

BIO SCI 1943 Introduction to Human Anatomy and Physiology I (LEC 3.0)

First semester of a two-semester sequence dealing with the structure and function of human organ systems. Includes the study of cells, tissues, and the integumentary, skeletal, muscular and nervous systems. Prerequisite: Any high school or college Biology course.

Credit for Bio Sci 1943 can be obtained by completing the Principles of Biomedical Sciences curriculum offered 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. Human Body Systems
 - a. Body organization; body systems
 - b. Sources of information
 - c. Oral and poster presentations; prepare poster and concept maps
2. Heart Disease
 - a. Heart structure; dissection (sheep heart)
 - b. Cardiac function; measure blood pressure, heart rate and EKG (collect and analyze data)
 - c. Autonomic regulation of the heart
 - d. Blood as a tissue; composition and origin
3. Diabetes
 - a. Nutritional requirements
 - b. Biological chemistry; chemical bonds; molecular models
 - c. Biological macromolecules; build models of carbohydrates, proteins and lipids
 - d. Energy metabolism; calorimetry
 - e. Homeostatic regulation
 - f. Insulin
 - g. Enzymes; Lock and Key model; Induced fit model; co-enzymes
4. Sickle Cell Disease
 - a. Epidemiology
 - b. Oxygen transport
 - c. Chromosome and the chemical organization information molecules
 - d. General genetics introduction; pedigree charts
 - e. DNA structure (model building)
 - f. Genetic code; mutations; exons; introns; splicing
 - g. Proteins structure

- h. Karyotypes
- 5. Hypercholesterolemia
 - a. Cholesterol; HDL; LDL
 - b. Molecular Biological techniques: DNA amplification by polymerase chain reaction; restriction fragment length polymorphism; DNA separation by gel electrophoresis
- 6. Infectious Disease
 - a. Microbiology: bacteria and viruses
 - b. Gram staining; microscopy
 - c. Antibiotic effectiveness
 - d. Virus model
- 7. Medical Interventions
 - a. Pharmacology
 - b. Biomedical engineering
 - c. Drug development
- 8. Scientific Communications (Grant Proposal)
 - a. Grant proposal (NIH format)
 - b. Research
 - c. Oral and written presentation

Laboratory Techniques

PCR

Gel electrophoresis

Microscopy

Histological staining

Organ dissection

Cardiac function

Calorimetry

Data analysis: Excel

Scientific communications: PowerPoint; grants; reflections; lab notebooks