

**BIO SCI 1983 Introduction to Biological Design and Innovation (LAB 3.0)** Students will identify problems in biomedical sciences, and then design and implement innovative solutions using advanced techniques. Students will present and defend their proposals and results. Prerequisite: Bio Sci 1993.

Credit for Bio Sci 1983 can be obtained by completing the Biomedical Innovation 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 build on the knowledge and skills gained from previous courses to design innovative solutions for the most pressing health challenges of the 21st century. Students address topics ranging from public health and biomedical engineering to clinical medicine and physiology. They have the opportunity to work on an independent design project with a mentor or advisor from a university, medical facility, or research institution.

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. Emergency room design
2. Human Physiology
3. Medical Innovation
  - a. Design process
  - b. Marketing analysis
4. Environmental Health
  - a. Clean water considerations
  - b. Toxicology
5. Public Health Issue
  - a. Epidemiology considerations
  - b. Risk factors and biostatistics
6. Molecular Biology
  - a. Plasmid preparation
  - b. Restriction enzymes; ligation; selection

### **Laboratory Techniques**

Literature searches and critiques  
Gantt charts  
Biostatistics  
Prototype of novel medical product  
E coli assay in water samples  
PCR and gel electrophoresis to identify strains of bacteria  
Chemical assay of water contaminants (metals, N)  
plasmid isolation; gel electrophoresis; transformation

gene sequence analysis; homology searches