

### ***BIO SCI 1953 Introduction to Human Anatomy and Physiology II (LEC 3.0)***

Second semester of a two-semester sequence of the study of the structure and function of human organ systems, including the endocrine, cardiovascular, lymphatic, respiratory, digestive, urinary and reproductive systems. Prerequisite: Bio Sci 1943.

Credit for Bio Sci 1953 can be obtained by completing the Human Body Systems course developed by Project Lead the Way in an accredited program. An "A" or "B" grade is required as well as a stanine score of 6 or higher for each class, and/or a raw score or equivalent. Missouri S&T trains teachers in this curriculum and performs program certifications.

Students explore concepts of biology and medicine. Students perform activities and projects introduce students to human physiology, basic biology, medicine, and research processes while allowing them to design their own experiments to solve problems. The course is organized about specific diseases that allow the introduction of basic information on biochemistry and physiology as appropriate. Communication is emphasized and the preparation of charts, PowerPoint presentations, or written and oral reports are required in each Unit. Work in groups is emphasized. Experimental design is incorporated into each Unit.

Outline of Curriculum (major exercises, activities and learning objects are indicated):

1. Identity
  - a. Overview of human body systems and functions
    - i. Tissues; histology
  - b. Skeletal system; model building
  - c. Forensic analysis: restriction analysis and gel electrophoresis
2. Communication
  - a. Brain structure and function; build brain model
  - b. Electrical communication between cells: action potentials
  - c. Membrane potentials
  - d. Endocrine system
    - i. Hormones; insulin; homeostasis
  - e. Special sensory organs
  - f. Visual system
3. Power
  - a. Chemical energy and nutrition
  - b. Digestive system
  - c. Enzymology
  - d. High energy organic phosphate molecules
  - e. Oxidative metabolism
  - f. Gas transport in the body
  - g. Renal function: water, pH, electrolyte balances; hormonal regulation
4. Movement
  - a. Skeletal system; joints
  - b. Muscles structure and function
  - c. Calcium and ATP roles in contraction
  - d. Nervous control of movement
  - e. Blood flow; circulatory system

- f. Cardiac output
  - g. Blood pressure
  - h. Exercise physiology: coordinated systems
  - i. Performance enhancing drugs
  - j. Muscle fatigue
5. Protection
- a. Skin structure and function
    - i. Protection, temperature regulation. Sensation, excretion, absorption
  - b. Pain perception
  - c. Bone structure and function
  - d. Osteoclast and osteoblast balance
  - e. Role of calcium
  - f. Lymph composition and function
  - g. Introduction to immune system
6. Homeostasis
- a. Organ system integration

### **Laboratory Techniques**

Model building (neuron; digestive system; urinary system, muscle group;  
heart; skin; bone; lymph )

Reaction times

Dissection (eye; kidney; elbow; bone)

Enzyme measurement; spectroscopy

Oxygen measurements in respiration

Spirometry – lung capacity

Kidney filtration rates

Muscle contraction *in vitro*

Cardiac rate; Doppler ultrasound; measure ankle brachial index