

Engineering Capstone Honors

Department: Engineering

Department Chair: TBD

Credits: 1.0

Course Length: Full Year



Requirements:

Open to 12th grade students who have completed Introduction to Engineering, Principles of Engineering, and qualify for completion of the Engineering CTE program.

Course Description:

The knowledge and skills students acquire throughout the PLTW engineering program come together in this capstone course. Students will identify an issue and then research, design, and test a solution, ultimately presenting their solution to a panel of engineers. Students apply the professional skills they have developed to document a design process to standards, completing Engineering Design and Development ready to take on any post-secondary program or career.

Essential Questions:

- How can the Engineering Design Process be implemented to solve an everyday problem?
- Why is it crucial to use a design process when trying to solve complex problems?
- Why is teaming often more effective than individuals working alone when solving a complex problem?
- How might the public influence the need for solutions and their efficacy?

Related Frameworks/Competencies:

- PHS Learner Expectations ([Found on pg. 5 of the newest iteration of our Program of Studies](#))
- PLTW Capstone Project Course Framework

Course Outcomes/Power Standards:

Science and Engineering Practices

1. Asking questions and defining problems
2. Developing and using models

3. Planning and carrying out investigations
4. Analyzing and interpreting data
5. Using mathematics and computational thinking
6. Constructing explanations and designing solutions
7. Engaging in argument from evidence
8. Obtaining, evaluating, and communicating ideas

Crosscutting Concepts

1. Patterns
2. Cause and effect: Mechanism and explanation
3. Scale, proportion, and quantity
4. Systems and system models
5. Energy and matter: Flows, cycles, and conservation
6. Structure and function
7. Stability and change

Disciplinary Core Ideas

ETS1C: Optimizing the Design Solution

Course Expectations (Attendance, Participation, & Preparation):

Participation/Preparation for Class: In order for students to find success in science, students are expected to come prepared for class with their notebook/binder, charged Chromebook, pen/pencil, calculator, and any other supplies required for class. Completed homework is due at the beginning of class.

All students enrolled in a lab science course are required to review, sign and adhere to a lab safety contract. Students who violate this contract will be subject to disciplinary action.

Attendance: Students are expected to attend all classes and will have greater success in doing so.. Attendance will be taken each class. YOU are responsible for making arrangements to get notes, assignments, directions, or announcements for missed classes. YOU are also responsible for reaching out to the teacher to make up any missed lab work and/or assessments.

If an absence is deemed “unexcused” the student will not be allowed to make-up any graded classwork/quizzes/exams administered during the missed class. If you have ANY questions please see the classroom teacher and/or read the policy outlined in the most recent iterations of the Student Handbook.

Course Communication: Some methods for class communication will be through personal conversation, school email, Remind, and Google Classroom. The best way to contact the teacher is through email. Messages and/or assignments may be posted in Google Classroom. For this reason students should check Google Classroom regularly.

Course Incompletes: Incompletes are not common practice. In the event that an incomplete must be given the student, teacher, school counselor, and guardian(s) will collaboratively come up with a dated plan that outlines the necessary steps for course completion. If you have ANY questions please see the classroom teacher and/or read the policy outlined in the most recent iterations of the Student Handbook.

Electronic Devices: While students are allowed to possess cell phones in school, all cell phones must be placed in the designated, wall mounted phone pockets at the beginning of each period. *Students who do*

not "turn-in" a cell phone at the beginning of class and are found to have one on their person/in their possession will be subject to disciplinary consequences.

In the rare instance that a student requires access to their cell phone as indicated by a 504 plan, IEP (Individualized Education Program), or Multilingual Learner services. If you have ANY questions please see the classroom teacher and/or read the policy outlined in the most recent iterations of the PHS Student Handbook.

Academic Dishonesty: It is paramount that you do your own work; provide appropriate references to all assignments; and abide by the Portsmouth High School academic honesty policy. Students who violate this policy will be subject to disciplinary action. If you have ANY questions please see the classroom teacher and/or read the policy outlined in the most recent iterations of the PHS Student Handbook.

Grade Reporting: Grades will be entered into the ASPEN in a timely fashion. It is your responsibility to verify grades have been entered correctly. If you notice a discrepancy, and/or feel an error has been made, please speak with the teacher as soon as possible so that the issue might be resolved.

Make-up Exams: Make-ups due to absence must be scheduled on an individual basis with the teacher. Please see me ASAP if an exam has been missed so that next steps might be discussed. Due to issues relating to academic honesty and fairness the teacher reserves the right to administer a different style exam to students requiring make-ups.

Grading:

Total Points (100%)

Students are expected to take an active role in their learning. Formative work will include engineering notebook entries, completed portions of the group and class projects, completed capstone project elements, class presentations, and a final paper. The majority of the work conducted will be in small groups. It is important to remember that all assignments are crafted to help students learn the required content and skills of the course. Whether independently, with a partner or a group, it is the student's responsibility to be active in the learning process - completing all coursework with integrity. It is the student's responsibility to work hard, ask questions and get extra help when needed.

GRADING SCALE:

A+	96.5-100%	B	82.5-86.4%	C-	69.5-72.4%
A	92.5-96.4%	B-	79.5-82.4%	D	64.5-69.4%
A-	89.5-92.4%	C+	76.5-79.4%	F	< 64.5%
B+	86.5-89.4%	C	72.5-76.4%		

***** In order to receive credit for the course, you must pass with at least a "D"***

SCOPE & SEQUENCE

** Please note that the Scope & Sequence provided below outlines the closest representation of course topics and timelines. Depending on the circumstances of any given school year, the order and inclusion of these topics may be subject to change.*

Timeframe	Units of Study
Quarter 1	<ul style="list-style-type: none"> - Product Design Challenge - Small group - Catapult - class project
Quarter 2	<ul style="list-style-type: none"> - Capstone Intro <ul style="list-style-type: none"> - Defining the problem - Generating solutions
END OF SEMESTER ONE	
Quarter 3	<ul style="list-style-type: none"> - Capstone <ul style="list-style-type: none"> - Prototype construction and testing
Quarter 4	<ul style="list-style-type: none"> - Capstone completion <ul style="list-style-type: none"> - Report - presentation