

# Medical Interventions Syllabus

## Course Description/Goals:

Medical Interventions allows students to investigate a variety of interventions involved in the prevention, diagnosis and treatment of disease as they follow the life of a fictitious family. The course is a “How-To” manual for maintaining overall health and homeostasis in the body. Students explore how to prevent and fight infection; screen and evaluate the code in human DNA; prevent, diagnose and treat cancer; and prevail when the organs of the body begin to fail. Through these scenarios, students are exposed to a range of interventions related to immunology, surgery, genetics, pharmacology, medical devices and diagnostics.

## Course TEKS/Objectives:

Students explore how to prevent and fight infection; screen and evaluate the code in our DNA; prevent, diagnose, and treat cancer; and prevail when the organs of the body begin to fail. A wide range of interventions related to immunology, surgery, genetics, pharmacology, medical devices, and diagnostics are explored in real-world, patient-centered scenarios. Interventions may range from simple diagnostic tests to treatment of complex diseases and disorders. Lifestyle choices and preventive measures are emphasized throughout the course as well as the role that scientific thinking and engineering design play in the development of interventions of the future. Students practice problem-solving with structured activities and progress to open-ended projects and problems that require them to develop planning, documentation, communication, and other professional skills.

<https://tea.texas.gov/academics/pltw-medical-interventions.pdf>

## Course Outline:

Semester 1	Semester 2
<ul style="list-style-type: none"><li>• Outbreak investigation and pathogen identification</li></ul>	<ul style="list-style-type: none"><li>• Cancer diagnostics: biopsy, imaging, tumor markers</li></ul>

- Diagnostic techniques: DNA sequencing and ELISA testing
- Antibiotic mechanisms & microbial resistance
- Vaccination development and design (e.g., paper plasmid vaccine model)
- Long-term sequela: hearing assessment and remediation
- Genetic testing and prenatal screening (e.g., amniocentesis, NIPT)
- Interpretation of genetic information and risk assessment
- Ethical considerations in gene therapy and reproductive decision-making
- Genetic counseling role play and policy discussions on emerging technologies

- Risk factors, prevention, and early detection strategies
- Treatment paths: surgery, chemotherapy, radiation, nanotechnology
- Design and testing of prosthetics and future cancer treatments
- Rehabilitation planning and innovation in biomedical engineering
- Biomanufacturing of therapeutic proteins (e.g., bacterial transformation to produce insulin/GFP, chromatography, electrophoresis)
- Dialysis fundamentals and design of support systems
- Organ transplantation protocols: donor ethics, rejection, surgical intervention
- Designing bionic devices and next-gen biomedical collaborations