



# Medical Interventions

Ms. Shnider- Periods 3 & 6

**Ms. Shnider will be available during REAL time and Lunches. See the schedules posted outside of Room 306 to find her!**

**Welcome to Medical Interventions! Wheaton High School is the only school in Montgomery County to be partnered with Project Lead the Way to offer this class. The equipment that you work with this year has been specially purchased so that we can experiment, research, and build scientific models together. This course builds upon the Principles of Biomedical Sciences and Human Body Systems courses that you have already taken. In the Medical Interventions course, you will investigate the variety of interventions involved in the prevention, diagnosis and treatment of disease as you follow the lives of a fictitious family. A “How-To” manual for maintaining overall health and homeostasis in the body, the course will explore how to prevent and fight infection, how to screen and evaluate the code in our DNA, how to prevent, diagnose and treat cancer, and how to prevail when the organs of the body begin to fail. Through these scenarios, you will be exposed to the wide range of interventions related to Immunology, Surgery, Genetics, Pharmacology, Medical Devices, and Diagnostics. Each family case scenario will introduce multiple types of interventions and will reinforce concepts learned in the previous two courses, as well as present new content. Interventions may range from simple diagnostic tests to treatment of complex diseases and disorders. These interventions will be showcased across the generations of the family and will provide a look at the past, present and future of biomedical science. Lifestyle choices and preventive measures are emphasized throughout the course as well as the important role scientific thinking and engineering design play in the development of interventions of the future.**

## **Responsibilities – What are my responsibilities as a student in this class?**

1. Always bring your binder, notebook and pencil to class. Upon occasion a calculator will be needed, so have one available.
2. Tardy by definition in this class is simply not being in your assigned seat when the tardy bell rings. You are to be seated before the tardy bell rings. This specifically means personal business should be tended to such as sharpening pencils prior to the tardy bell. Each tardy will earn you one lunch detention. Failure to show for a lunch detention will result in an after school detention.
3. Always work until the bell; never stand by the door waiting for the bell.
4. **Share clean-up responsibilities:** Sinks are not to be used to dispose of trash, including glass cover slips, paper towels, or anything else. Broken glass should be brought to my attention for proper disposal. If you need something, ask.
5. If you missed notes, labs, or an exam due to an absence it is your responsibility to get the missing information and schedule a completion time. Excused absences will be allowed the same amount of time you missed to make-up work before it is considered to be late. Do not skip class; it will hurt your grade.
6. Hats, cell phones, and other electronic devices are to be out of sight (this applies even if they are not being used!). Cell phones and all electronic devices are to be turned off (not on silent) during class. Violation of this school wide policy will result in the confiscation of your property. If this should occur you will have to deal with an administrator or security to retrieve your property.

## Rituals and Routines – What should I expect in my MI class?

A weekly agenda will be provided to you at the beginning of each week. Each class period will follow the format outlined below.

- A **warm-up** question/activity will start every class period to engage students in the content of class.
- **Homework check** occurs when students are working on the warm-up. Students are required to have the assignment and homework sheet on the desk when they come into class.
- **Read – Aloud** of text that will lead into the lesson.
- Review previous homework assignment. Explain new **homework assignment** and **refer to weekly agenda**.
- **Mini-lesson** on content.
- **Work period:** Project Work in small groups, laboratory Investigations, or oral presentations.
- **Closing: Summarizers** recap the content that was addressed during class & how it will relate to what is done the following day.

## Materials – What should I bring to MI class?

- Composition Notebook
- Scientific Science Notebook
- Jump Drive of 256MB or more (WHS computers do not read U3!)
- 2 inch binder with 2 packets of 5 dividers and notebook paper
  - Label dividers References, Unit 1, Unit 2, Unit 3, Unit 4
- Writing utensils and a calculator

## Assessment – How will I be graded in MI?

- 1) Each assignment will have a **due date** and a **deadline date**. The deadline will always be one week after the due date, unless otherwise noted. Any student, who turns in his /her work after the due date, will be penalized one letter grade. Assignments will not be accepted after the **deadline date**.
- 2) Cheating will not be tolerated. Plagiarism is cheating! Students will receive a score of zero for any assignment in which in the student has cheated. Just because you work with a partner does not mean that your answers are identical!
- 3) Quizzes may be announced or unannounced. Some quizzes may be re-taken once a student has shown that he/she has mastered the indicator. Unit exams or final exams will never be retaken.
- 4) Grades are posted on the web. Progress reports will be issued at three week intervals. Students are expected to keep all returned papers. In case of a grade discrepancy, the burden of proof rests entirely on the student! **Keep all papers!**
- 5) Students who fulfill the requirements of an assignment or exam will not receive any grade lower than 50%. However, students who do not complete the assignment will receive a zero and may not have the opportunity for a re-take or re-assessment.
- 6) Make-up Policy If you are absent, it is up to **you** to get the work and the assignments you have missed. The agenda for each class and the distributed materials are located in the **catch-up center**. For excused absences, you will have as many days to make up this work as the days that you missed.

### Summative Assessments 50%

- Projects and Laboratory Analyses
- Oral Presentations and some career journals

### Formative Assessments 40%

- Career Journal
- Assignments
- Notebooks
- Quizzes

### Homework 10%

### Grading Scale

100 - 90 = A

89 - 80 = B

79 - 70 = C

69 - 60 = D

59-0 = E

# Medical Interventions™ Course Overview

## **UNIT ONE:**

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 and used to prevent infection.

## **UNIT TWO:**

Students are introduced to Mr. and Mrs. Smith, the head of the Smith family. Mr. and Mrs. Smith are very excited because they just found 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 THREE:**

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; in order to remove all of the cancerous tissue, he had to have most of his arm amputated and he 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 FOUR:**

Students are introduced to Mrs. Jones, the forty-four-year-old sister of Mrs. Smith. Mrs. Jones has been struggling with Type 1 Diabetes Mellitus 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, non-invasive surgery techniques, as well as creation of a bionic human.

# Course Outline – Medical Interventions™

## Unit One: How to Fight Infection (45 Days)

### Lesson 1.1: The Mystery Infection (17 Days)

- Activity 1.1.1 - Medical Interventions Inventory
- Activity 1.1.2 - Investigating an Outbreak
- Problem 1.1.3 - Using DNA to Identify Pathogens
- Activity 1.1.4 - What's the Concentration? (**Optional**, additional 3 days)
- Activity 1.1.5 – ELISA
- Activity 1.1.6 - Final Diagnosis

### Lesson 1.2: Antibiotic Treatment (9 Days)

- Activity 1.2.1 - Antibiotic Therapy
- Project 1.2.2 - Attack of the Superbugs
- Activity 1.2.3 - When Antibiotics Fail

### Lesson 1.3: The Aftermath: Hearing Loss (10 Days)

- Activity 1.3.1 - Good Vibrations
- Activity 1.3.2 - Can You Hear Me Now?
- Activity 1.3.3 - Cochlear Implant Debate

### Lesson 1.4: Vaccination (9 Days)

- Activity 1.4.1 - Disease Prevention Through Vaccination
- Activity 1.4.2 - Vaccine Development
- Activity 1.4.3 - Life of An Epidemiologist

## Unit 2: How to Screen What Is In Your Genes (23 Days)

### Lesson 2.1: Genetic Testing and Screening (16 Days)

- Activity 2.1.1 - Chronicles of a Genetic Counselor
- Activity 2.1.2 - Copy Your Genes
- Activity 2.1.3 - Test Your Own Genes
- Activity 2.1.4 - Genetic Testing (**Optional**, 3 Days)
- Activity 2.1.5 - Maternal and Child Health

### Lesson 2.2: Our Genetic Future (7 Days)

- Activity 2.2.1 - Gene Therapy
- Activity 2.2.2 - Reproductive Technology

## Unit Three: How to Conquer Cancer (58 Days)

### Lesson 3.1: Detecting Cancer (15 Days)

- Activity 3.1.1 - Who is Affected by Cancer?
- Activity 3.1.2 - Diagnostic Imaging Career Activity
- Activity 3.1.3 - When Cells Lose Control
- Activity 3.1.4 - DNA Microarray
- Activity 3.1.5 - Unlocking the Secrets in Our Genes

### Lesson 3.2: Reducing Cancer Risk (17 Days)

Activity 3.2.1 - Am I at Risk?  
Project 3.2.2 - Skin Cancer Prevention  
Activity 3.2.3 - Breast Cancer Screening & Prevention  
Activity 3.2.3 – Breast Cancer Screening & Prevention with Electrophoresis (**Optional** –  
Alternative for Activity 3.2.3 Breast Cancer Screening & Prevention)  
Activity 3.2.4 - Virology Career Activity  
Activity 3.2.5 - Routine Screenings

### **Lesson 3.3: Treating Cancer (12 Days)**

Activity 3.3.1 - Diary of a Cancer Patient  
Project 3.3.2 - Biofeedback Therapy with EKG  
Project 3.3.2 – Biofeedback Therapy with Hand Grip Monitors (Alternative for Project  
3.3.2 Biofeedback Therapy with EKG)  
Project 3.3.3 - Design of a Prosthetic Arm  
Project 3.3.4 - Occupational and Physical Therapy Careers

### **Lesson 3.4: Building a Better Cancer Treatment (14 Days)**

Activity 3.4.1 - Personalized Medicine  
Activity 3.4.2 – Nanofuture  
Activity 3.4.3 - Clinical Trials  
Project 3.4.4 - Tiny Treatment

## **Unit Four: How to Prevail When Organs Fail (49 Days)**

### **Lesson 4.1: Manufacturing Human Proteins (20 Days)**

Activity 4.1.1 - All About Insulin  
Activity 4.1.2 - Protein Factories  
Activity 4.1.3 - Protein Purification  
Activity 4.1.4 - Protein Gel Electrophoresis  
Activity 4.1.5 - Careers in Biomanufacturing

### **Lesson 4.2: Organ Failure (3 Days)**

Activity 4.2.1 - Medical Detectives

### **Lesson 4.3: Transplant (15 Days)**

Activity 4.3.1 - Who Should Receive the Organ?  
Activity 4.3.2 - Finding a Match  
Activity 4.3.3 - Kidney Donation  
Activity 4.3.4 - You Be the Surgeon  
Activity 4.3.5 - Transplant Team  
Activity 4.3.6 - Are All Transplants the Same?

### **Lesson 4.4: Building a Better Body (11 Days)**

Activity 4.4.1 - Replacement Parts  
Problem 4.4.2 - The Bionic Human  
Activity 4.4.3 – Putting it all Together