

Biomedical Innovation Syllabus

Course Description/Goals:

Biomedical Innovation offers students the opportunity to design innovative solutions for the health challenges of the 21st century. They work through progressively challenging open-ended problems, addressing topics such as clinical medicine, physiology, biomedical engineering, and public health. They have the opportunity to work on an independent research design project with a mentor from a university, medical facility, or research institution. An examination for BLS CPR, BACE and Microsoft Excel is required by the end of the course.

Course TEKS/Objectives:

Students are presented with each problem in a mission file, a case brief, a list of completion tasks, links to resources, and a reflection section. This information provides skills-based instruction in research and experimentation; tools students use to design innovative solutions to real-world problems. Students use what they learn in these missions as they develop and implement their independent project at the end of the year, culminating in the creation of a project portfolio. Students are encouraged to work with a mentor from the biomedical industry and present their work to an audience from the health care community.

<https://tea.texas.gov/academics/learning-support-and-programs/innovative-courses/pltw-biomedical-innovation.pdf>

Course Outline:

Semester 1	Semester 2
<ul style="list-style-type: none">• Design and execution of experimental investigations on one or more body systems	<ul style="list-style-type: none">• Analyze family health cluster tied to environmental exposures

- Use of variables, controls, data collection, statistical analysis, and presentation
- Critiquing scientific information from media vs. peer-reviewed literature
- Review of past interventions: devices, therapies, diagnostics in PLTW courses
- Guided fetal pig dissection to follow forensic autopsy procedures
- BLS CPR Certification Training
- Brainstorm new or improved biomedical innovations (device, drug, process, algorithm)
- Explore literature review, design process, and communication strategy
- Statistical data analysis with Microsoft Excel
- BACE prep: Medical terminology, anatomy & physiology review

- Test water samples for microbial contaminants (e.g., E. coli), isolate DNA, run PCR
- Explore toxicology—dose-response experiments using plant models
- Develop community action plan and health risk assessment
- Epidemiological analysis of outbreak case studies, symptoms, and demographic data
- Design study to test disease hypothesis and develop prevention/control strategies
- Draft mini-grant proposals (NIH style) addressing local, national, or global health issues
- Apply research design, experimentation, prototyping, or innovation