PLTW Capstone CURRICULUM

Board Approved: [date]

Course Information

Course Description:
PLTW Capstone is a capstone course for students who are completing any of PLTW's high school programs. It is an open-ended research course in which students work in teams to design and develop an original solution to a well-defined and justified open-ended problem. Teams draw on the knowledge, skills, and interests of each member, as they perform research to select, define, and justify a problem. Given this collaboration, team members leave the course with a broadened skillset and an appreciation for learning from their peers. After carefully defining the design requirements and creating multiple solution approaches, student teams select an approach, create, and test or model their solution prototype. As they progress through the problem-solving process, students work closely with experts and continually hone their organizational, communication, and interpersonal skills, creative and problem-solving abilities, and their understanding of the integration of processes such as the design process, experimental design, and the software development process. At the conclusion of the course, teams present and defend their original solution to an outside panel. PLTW Capstone is appropriate for 12th grade students who are interested in any technical career path because the projects students work on can vary with student interest, and the curriculum focuses on collaborative problem solving and project management. Students should take PLTW Capstone as the final PLTW course, because it requires application of the knowledge and skills introduced during the PLTW foundation courses. This course is not designed to teach additional content, but to empower students to find resources—mentors, subject matter experts, research articles, peers, and teachers—to meet their needs, bolster their skills, and solve the problem they have selected.

Curriculum Standards: PLTW Capstone Standards Connection

Curriculum Resource(s):

PLTW High School
PLTW Capstone | Course Outline

The knowledge and skills students acquire throughout PLTW high school courses in computer science, engineering, and biomedical science come together in PLTW Capstone as student teams pool resources to identify an issue or problem of interest and then research, design, and test a solution, ultimately presenting their solution to a panel of professionals. Students work with their team, drawing on the strengths and skills of each member, as they prepare themselves for the interdisciplinary collaboration required for success in college and career.

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PLTW Capstone Course Subjects/Subject Areas

Innovation and Problem-solving
- Design Process
- Experimental Design
- Software Development Process
- Project Management
- Professional Documentation
- Technical Writing
- Ethical Reasoning
- Teamwork and Collaboration

Independent Problem Design and Execution
- Problem Identification and Justification
- Research
- Identification of Design Requirements
- Project Proposal
- Design, Prototyping, and Testing
- Design Review
- Presentation of the Process and Results

PLTW Capstone Course Structure

The structure of PLTW Capstone is aligned to the Engineering Design Process Portfolio Rubric. Students in this course are encouraged to format their portfolio according to the Components and Elements defined within that rubric.

Component 1. The Capstone Journey
This component introduces the course, provides a brief overview of the process to identify and solve an open-ended problem, and highlights a wealth of resources students will refer to as they progress through the year. Students review the elements of design and processes that assist with problem-solving. They explore tools of project management and learn how to organize their work in a course binder and portfolio. Students discover resources to help them network with industry professionals regarding their research and design, as well as how to build and present a professional presentation. As the culmination of this component, students have a chance to get to know their peers and collaborate across disciplines as they complete a mini design project.

Component 2. Problem Validation
This component requires students to identify a problem for which they will design a solution during the rest of the course. In the first lesson, students write a clear problem statement and validate the problem by documenting credible sources that indicate that the problem exists. Validation is carried out through research and input from experts and mentors. After their work is defined, students justify the problem with additional research to confirm that the expense and effort involved with solving the problem are warranted. Students will explore and analyze previous solution attempts. Based on their research, students create a testable design requirement, which they will use to explore possible solutions. Students will present a project proposal to ensure that the project is justified and they have explored all prior solution attempts.

- Element A. Identification and Justification of the Problem
- Element B. Documentation and Analysis of Previous Solution Attempts
- Element C. Presentation and Justification of Solution Requirements

Component 3. Solution Design
Based on the design requirements identified through research, students develop multiple solution possibilities. Through an evaluation process that involves feedback from experts and stakeholders and the application of a decision matrix or data-driven process, students select the best potential solution to pursue. Students will refine the final solution path and provide evidence that the selected solution is viable.

- Element D. Design Concept Generation, Analysis, and Selection
- Element E. Application of STEM Principles and Practices
- Element F. Consideration of Design Viability

Component 4. Prototyping and Testing
Students create a physical or virtual, testable prototype or model. To determine the effectiveness of the solution created, students devise an unbiased testing plan based on the defined design requirements.

- Element G. Construction of a Testable Prototype
- Element H. Prototype Testing and Data Collection Plan
- Element I. Testing, Data Collection, and Analysis

Component 5. Project and Process Evaluation
At this point in the design process, it is critical to seek and document feedback from all stakeholders. The student designers reflect on all design decisions and the analysis that was generated from the testing process. Then, the designers can begin to formulate next steps.

- Element J. Documentation of External Evaluation
- Element K. Reflection on the Design Project
- Element L. Presentation of Designer's Recommendations

Component 6. Design Presentation
At the conclusion of the design process, students present and defend their process and decision.

- Element M. Presentation of the Project Portfolio
- Element N. Technical Communication

Component 7. Beyond PLTW Capstone
After completing design work, students explore resources related to college and career readiness and success. Student opportunities include competitions, scholarships, university admission, and interest from business representatives to further develop the ideas created in PLTW Capstone classrooms.