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| ***Course Description:*** | | **Principles of the Biomedical Sciences (PBS) PLTW**  This course introduces the biomedical sciences through exciting hands-on projects and problems. Students investigate concepts of biology and medicine as they explore health conditions including heart disease, diabetes, sickle-cell disease, hypercholesterolemia, and infectious diseases. They will determine the factors that led to the death of a fictional woman as they sequentially piece together evidence found in her medical history and her autopsy report. Students will investigate lifestyle choices and medical treatments that might have prolonged the woman’s life and demonstrate how the development of disease is related to changes in human body systems. The activities and projects introduce students to human physiology, basic biology, medicine, and research processes and allows students to design experiments to solve problems. Key biological concepts including maintenance of homeostasis in the body, metabolism, inheritance of traits, and defense against disease are embedded in the curriculum. This course is designed to provide an overview of all the courses in the biomedical sciences program and lay the scientific foundation for subsequent courses. All students are encouraged to actively participate in HOSA.  **Culminating Product:** Upon completion of this course, students will be prepared for further study in the PLTW Biomedical series and other health-related courses.  **Available Student Industry Credentials:** American Lifeguard Association Certification if age 15.  **Students are encouraged to participate in HOSA**, The HOSA-Future Healthcare Providers is our professional student organization, whose mission is to promote career opportunities in the healthcare industry and to enhance the delivery of quality healthcare to all people.  **Goals:** To introduce students to the healthcare system.  To assist students in making realistic career decisions.  To develop students’ leadership skills.  To prepare students for acceptance in postsecondary healthcare  education programs and /or employment in healthcare positions. | | |
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| ***Course Objectives:*** | **Unit 1: Medical Investigation -** In Unit 1 students engage in forensic science and medical examination investigations to explore biological and forensic science careers and gain experience in experimental design and data analysis. Through the investigation of a mysterious death, students learn about:   * Biomolecules and their role in determining identity * Human anatomy and physiology * Interconnectedness of systems   -Essential Questions:  1) What are different forms of evidence, how infallible are they, and how are they useful in resolving potential criminal cases?  2) How can varying forms of evidence be evaluated for meaning?  3) How does technology help bring resolution to forensic cases? Or how does technology advance the  understandings in forensic science?  4) How can the cause, mechanism, and manner of death be established?  5) What information can be collected from an autopsy?  6) How can information collected during an autopsy lead to an understanding of disease and/or cause of death?  7) In what ways are the careful evaluation of evidence and accurate recording of data critical to establishing legitimate testimony?  8) How can individual pieces of evidence, evaluated against the whole, be used to resolve questions?  9) In what ways can scientific writings and presentations be utilized to present evidence and justify conclusions?  10) To what extent can current understandings be reinforced through practice?  **Unit 2: Clinical Care -**Students assume the role of different medical professionals working through the schedule of patients in a family care clinic. Over the course of the unit, students:   * Explore medical careers * Practice professional communication * Gain experience collecting, recording, and interpreting physiological data * Learn how to perform routine medical tests and evaluate results   While “meeting” with patients, the interconnectedness between body systems is reinforced, and students explore the various causations and inheritance of disease. Students are exposed to cutting-edge technologies that are revolutionizing health care and will evaluate their impact.  -Essential Questions:  1) How can an individual’s health status be assessed and evaluated?  2) What factors make an individual more susceptible to disease?  3) What are strategies for maintaining health?  4) What are effective means of communicating with others in order to reach common goals?  5) What qualities make for an effective medical professional?  6) In what ways, and for what purpose, can patient confidentiality be maintained?  7) How can changes in a genome lead to disease?  8) Why is an understanding of heredity an important factor in human health?  9) In what ways are genetic changes acquired?  10) In what ways can altered biological processes lead to disease?  11) How can the genetic health of an individual be evaluated?  \*All Activities listed in the following table are considered formative assessments and will serve as to measure of student progress.  \*All Problems listing in the following table are considered summative assessments and will serve to measure student knowledge and skills related to Biomedical Science.  **Unit 3: Outbreaks and Emergencies (Weeks 1-7) -**Working as public health officials and then as emergency responders, students are presented a series of events they must address while exploring careers in epidemiology, public health, microbiology, and emergency medicine. Students have opportunities to develop their professional communication and presentation skills. Key skills highlighted include data analysis, medical decision-making, patient diagnosis, identification of agents of disease, first aid, triage, and strategies involved in disaster preparedness and response.  -Essential Questions:  1) In what ways, and for what purpose, can microorganisms be characterized?  2) What factors affect the growth and death of microorganisms?  3) What are effective strategies for preventing and treating disease?  4) How does an immune system identify and eradicate infection?  5) How can pieces of evidence be evaluated to form conclusions and inform decisions?  6) How can an individual’s health status be assessed and evaluated?  7) How is patient case information summarized and communicated efficiently?  8) What professions respond in emergency situations, what are their roles, and how do they work together?  9) What are several career paths in the field of emergency medicine?  10) How do patient vitals and presumptive diagnoses inform the prioritization for treatment options in emergency medical situations?  11) What make for effective emergency and disaster response protocols?  12) How do medical professionals manage emergencies that involve multiple patients?  13) To respond to emergency situations, what common medical resources and facilities need to be available?  14) What are features of a user-friendly app?  15) In what ways can technology enable a faster response and quicker resolution during medical emergencies?  **Unit 4: Innovation Inc. (Weeks 7-14) –**Welcome to PLTW Innovation, Inc., an incubator for innovation where some of the best minds in science and engineering endeavor to solve some of the world’s most pressing biomedical challenges. Students tour PLTW Innovation, Inc. labs and engage in experiences designed to build their engineering and experimental design process skills and to create solutions to current and emerging issues both on and off this earth. Students will build their computer science skills by using computer-aided design (CAD) and geographic information system (GIS) and unite these skills with their science and engineering experiences to innovate the future of medicine. This unit demonstrates that solutions to biomedical science problems rely on collaboration between professions.  -Essential Questions:  1) How do the engineering and experimental design processes enable innovation?  2) Who innovates, and why?  3) What is the process for innovation and what personal characteristics are required for success?  4) How do innovations impact and advance human health?  5) How does technology function as a vehicle for innovation?  6) In what ways do different types of scientists and engineers collaborate in the biomedical sciences field?  7) What are potential untapped resources that could work to advance the field of biomedical sciences? | | | |
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| ***Classroom Expectations:*** | | | Students must comply with the following expectations:  1. Be prepared, seated, and ready to work when the bell rings.  2. Do not enter the class until you are ready to stay in the classroom.  3. Future healthcare workers are polite and respectful to friends and faculty.  4. Handle lab equipment only when instructed by the teacher. Handle equipment with care.  **5. No eating, drinking or gum chewing in the classroom. Remember that this is a laboratory classroom. Leave your backpack and any other unnecessary supplies on the floor during class.**  6. Daily work must be made up within 3 days of the student’s return to class. Homework isdue at the start of class.  7.  **All assignments will be turned in on paper in class OR electronically through the assignment turn-in folder on schoology.**  8. If you are absent, it is your responsibility to check with the teacher for any missed work!!  **\*Course Final Exam and portfolio data will be collected to document content knowledge growth over the whole course.**  **Cheating:** Cheating will not be tolerated. The student is expected to complete his/her own work. If the student is caught cheating, he/she will be given an automatic “F” and **will NOT be given a chance to retake that assessment.**  **Homework/Classwork/Projects expectations:** Homework/Classwork consists of a variety of things including introduction to new material, practice opportunities, intervention, and remediation. When homework is assigned students are expected to do it! Homework is essential and provides information to students, parents, and teachers about the student’s progress.  Homework may be assigned several nights a week, depending on what is completed in class. Students should write homework in their planner daily. In addition, there may be group projects that will require time outside of class to complete.  All homework may be posted on the class website daily. Parents may check the website to see what homework was assigned and when it is due. Homework is due on the day assigned. It will be imperative that student’s complete homework on time and to the best of their abilities. If no homework is not assigned students are encouraged to study in class materials covered in class.  All work is expected to be completed on time and high quality. ***Late work will NOT be accepted***, except for excused absences on the date the assignment was assigned to the class.  8. Employability Skills- Students will receive a weekly professional evaluation grade. Examples of behaviors **not** appropriate for healthcare professionals which can lead to loss of points are:   1. talking during class 2. tardiness 3. lack of preparation 4. inappropriate dress 5. not attending class 6. All behavior not fitting a healthcare provider.   11. CELL PHONES MUST be in silent mode and placed in the cell phone holder!  12. IPads and personal computers may be used in class for note taking.  13. Obey all school rules (see student handbook).  14. Laboratory Investigations: Laboratory investigations will be throughout each lesson. Students will be given methods to design labs and rubrics for the grading of labs.  15. Portfolio: Students may be keep a hardy copy portfolio with class assignments, activities, and labs throughout the year. Student will be required to keep a digital portfolio for PBS including all handouts, notes, lab investigations, citations of research, activities and photos through Google Drive. This will be part of their semester final coursework category.  16. Tests: Tests will be given at the end of each unit. They will be a combination of multiple choice and written responses  17. Class Participation/Attendance: For excused absences work can be made up within 3 days of the absence. There will be folders with class assignments in schoology and the assignments covered for each day will be listed in the calendar on schoology.  Students are expected to participate in class discussions, group projects, and labs. | |
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| ***BJ Grading Policy:*** | | | | Students will be evaluated as follows:  Evaluation Criteria Method of Evaluation Percent  Daily Grades Clinical and Employability Skills, 30%  Quizzes, Worksheets, Oral  Presentations, Written Reports,  Review Questions, Lab participation  Tests/Projects Unit Tests/Projects 70%  A 90-100  B 80-89  C 70-79  D 65-69  F 0-64 |
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| ***BJ Make-up Test Policy:*** | | | | Make-up tests will only be given to a student who has an excused absence. The student must make arrangements with the teacher. Tests may be scheduled during Patriot Path or at 7:00 am or after school by appointment. |
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| ***Text and Other Required Reading:*** | | | | Project Lead the Way Online Curriculum  Other Supplemental Resources |
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| ***Materials and Supplies Needed:*** | | | | **White long sleeve lab coat with length to mid-thigh (more information to come)**  **2” 3-ring binder – This will be used throughout the PLTW Biomed courses**  The followingare provided IN THE CLASSROOM (virtual students may need to purchase these items for home use)  Spiral Notebook or Composition notebook  Colored Pencils or markers 8 dividers  Computer and internet access Scissors  Pencils or pens Calculator  Colored pencils Highlighters  Glue/ Glue stick |
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***Concerning laptop utilization:***

***1. Under no circumstances are student laptops to be wired to the network or have print capabilities.***

***2. No discs, flash drives, jump drives, or other USB devices will be allowed.***

***3. Neither the teacher, nor the school is responsible for broken, stolen, or lost laptops.***

***04. Laptops will be used at the individual discretion of the teacher.***

***Note:***

***1. The academic misconduct policy of the school will be followed in this course.***

***2. The attendance policy of the school will be followed for this course.***

***3. Any student who receives failing grades during this course is urged to discuss this with the teacher immediately.***

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| **Unit/Week** | **Content Covered** | **Assignment** | **Portfolio Requirements & Approximate Due Dates** |
| Unit 1: Medical Investigation | -Investigating a crimes scene  Analyzing crime scene evidence  -Types of witnesses  -Manners of death and persons of interest  -DNA structure and gel electrophoresis | -Lesson 1.1 Crime Scene Investigation and Analysis of crime scene evidence  -Activity 1.2 Autopsy, toxicology and histology  -Activity 1.3 Cracking the case  **-Summatives: Time of Death Lab, case report and End of Unit Test.** | -Activity 1.1.1-1.1.2 Crime Scene Sketch and witness reliability End of Week #2 |
| -Activity 1.1.3-1.1.4 Trace evidence and Blood Analysis End of Week #3 |
| Activity 1.1.5-1.1.6 DNA Evidence and Analysis End of Week #4 |
| Activity 1.1.7-1.2.1 Status Report-Autopsies End of Week #5 |
| Activity 1.2.2-1.2.3 Time of Death and Forensic Toxicology End of Week #6 |
| Activity 1.2.4-1.2.5 Histology and Gross Anatomy Examination End of Week #7 |
| Activity 1.2.6-1.3.1 Case closed and Crack the Case Report End of Week #8 |
| **End of Unit Test and Portfolio Check.** Beginning of week #9 |
| Unit 2: Clinical Care | -Patient Medical Histories and vital signs.  -Nutrition and Food Testing  -Diabetic Complications and Cell Transport  -Diabetes Treatment | -Lesson 2.1 Medical histories, clinical lab testing, telehealth, patient confidentiality, patient visits.  -Lesson 2.2 Cancer, inheritance, proteins and cell division.  -Lesson 2.3 New patient intake and diagnosis.  **-Summatives: patient visit design, family affair lab and End of Unit Test.** | -Activity 2.1.1 Building Medical History End of Week #9 |
| -Activity 2.1.2-2.1.3 Vital Signs and Routine testing in the office End of Week #10 |
| -Activity 2.1.4-2.1.5 Routine Testing in lab and telehealth End of Week #11 |
| **-** Activity 2.1.6-2.1.7 Patient privacy and Design a Visit End of Week #12 |
| **-** Activity 2.2.1-2.2.2 Bothersome bumps and Protein Problem End of Week #13 |
| **-** Activity 2.2.3-2.2.4 Inheritance Story and Clues in the Chromosomes End of Week #14 |
| - Activity 2.2.5-2.2.6 My. Oh Meiosis, A Family Affair End of Week #15 |
| - Activity 2.3.1 New Patient End of Week #16 |
| **-** **End of Unit Test and Portfolio Check** End of Week #16-17 |

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| **Unit/Week** | **Content Covered** | **Assignment** | **Portfolio Requirements & Approximate Due Dates** |
| Unit 3: Outbreaks and Emergencies | -Outbreaks and infectious agents that cause disease.  -Modes of transmission and evaluating evidence.  -Isolation and gram staining of bacteria  -Emergency response and protocols.  -User Friendly design, biotechnology | -Lesson 3.1 Outbreaks, Agents of Disease, Modes of transmission, Evidence evaluation, Isolation and gram staining of bacteria.  -Activity 3.2 Emergency response and protocols.  -Activity 3.3 Design protocols and biotechnology  **-Summatives: Mobile Care Facility, Grams Staining Lab and End of Unit Test.** | -Activity 3.1.1 Outbreak!! End of Week #1 |
| -Activity 3.1.2Agents of Disease End of Week #2 |
| Activity 3.1.3-3.1.4 Modes of Transmission and Evidence Evaluation End of Week #3 |
| Activity 3.1.5 Isolation End of Week #4 |
| Activity 3.1.5 Gram Staining End of Week #5 |
| Activity 3.1.7-3.2.1 Transmit the Tale and Survey and Assess End of Week #6 |
| Activity 3.2.2 Drug Delivery End of Week #7 |
| Activity 3.2.3 Control Bleeding End of Week #8 |
| Activity 3.2.4-3.2.5 Crisis Communication and Medical Surge End of Week #9 |
| Activity 3.2.6 Mobile Medical Facility End of Week #10 |
| Activity 3.3.1 User-centered Design End of Week #11 |
| Activity 3.2.2 Public Health Emergency Apps End of Week #12 |
| **End of Unit Test and Portfolio Check.** End of week #12 |
| Unit 4: Heart and Heart Disease | -Biotechnology  - Medical Innovation  -Drug designing  -Innovating for new frontiers | -Lesson 4.1 Device Lab  -Lesson 4.2 Regenerative Medicine and Health Promotion  -Lesson 4.3 Innovation Plans  **-Summatives: Under the Sea Lab, Drug Desgin, End of Unit Test** | -Activity 4.1.1-4.1.2 Open for Innovation and Device Lab End of Week #13 |
| -Activity 4.1.3-4.1.4 Regenerative Medicine and Health Promotion End of Week #14 |
| -Activity 4.1.5-4.1.6 Drug Design Lab and Innovation by Inspiration End of Week #15 |
| - Activity 4.2.1-4.2.2 Mapping Innovation and Under the Sea End of Week #16 |
| **-** Activity 4.2.3-4.2. Out of this World and New Frontiers End of Week #17 |
| **-** Activity 4.3.1 Pioneering the Future End of Week #18 |
| **-** **End of Unit Test and Portfolio Check** Beginning of Week #19 |

*I have read and understand the syllabus, particularly the requirements for make-up of classroom work, assignments and tests.*

*Student Signature: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Date:\_\_\_\_\_\_\_\_\_\_*

*Parent Signature:* \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ *Date: \_\_\_\_\_\_\_\_\_*

*Parent Contact Information*

*Parent to contact with classroom related issues:*

*\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*Please print name*

*Email: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*Please print*

*Home Phone: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*Best time of day to call*

*Cell Phone: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_*

*Best time of day to call*

*Does your child have internet access at home? \_\_\_ yes \_\_\_ no*

*Do you have a printer at home? \_\_\_yes \_\_\_ no*