



Biomedical Innovation

Ms. Gerhardt

1st and 3rd Periods - Room 302

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Ms. Gerhardt will be available for help Wednesday at lunch in 302 and any other time by appointment. My office is in the Media Center and I can always be reached by email.

Welcome to Biomedical Innovation (BI) Class! Wheaton High School is the only school in Montgomery County to be partnered with Project Lead the Way to offer this class. In this capstone course, students apply their knowledge and skills to answer questions or solve problems related to the biomedical sciences. Students design innovative solutions for the health challenges of the 21st century as 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 project and may work with a mentor or advisor from a university, hospital, physician's office, or industry. Throughout the course, students are expected to present their work to an adult audience that may include representatives from the local business and healthcare community.

These are the policies that we have created to make the most of the time that we have together and ensure our SUCCESS.

Responsibilities - What are my responsibilities as a student in this class?

1. Come Prepared and On Time

- Always have paper and pens/pencils available for use in class. Upon occasion a calculator will be needed, so have one available. Your notebook and binder should never leave the classroom.
- 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. Three tardies will result in one unexcused absence. Your tardy will be logged into the computer. If you have an excused pass, please bring it to my computer.
- If you missed notes, labs, or a quiz 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. **Any assignments not turned in by the deadline will receive a grade of zero and cannot be made up.**

2. Do Your Best, Every Day.

- Always work until the bell; never stand by the door waiting for the bell.
- **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.
- Hats, cell phones, and other electronic devices are to be out of sight. Cell phones are to be turned off all during class. Electronic devices are to be turned off during class time. Violation of this school wide policy could result in the confiscation of your property by a member of the security team. If this should occur you will have to deal with an administrator to retrieve your property.

Materials – What should I bring to BI class?

- Composition Notebook
- Scientific Science Notebook
- Jump Drive of 256MB or more
- 1 inch binder with 2 packets of 5 dividers and notebook paper
 - Label dividers Problem #1, Problem #2..... Problem #6, Independent Research, References
- Ruler and calculator
- Pencil, pen, highlighters

Assessment – How will I be graded in BI?

- 1) Each assignment will have a **due date** and a **deadline date**. 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 and will receive a score of zero**.
- 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. This includes all students involved in the situation. See Discipline Policy for further information.
- 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 Ed-Line. 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 or have not put effort into an 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. For excused absences, you will have as many days to make up this work as the days that you missed. All missed assignments resulting from unexcused absences will be considered late and receive a 10% penalty.

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

Biomedical Innovation Course Overview

Problem One: Design of an Effective Emergency Room

In this problem, students apply their knowledge of emergency medical careers, diagnostic testing and patient evaluation, human body systems, and medical interventions to analyze the workings of an emergency room and discuss inefficiencies that may hinder appropriate clinical care. Student teams will work collaboratively to design a more efficient emergency medicine delivery system. As students work through their designs, they will review research methods, practice effective presentation skills, and learn project management techniques.

Problem Two: Exploring Human Physiology

In this problem, students build upon what they know about the research process in order to design, conduct, and analyze an experimental study. Students will choose a question relating to one or more body systems that they are interested in studying and will work with a team to investigate and answer that question. As students work through the experimental process, they will review and expand what they know about experimental design, collection of data, statistical analysis of data, and the presentation of data.

Problem Three: Design of a Medical Innovation

In this problem, students review the diseases and disorders as well as the corresponding medical interventions they have investigated in the previous courses and propose a new or better medical device, pharmaceutical, surgical procedure, or genetic intervention. Students will work with a team to build a prototype, model, or schematic of the intervention as well as develop a marketing plan for the product. As students work through this problem, they will review the design process, complete a literature review, and further practice effective presentation skills.

Problem Four: Environmental Health

In this problem, students will explore how substances or chemicals in the environment impact human health. Students will investigate a disease cluster in a fictional family and assess the activities of the individuals for environmental risks. Students will test water samples for the presence of contaminants that could be detrimental to human health and use molecular biology techniques to identify specific microorganisms. Students will also design an experiment to test the effects of a particular chemical and doses of that chemical on plant growth. Students will then compile a comprehensive environmental health profile for their local area. They will use publicly available databases, as well as personal contacts and visits, to uncover possible sources of environmental contamination in the community and to assess risk and level of exposure to people, wildlife, and environmental resources.

Problem Five: Combating a Public Health Issue

In this problem, students draw on information they have learned in the previous courses about public health, epidemiology, and disease diagnosis to work through one of two epidemiology studies. In each study, students will analyze data to define the outbreak, generate a hypothesis by diagnosing the patients' symptoms and identifying the disease pathogen, design and analyze an epidemiological study to test the hypothesis, and outline a plan for initiating control and prevention measures. Students will then identify a local, national, or global public health crisis and write a mini-grant proposal, based on the National Institutes of Health grant structure, outlining a plan with intervention strategies. As students work through this problem, they will review evidence analysis, the design process, methodology, and analyze study data to evaluate risk.

Problem Seven: Forensic Autopsy (Optional)

In this problem, students will work as medical experts to work through mysterious deaths. First, as forensic pathologists, students will examine a fetal pig using the same protocol as a human autopsy, including examination of the tissues, organs, systems, and body fluids, and note any abnormalities. Second, students will draw on information they have learned in the previous courses about human body systems to design a fictional death. Students will showcase the clues left behind in the body and tell the story of how the person died through documents including an autopsy report, and medical history forms. Students will finally be tasked with solving another group's mystery.

Problem Eight: Independent Project

In this problem, students will work independently to determine an area of interest in the biomedical sciences and outline milestones in a long-term open-ended problem. Students will use skills learned in the previous courses as well as the previous problems to help them complete their project. Student work will include completing a literature review, writing and carrying out the methodology for their project, analyzing the results, making adjustments as needed, and finally presenting the results of their work to an adult audience. Students may work with mentors or advisors from a university, hospital, physician's office, or industry partner to help guide them as they complete their work.