students will know the structural aspects of the cell and the functional aspects of cellular metabolism.

Students will know the structural and functional aspects of the various tissues of the body.

Students will know the structure and function of the various organs and organ systems of the human body.

Students will know some of the more common diseases or defects concerned with the various organs and organ systems of the human body.

## Course Outline

### 1. An Introduction to Anatomy and Physiology

Characteristics and maintenance of life.  
General organization of the human body.  
Anatomical Terminology

### 2. The Chemical Basis of Life

Structure of Matter  
The chemical constituents of cells.

### 3. Cells

Components and functions  
Movements through cell membranes.  
The cell cycles – mitosis/meiosis.  
Cellular metabolism  
Metabolic reactions and pathways.  
Nucleic acids and protein synthesis.

### 4. Tissues

Epithelial Tissues  
Connective Tissues  
Muscle Tissues  
Nervous Tissues

### 5. Skin and the Integumentary System

Membranes and Tissues  
Accessory Organs

6. Skeletal System

Bone structure, development and function.  
Skeletal organization: major parts of both the axial and appendicular skeleton.  
Joints

7. Muscular System

Structure, contraction, and response of skeletal muscle.  
Major skeletal muscles.

8. Nervous System

General functions and structures of the nervous system.  
Neurons, types of nerves, nerve pathways, and the central and peripheral nervous system.  
Dissection of a sheep brain.

9. Somatic and Special Senses

Somatic Senses  
Special Senses  
-Sense of hearing, smell, equilibrium, and sight.  
Dissection of sheep eye.

10. Endocrine System

Major structures of the endocrine system.  
Hormone regulation and secretions.

11. Blood

Red blood cells, white blood cells and platelets.  
Blood Plasma  
Blood groups and transfusions.  
Students will conduct procedures to identify their blood type(if possible).

12. Cardiovascular System

Structure and functions of the heart.  
Arteriole and venous system.  
Blood Pressure  
Dissection of a sheep heart.

13. Lymphatic System and Immunity

Structures and functions of the lymphatic system.  
Body defenses against infection.

14. Digestion and Nutrition

Structures and functions of the digestive system.  
Dissection of sheep gastrointestinal system.

15. Respiratory System

Structures and functions of the respiratory system.  
Breathing mechanisms  
Use of spirometer to determine respiratory air volume and capacities

16. Urinary System

Structures and functions of the urinary system.  
Urine formation  
Dissection of a sheep kidney.  
Students will conduct procedures to perform individual urinalysis.

17. Reproductive Systems and Pregnancy, Growth and Development.

Structures and functions of the male and female reproductive system.

Birth Control

Pregnancy

Dissection of a sheep uterus.

Dissection of a sheep testicle.

18. Dissection of the fetal pig

In groups of two, students develop in-depth fetal pig dissection techniques. Procedures and results are reported in a comprehensive, detailed laboratory report. This assignment is completed during the 4th quarter of each school year.

### **Teaching Methods**

This class is taught through lecture, study guides, projects, presentations, independent study, readings, videos, guest speakers, and field trips. Students are allowed to work together on selected projects and are given worksheets and handouts to supplement each unit.

### **Assessment**

Cooperative group presentations to be evaluated by teacher and/or peers according to rubric detailed with various desirable behaviors that contribute to a quality project.

Successful group discussing behavior will be evaluated by the teacher according to demonstration of skillful paraphrasing, intelligent questioning strategies, and evidence of respectful responses.

Oral presentations to be evaluated by the teacher and peers through accuracy of information and effective, accepted public speaking practices.

Tests and quizzes that include essay, short answer, multiple choice, matching, fill in the blank and true/false type questions.

Completion and level of participation in hands-on and dry laboratories.

Completion of daily work and participation in daily discussions.

### **Text(s)**

Shier, David., Jackie Butler, and Ricki Lewis. Hole's Essentials of Human Anatomy and Physiology. Boston, Massachusetts: WCB McGraw-Hill, 2003. 8Th Edition

### **Enrichment**

**Videos** – The Miracle of Life; Assignment Discovery An Inside Look: Heart Attack; Assignment Discovery An Inside Look: Broken Bones. Discovery: Ultimate Guide to the Human Body.

### **Field Trips**

Field Trips to the St. Louis University Practical Anatomy Laboratory:

Field trips involve 3-D presentations of actual human body parts by practicing physicians. Each presentation is approximately an hour. These presentations may be followed by guided dissections. Lectures may include the human heart, lungs, brain and eye.

The final field trip, usually taken in March/April, students will participate in a guided tour of a human cadaver. All of the major structures and physiological processes of the human body are discussed by medical students currently attending St. Louis University.

A fee is associated with all trips taken by the anatomy and physiology class.

### **Dissections**

Sheep brain, sheep eye, sheep heart, sheep gastrointestinal system, sheep kidney, sheep uterus, sheep testicle, and fetal pig.

### **Guest Speakers – May include, but are not limited to:**

A representative from the Department of Nutrition and Dietetics at Saint Louis University will discuss career options in nutrition and dietetics as well as nutrition and disease prevention and eating disorders.

Representatives from Southwestern Illinois College (SWIC) Allied Health Areas will discuss opportunities available in the Allied Health areas.

Jean Dietz, an instructor at SWIC and laboratory tech at St. Elizabeth's hospital in Belleville, will conduct a hands-on lab in the area of blood typing and urinalysis. If possible students will have a chance to determine their own blood types as well as perform simple diagnostic tests on their own urine.

Randolph County Deputy Coroner Randy Dudenbostel

A representative from BJC Health Care System will give a presentation using cadaver specimens to demonstrate the effects of alcohol and various drugs on the organs of the human body.

## **Job Shadowing**

Job shadowing opportunities are available for students seriously considering careers in a medical field.

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