MT. DIABLO UNIFIED SCHOOL DISTRICT
COURSE OF STUDY

COURSE TITLE:	**Medical Interventions**
COURSE NUMBER:	**002254**
CBEDS NUMBER:	**4245**
DEPARTMENT:	**CTE/Science**
LENGTH OF COURSE:	**One Year**
CREDITS PER SEMESTER:	**5**
GRADE LEVEL(S):	**Elective**

PREREQUISITES:
Required - Completion with a "C" or better in biology/PBS, chemistry, and HBS.
Recommended – N/A

BOARD OF EDUCATION ADOPTION: (Date of Action Meeting)

COURSE DESCRIPTION: This is the final class of the 3 year series investigating the integration of the body systems, health conditions and related careers. Students 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 PURPOSE: 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.

COURSE OUTLINE:

Unit 1: How to Fight Infection
In this unit students are introduced to Sue Smith, the eighteen-year-old daughter of Mr. and Mrs. Smith. Sue is a college freshman who is presenting symptoms of an unknown infectious disease which students eventually identify as bacterial meningitis. Sue survives the infection but is left with hearing impairment. Through this case students will explore the diagnostic process used to identify an unknown infection, the use of antibiotics as a treatment, how bacteria develop antibiotic resistance, how hearing impairment is assessed and treated, and how vaccinations are developed are used to prevent infection

Unit 2: How to Screen What is in Your Genes
In this unit students are introduced to Mr. and Mrs. Smith, Sue's parents. Mr. and Mrs. Smith are very excited to find out they are expecting a new baby. Because the couple is in their early 40s, the doctor has suggested genetic screening and testing. Through this case students will explore how to screen and evaluate the code in our DNA, the value of good prenatal care, and the future of genetic technology.

Unit 3: How to Conquer Cancer
In this unit students are introduced to Mike Smith, the sixteen-year-old son of Mr. and Mrs. Smith. Mike is diagnosed with osteosarcoma, a type of bone cancer that often affects teenagers. Mike's treatments put him into remission; however, in order to remove all of the cancerous tissue, he had to have most of his arm amputated. Mike now needs a prosthesis. Through this case students will explore the diagnostic process used to determine the presence of cancerous cells, the risk factors and prevention of cancer, rehabilitation after disease or injury, and the design process for new medications, prosthetics, and nanotechnology.

Unit 4: How to Prevail When Organs Fail
In this unit students are introduced to Mrs. Jones, the forty-four-year-old sister of Mrs. Smith. Mrs. Jones has been struggling with Type 1 Diabetes for twenty years. Over the years, Mrs. Jones did not take good care of herself or properly control her diabetes. She eventually began using an insulin pump and changed her lifestyle to regulate her blood sugar levels, but the damage had already been done. Mrs. Jones is now dealing with end stage renal failure and needs a kidney transplant. Through this case students will explore protein production, blood sugar regulation, dialysis, organ donation and transplantation, and non-invasive surgery techniques. In addition students will create a bionic human

For Lab Sciences Only

LABORATORY ACTIVITIES:

Laboratory Skills
• Aseptic technique
• Bacterial plating
• Micropipetting
• DNA extraction
• Restriction enzyme digest
• DNA gel electrophoresis
• Protein gel electrophoresis
• Hydrophobic Interaction Chromatography (HIC)
• Bacterial transformation

Clinical Skills
• Karyotyping
• Quantitative Enzyme-linked Immunosorbant Assay (ELISA) analysis
• Interpretation of audiograms
• Blood typing
• Tissue typing

KEY ASSIGNMENTS:
1. ELISA- finding patient zero in a meningitis outbreak
2. Building a bionic human research project and presentation
3. HOUSE-like project in which students are racing against the clock to diagnose kidney failure
4. Building a prosthetic arm and testing it for 2 functional tasks
5. Analyzing genes using PCR and electrophoresis
6. Informative PSAs about cancer, including presentation with information and possible treatment

INSTRUCTIONS METHODS and/or STRATEGIES:
- Project Based Learning
- Guided Inquiry projects
- Modeling

- Direct instruction (minimal)

ASSESSMENTS INCLUDING METHODS and/or TOOLS

- Project-based learning (Graded by rubric)
  - Cumulative unit presentations
  - Medical Innovations for real life medical phenomenon
- Unit exams
- End of Course Exam

INSTRUCTIONAL MATERIALS:

- Course laptops to allow for research and exploration of biomedical concepts
- Inspiration concept mapping tool
- Google Classroom/Edmodo
- PLTW Curriculum
- Equipment and Software Proficiencies
  - Microsoft Office (Excel, Word, PowerPoint)
  - Vernier probes and sensors
  - Data acquisition Software (Vernier Logger *Pro*)
  - Microscope
  - Thermal Cycler

For CTE Pathway:

This course is designed with an industry partner and to be scheduled in a course sequence as follows.

Industry Partner: PLTW

Sequence of Courses: Principles of Biomedical Science (Year One)
Human Body Systems (Year Two)
Medical Interventions (Year Three)

Committee Members:

1. Dylan Bland, PLTW Instructor

2. Marcus Thomas, PLTW Instructor

3. Al Douex, PLTW Instructor

4. Heather Fontanilla, Administrator, Career Pathways & Linked Learning

5. David Sauceda

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