

### **BIO SCI 1982 Introduction to Biomedical Problems (LEC 3.0)**

Problem based learning approach to issues in medical science. Students will work in groups and individually to answer problems related to diagnostic testing and evaluation of diseases and other medical conditions. Prerequisite: Bio Sci 1953.

Credit for Bio Sci 1982 can be obtained by completing the Medical Interventions 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 follow the life of a fictitious family as they investigate how to prevent, diagnose, and treat disease. Students explore how to detect and fight infection; screen and evaluate the code in human DNA; evaluate cancer treatment options; and prevail when the organs of the body begin to fail. Through real-world cases, students are exposed to a range of interventions related to immunology, surgery, genetics, pharmacology, medical devices, and diagnostics.

Communication is emphasized and the preparation of charts, PowerPoint presentations, or written and oral reports is 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. Infection
  - a. Epidemiology
  - b. Genetic identification of pathogens
  - c. ELISA
  - d. Antibiotics; antibiotic resistance
  - e. Hearing loss
  - f. Cochlear implants
  - g. Vaccination
2. Genetic screening
  - a. Genetic counseling
  - b. Gene therapy
  - c. Reproductive e technology
3. Cancer
  - a. Epidemiology
  - b. DNA microarray
  - c. Gene organization
  - d. Cancer risk (skin; breast); cancer screening
  - e. Treatment options
  - f. Occupational therapy
  - g. Personalized medicine
4. Organ failure
  - a. Protein biosynthesis
    - i. Ribosomes, protein purification, electrophoresis

- b. Organ transplant; organ donors; tissue matching
- c. Tissue engineering

### **Laboratory Techniques**

ELISA  
DNA microarray  
Biofeedback (EEG)  
Serial dilutions  
Models: ear; plasmid; arm; protein  
DNA amplification  
DNA extraction, PCR, restriction analysis  
Histology of cancer and normal cells  
Effectiveness of UV blockers  
SNP profile analysis  
Plasmid transfection  
Column chromatography (protein purification)  
Blood matching