

PLTW Medical Interventions and Biomedical Innovations Syllabus™

Hinzman/McCormick 2024-25 Course Syllabus

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COURSE DESCRIPTION: *The major topics covered in this course are infection, genetics, cancer, proteins, disease and cures, research, forensics, molecular biology, medical technologies, and laboratory skills. This class centers around the diagnosis, treatment, and prevention of disease with extensive discussions, laboratory work, projects, and presentations. This course is designed to promote students' preparation into the medical and medically related fields involving at least a four-year college degree.*

INSTRUCTIONAL PHILOSOPHY: *This course is based on an inquiry-driven scientific process. Laboratory activities are designed to teach major scientific concepts and scientific ways of thinking. Students are challenged to think logically, apply theory, and prerequisite course knowledge to solve medical problems. Entry-level laboratory and aseptic techniques are performed.*

ESSENTIAL STANDARDS:

Design an experiment that investigates a research question.

Collect and analyze data to draw conclusions.

Solve a problem using analytical and critical thinking.

Explain the value of diverse perspectives in the problem-solving process.

Explain how scientists increase scientific knowledge.

Select and use appropriate tools, technology, and/or software for experimental and clinical data collection and analysis.

Collect and analyze medical information to evaluate the cause, prevention, and treatment of disease.

Explain the structure and function of bacterial cells and how antibiotics work to disrupt their growth.

Describe how diagnostic tests are used to assess the health of an individual and/or indicate the presence of disease.

Explain the physiological processes associated with disease or injury.

Describe how medical interventions are used to improve health or alter the course of an illness.

Describe the applications of bioinformatics in health and wellness.

Explain how recombinant DNA technology allows scientists to custom-design bacteria that can produce a variety of important protein products.

Explain how single base pair changes, called single nucleotide polymorphisms (SNPs) can be identified through genetic testing and often correlate to specific diseases or traits.

Describe how genetic counseling can help a family understand the risks of having a child with a genetic disorder, as well as inheritance information about an already diagnosed condition.

Explain the education and skills required for biomedical science professionals.

Describe the societal impact of biomedical science professionals.

Apply professional standards, as they relate to the personal traits of a biomedical science professional.

Evaluate ethical and moral issues related to various medical interventions.

Communicate effectively with a specific audience.

Create an effective team environment to promote successful goal attainment.

MAJOR ASSIGNMENTS/PROJECTS for Medical Interventions:

- 1. Maintain a Properly Documented Laboratory Notebook*
- 2. Perform an Outbreak Investigation*
- 3. Conduct an Enzyme-Linked Immunosorbent Assay*
- 4. Perform Bacterial Conjugation Experiment*
- 5. Perform a Genetic Case Presentation*
- 6. Explore Technology Associated with Genetic Engineering*

7. Analyze your DNA for the Presence of SNP's
8. Determine the Genetic Causes of Cancer
9. Perform a DNA microarray analysis and correlate gene expression
10. Clone and Isolate a Protein

MAJOR ASSIGNMENTS/PROJECTS for Biomedical Innovation:

11. Perform an Autopsy on a newborn Pigs
12. Construct, Clone, Isolate and Characterized Recombinant DNA
13. Design and Conduct Research
14. Present Unique Research Findings
15. Test Water Quality and Determine a Community Action Plan
16. Design Innovations for the Delivery of Emergency Medicine

ASSESSMENT PLAN: Formative discussions will be used to identify whether students are attaining the essential learning targets. After each sub-topic the student will complete conclusion questions, after each topic the student completes a quiz. Summative assessments are given after units and projects. A comprehensive final is given at the end of the semester along with a National Standardized End of Course Exam in MI. In BI students use their prerequisite knowledge to solve a series of problems and projects. Daily assessments, self-assessment, quizzes, and tests are completed during and after the completion of Problems.

COLLEGE CREDIT OPPORTUNITIES: Offered to students completing MI and earning an EOC score of Accomplished or higher with a course grade of B or higher, and for BI students earning a course grade of B or higher is 3 college credit hours each from Missouri University of Science & Technology/Bio 1982: Introduction to Biomedical Problems and Bio 1983: Introduction to Biological Design and Innovation respectively. At UCM the college credit has the same grade and EOC requirements. This is the course combinations UCM gives credit for: Human Body System + Medical Interventions - BIOL 1510 (4 credit hrs)

GRADING POLICY: Grades will be calculated using the Summit Technology Academy-approved grading scale. Grades are cumulative throughout the semester. The grade in MI will be based on the following distribution: Tests 27%, Quizzes 18%, Lab Notebook 18%, EOC 13.5%, Final 10%, and Projects 13.5%. The grade in BI will be based on the following distribution: Tests, Projects, Lab Notebook 18%, Activity Assignments 13.5%, Independent Research 22.5%, and Final 10%. The following standardized grading scale is used for STA:

A = 95 -100	C = 73 - 76
A- = 90 - 94	C- = 70 - 72
B+ = 87 - 89	D+ = 67 - 69
B = 83 - 86	D = 63 - 66
B- = 80 - 82	D- = 60 - 62
C+ = 77 - 79	F = 59 & below (No Credit)

TUTORING/EXTRA HELP PLAN: STA utilizes a pyramid of interventions in order to ensure students successfully meet the course requirements. Tutoring or extra help can be obtained by contacting the STA teacher through email. The teacher and the student will agree on the arrangements.

ATTENDANCE POLICY: Regular attendance reflects dependability. The experience gained by students in the laboratory may not be duplicated in the event of absence. **Summit Technology Academy's policy may differ from that of the home school and will be in effect for the period of attendance at STA. Please reference the on-line student handbook for the most current policy at <http://sta.lsr7.org>.** Absences must be reported by school personnel, parents or guardians to STA by calling (816)986-3413. Andrea Bisogno is the attendance secretary at STA.

A student shall be allowed no more than nine (9) absences, excused or unexcused, per semester in any one class. A letter serves as notification of the number and type of absences by the student in each class. On the tenth (10) absence, in any one class, the student will not earn credit for that class. Students will have the opportunity to work with their

administrator or teacher to make up missed time prior to the end of the semester. A waiver to maintain full credit must be submitted by the end of the semester. This waiver form includes documentation of illness, funeral, or family emergency from a medical doctor, dentist, minister, or other official source. The waiver should be turned into the attendance office.

ELECTRONIC GRADEBOOK/PARENT CONNECT WEBSITE: Grades are updated on a weekly basis. The Parent Connect website address is <https://powerschool.lsr7.org/teachers/home.html>

ACADEMIC LETTERING: Students who have earned a 95% or higher in a STA program first semester and a 95% or higher grade at the time of the 5th grading period will receive the academic letter, also known as a Chenille letter.

EARNING A WHITE COAT: Students who have completed all 4 years of the PLTW Biomedical Science Program will earn a 'white coat.' Students will take the first two years of the program at their sending high school.

TARDY POLICY: Tardies will be issued according to the student handbook. Students are on time if they are seated in the classroom at the time of the bell.

DRIVING PRIVILEGES: Students are strongly encouraged to utilize bus transportation when provided. However, students are permitted to park on school premises with a valid STA or UCM (e.g. MIC students) parking permit. Student parking on-site is a privilege, and can be revoked.

Students parking/driving to STA without permission from their sending school and STA will be subject to disciplinary action. Parking permits may be revoked if a student is frequently tardy or late to school. (see tardy or late to school policies).

ADDENDUM TO COURSE SYLLABUS

ELECTRONICS POLICY: No electronics or headphones are allowed in the classroom unless being used in the educational process as directed by the instructor. Electronics should be placed in backpacks or purses and out of sight. Students are encouraged to interact and help one another when appropriate.

MATERIALS NEEDED: A lab journal will be supplied to you. Access to home internet is required. 1.5 to 2 inch 3 ring binder or notebook, black ultra fine point felt tip sharpie marker, and a black or blue ink pen.

ASSIGNMENT FORMAT: All assignments will be APA format. Assignments need to be typed and handed in according to instructions. Schoology platforms will be utilized. Lab journal data, labeling and execution will be handwritten.

TECHNOLOGY: Students are required to utilize technology for various assignments.

LATE WORK: Late work is discussed with the instructor. Professional standards require students to hand in assignments on time.

LAB WORK: Prior to being allowed to work in the lab the student is required to read the Summit Technology Lab Safety Guide. Afterward, the student is required to pass an exam on lab safety with a 80% or better. The parent and student are required to sign the Lab Safety Contract and the Working with Microorganisms Contract. Lab coats, goggles and gloves are supplied by the school. Students must wear appropriate personal protective equipment at all times in the lab. If students fail to wear appropriate clothing, per the lab safety contract, they will be asked to sit out of the lab and lose points from the lab. The lab is a BSL-1 lab and no food, drink, or makeup is allowed in the lab. No food products unless for laboratory use only can be stored in the lab. Any food products for laboratory use will be clearly marked. Appropriate aseptic techniques will be followed by the student and is a requirement of the class to know and remember.

SHADOWING/INTERNSHIPS: Students desiring to shadow in the lab must provide a negative TB skin test, an updated immunization record, fill out a background check form, and complete the required HIPAA/EMTALA training.