PLTW 2004
Capstone
Course Syllabus 2024-2025

Course Description

The PLTW Capstone course is the culminating course in the PLTW high school engineering program. It is an open-ended engineering research course in which students work in teams to design and develop an original solution to a well-defined and justified open-ended problem by applying an engineering design process.

Students will perform research to select, define, and justify a problem. After carefully defining the design requirements and creating multiple solution approaches, teams of students select an approach, create, and test their solution prototype. Student teams will present and defend their original solution to an outside panel.

While progressing through the engineering design process, students will work closely with experts and will continually hone their organizational, communication and interpersonal skills, their creative and problem solving abilities, and their understanding of the design process.

Since the curriculum focuses on problem solving, PLTW Capstone is appropriate for students who are interested in any technical career path.This course carries a weighted grade.

Course Objectives

Students will:

1. demonstrate an ability to identify, formulate, and solve engineering problems.
2. demonstrate an ability to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social,political, ethical, health and safety,manufacturability, and sustainability.
3. demonstrate an ability to design and conduct experiments, as well as to analyze and interpret data.
4. demonstrate an ability to apply knowledge of mathematics, science,and engineering.
5. demonstrate an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
6. pursue the broad education necessary to understand the impact of engineering solutions in a global,economic, environmental, and societal context.
7. demonstrate an understanding of professional and ethical responsibility.
8. demonstrate an ability to function on multidisciplinary teams.
9. demonstrate an ability to communicate effectively.
10. gain knowledge of contemporary issues.
11. recognize the need for, and develop an ability to engage in life-long learning.

General Student Expectations

1. Come prepared. (pencil, engineering notebook, calculator, flash drive, etc.)
2. Be on time to class. (students will serve an hour detention for each tardy after 2)
3. Follow the school discipline code.- All NVHS/IPSD school policies apply to this class
4. Participate in classroom discussions in a positive manner.
5. Follow and use the lab and classroom rules.
6. **NO FOOD IS ALLOWED AT ANY TIME** (if we are meeting in the classroom)! Students with medical reasons requiring snacks must have documentation on file with the school and ALL SNACKS must be allergen free. Appropriate drinks are allowed and reusable containers are encouraged.
7. Students are not permitted to access the storage areas without instructor permission.

8. If necessary, discipline will include redirection, email home, phone call home, and/or referral to the dean.

Attendance

Consecutive attendance is crucial to the understanding of the course materials and students are expected to attend. It is the student's responsibility to obtain missed lecture notes, handouts, announcements, and assignments from the instructor, classmates, or the PLTW Learning Management System (LMS). For each excused absence, students will have an equal number of days to complete and submit their work.

Electronic Policy

Students may use electronic devices during class only as indicated by the instructor. Failure to follow instructions will result in forfeiture of device or disciplinary action.

Academic Honesty

Any student found cheating will receive a zero for the assignment/assessment. Examples of cheating include, but are not limited to, allowing another student to copy your work or showing another student your work before discussing it with them.

The increasing availability of AI presents both opportunities and challenges for academic work. This course acknowledges the potential benefits of AI to enhance the learning process while maintaining academic integrity. AI-generated work should not be presented as an original student product as this is plagiarism and is subject to the school's academic dishonesty policy.

Course Topics

Major focuses of the course are project management and professional skills required to successfully complete and document an engineering design process. Topics students will study and skills they will refine include:

Component 1 - The Capstone Journey

- What is PLTW Capstone?
- Mini-Design Project

Component 2 - Problem Validation

- 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

- 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

- 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

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

Component 6 – Reflection and Presenting the Design Process

- Element M – Presentation of Project Portfolio
- Element N – Technical Communication

Evaluation & Grading

The grading scale will follow the NVHS standard: A = 90-100%; B = 80-89%; C = 70-79%; D = 60-69%; F = <60%. All assignments, assessment and projects have the same weighting - there are no categories such as Assignments, Test, or Projects.

Late work will only be accepted through up to 4 calendar weeks (28 days) following the assigned due date. Ten percent will be deducted for each school day late work is submitted (up to 50%). Extra Credit is not part of the planned curriculum though opportunities may be added at the teacher's discretion.

Instructor Information

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Illinois Student Online Personal Protection Act

In 2019, Illinois passed the Illinois Student Online Personal Protection Act (SOPPA). SOPPA now requires that school districts and operators execute a data sharing agreement when sharing student information for digital products that are specifically created for k-12 use. This class utilizes a resource that does not fall under the SOPPA guidelines, meaning the product is created for post-secondary or professional audiences, thus a Data Privacy agreement is not in place between the district and operator. The resource utilized in this course has been reviewed and approved by our Curriculum and Instruction Department and Tech Services Department. If you have any questions you can email curriculum@ipsd.org.