



**Dutch Fork High School
Career & Technology Education
Engineering Design and Development
2023-2024 Course Syllabus**

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I. Course Catalog Description

Engineering Design and Development is a senior level course for all students that have completed all Project Lead the Way courses. It is an engineering research course in which students work in teams for research, design, and construct a solution to an open-ended engineering problem. Students apply principles developed in the four preceding courses and are guided by a community mentor. They must present progress reports, submit a final written research report and defend their solution to a panel of outside reviewers at the end of the course. Students must participate in three different review forums including the district science fair, Region Two Science Fair, and final juried presentation to the community. This curriculum, methods, and assessments indicate an increased depth of rigor, complexity, challenges, and creativity beyond the CP level course. This course is designed to accelerate, extend, and deepen the learning opportunities for students exhibiting superior ability. The curriculum places emphasis on critical and analytical thinking, rational decision making, and inductive and deductive reasoning.

II. Course Standards or Objectives

Standards may be requested from the teacher or accessed at
<https://www.pltw.org/our-programs/pltw-engineering-curriculum#curriculum-9>

III. Instructional Goals

The goal of this course is to teach the product development process including problem identification, research, product specification, design, build, and test their product. Students will then create a marketing and business plan and present it to a technical audience.

This senior-level course is highly recommended for those who are interested in engineering or technology-related fields. Students will learn about engineering professions through speakers, job shadowing, and field trips.

IV. Course Sequence/Pacing Overview

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

V. Textbooks and Additional Resources

The curriculum will be provided online at <https://my.pltw.org>.

Assignments and Instructional videos will be provided online through Google Classroom.

Students will need a 1” binder or 2-pocket folder, flash drive, pen, pencil, calculator, and graph paper.

Computer programs used in the course:

- Onshape CAD

- Google Suite

Videos used in the course:

- Students will watch a Nightline session regarding re-engineering a product –no rating.
- Students will watch the movie Flash of Genius- rating PG

VI. Course Grading Policies and Assessments

- A. Assessment rubrics are used for all graded assignments. Rubrics are available on the PLTW.org website or Google Classroom.
- B. Grade Calculations:
 - a. Major Assignments; 50%
 - b. Minor Assignments: 50%

Other Information

Employability portion of the grade covers

- **Attendance** – E-mail prior to being absent will not count against the employability grade. Late buses will also not apply.
- **Punctuality** – on time for class.
- **Attitude/Cooperation** – Doing what is asked the first time.
- **Teamwork** – Will work with every student at least once per quarter.
- **Integrity** – Student's word is the truth.
- **Timely** – Turns work in on time.
- **Prepared for Class** – has an engineering notebook and pen every class.
- **Respectful** – address teacher and classmates in a respectful way. Deals with conflict
- **Safety and General Housekeeping** – Dress is appropriate. Leaves class ready for the next one.
- **Self-Management/Initiative** – Starts work without being told. Shows self-control. Is where he/she belongs (no non-class websites or games.)

Each ½ quarter is assigned 20 points. An infraction is recorded by subtracting 2 points. The reason will be specified in a grading comment.

- C. Homework will only be assigned as needed to stay on track. **Homework itself is not for a grade but could impact the student's grade in regards to quizzes, tests, and completion of class projects.**
- D. It is the responsibility of the student to make up work missed during absences. Make-up assignments will be accepted within an established timeframe only in accordance with the amount of time missed. If a student has an issue with accessing an assignment, they must e-mail me regarding their issue during the time they were to do the assignment. At the teacher's discretion students who experience difficulty completing assignments or who did not demonstrate mastery in a content area will be given additional time to complete the assignment in a timely manner. Special arrangements must be made with me for individualized instruction or make-up assignments using the computer lab.

VII. Grading Procedures

Continuing in the 2023-24 school year, grades for minor assignments must be posted within 5 school days, and major or extended assignment grades must be posted within 10 school days.

- **Major Grades** - Assignments that students are given 2 or more classes (more than 48 hours) to produce or prepare. The following will be major grades in all content areas:
 - Test
 - Essay
 - Research paper
 - Speech/Presentation
 - Project
 - Cumulative Assignments
 - Summative Assignments
 - Lab Reports
- **Minor Grades** - Assignments that students are given 1 class (48 hours) to produce or on-the-spot work. The following will be minor assignments in all content areas:
 - Homework
 - Quiz
 - Vocabulary
 - Classwork
 - Formative Assessments
 - Journal Entries
 - Other department specific assignments

VIII. Exam Exemptions -

Seniors can exempt final exams in semester classes and yearlong classes if they meet the following conditions:

1. Grade of 80 or higher in the course.
2. Has not had an Out of School Suspension.

IX. Honor Code

In order to foster an environment of mutual trust and respect, we believe, within the community of School District Five of Lexington and Richland Counties, each individual should accept the personal responsibility to exhibit and promote academic and social integrity. *Students will not cheat or plagiarize.*

Plagiarism - All work must be properly cited (APA format). Any work found to be plagiarized will result in an immediate 0. Any questions regarding citations or plagiarism, please ask.

X. Suggestions for Success in Course

As a member of the PLTW EDD class, you have certain responsibilities that will enable you to learn the knowledge and skills that are taught.

1. You must attend class regularly. This class moves at a rapid pace with each new skill scaffolding to the next. You can easily fall behind. All makeup work must be made up in accordance with the Dutch Fork High School makeup policy.
2. To receive credit for the day's work:
 - a. You must do all assignments during class time.
 - b. All assignments must be stored on the student's Google drive to receive credit.

- c. All requested assignments must be printed out and turned in to the teacher by the end of the period. All assigned work not handed in at the end of the period will be averaged in as a zero.
3. It is your responsibility to obtain make-up work from the teacher.
4. It is the student's responsibility to work out a time with the teacher for all make-up tests.
5. You are responsible for listening to and following the teacher instructions and for asking questions when something is unclear.
6. Each student should be in his/her seat when the tardy bell rings-ready to begin work

CP

The content recovery program consists of a course-specific, skills-based learning opportunity for students who are still enrolled in a course who have not achieved mastery of course content that has already been addressed. Content recovery allows a student to retake a subset of a course, including a single unit, more than one unit, or other supplemental assignments/activities assigned and approved by a certified teacher as needed for the student to achieve mastery of the course content. Students who score a 60 or below will be eligible for content recovery **after every major test/project.**

The score for that major test/project may be changed by earning a passing grade through a teacher-made retake or other assessment at the teacher's discretion to measure content remediation. Students must show that they have completed all homework and reviews that lead up to the retake with at least 60% accuracy. Work leading up to the retake may be completed at home, but any test/project must be taken at school under supervision of the teacher or a designated tester arranged by the teacher. If the student passes the retake, that test/project score will be changed to a 60. If the student fails the retake, the higher of the two failing scores will be entered in the gradebook. There is only one retake per major test/project. The student has a **maximum of 10 school days** after the test/project is returned to complete the retake.

If a student continually needs to retake, the student and parent must conference with the teacher to determine a path for success on the first administration of the assignment. Parents are highly encouraged to monitor student grades on Parent Portal to ensure students complete the recovery within the allotted time period.

Honors/AP

The content recovery program consists of a course-specific, skills-based learning opportunity for students who are still enrolled in a course who have not achieved mastery of course content that has already been addressed. Content recovery allows a student to retake a subset of a course, including a single unit, more than one unit, or other supplemental assignments/activities assigned and approved by a certified teacher as needed for the student to achieve mastery of the course content. Students who score a 60 or below will be eligible for content recovery **for one major test/project each semester.**

The score for that major test/project may be changed by earning a passing grade through a teacher-made retake or other assessment at the teacher's discretion to measure content remediation. Students must show that they have completed all homework and reviews that lead up to the retake with at least 60% accuracy. Work leading up to the retake may be completed at home, but any test/project must be taken at school under supervision of the teacher or a designated tester arranged by the teacher. If the student passes the retake, that test/project score will be changed to a 60. If the student fails the retake, the higher of the two failing scores will be entered in the gradebook. The

student has a **maximum of 10 school days** after the test/project to complete the retake. Parents are highly encouraged to monitor student grades on Parent Portal to ensure students complete the recovery within the allotted time period.

****Remember- I want you to succeed, so talk to me if there is an issue I could help you overcome.****

XI. Classroom Management Plan

- A. **Cell Phones/Personal Computers** are not allowed during class. They cannot be charged during class.
- B. **Food:** No food or drink can be consumed during class.
- C. **Chromebook** may be used in class. Students are expected to bring a charged Chromebook, use them for classwork only, and follow all instructions. Non-compliance will result in their Chromebook being taken and then returned at the end of class.
- D. **Parent Opportunity to monitor student progress i.e.** parent portal
In addition to the parent portal, I will send printouts of student's grades to be signed and returned for a grade. Look for them every two weeks.
- E. **Summative Assessments:** Tests and exams ARE BASED ON FORMATIVE work but are given as a single attempt assessment.
- F. **10/10 Rule:** Nobody leaves class within 10 minutes of the start or end.
- G. **Public speaking** is an essential 21st Century communication skill. To help develop this skill each student will be required to present in the classroom setting. Students in each of the classes will present concepts they've learned and demonstrate projects that they have built to their peers and, possibly, school officials.
- H. Students are expected to follow all rules and guidelines listed in the [Student Handbook](#) on the school's website.
- I. Students are expected to use school and personal technology responsibly and follow rules included in the [22-23 District 5 Mobile Device Guide](#) and [Acceptable Use Agreement](#). This includes:
 - a. Having a charged mobile device (district-issued Chromebook or comparable personal device) at school EVERYDAY.
 - b. Not using devices assigned to other students.
 - c. Being responsible for their own devices and should keep them secured at school and off-campus.
 - d. Following all teacher directions regarding appropriate times for use of the device.

XII. Uniform Grading Scale

See [State Department of Education website](#) for complete details.

| 10 Point Grading Scale | | | | |
|--|--------------|------------------------|------------------|-----------------------------|
| South Carolina Uniform Grading Scale Conversions | | | | |
| Numerical Average | Letter Grade | College Prep Weighting | Honors Weighting | AP/IB/Dual Credit Weighting |
| 100 | A | 5.000 | 5.500 | 6.000 |
| 99 | A | 4.900 | 5.400 | 5.900 |
| 98 | A | 4.800 | 5.300 | 5.800 |
| 97 | A | 4.700 | 5.200 | 5.700 |
| 96 | A | 4.600 | 5.100 | 5.600 |
| 95 | A | 4.500 | 5.000 | 5.500 |

All report cards and transcripts will use numerical grades.

A=90-100; B=80-89; C=70-79; D=60-69; F=Below 60

Each final grade (numerical) will have different weighting for the basis of computing GPR. The chart included gives the weighting for each numerical value.

Extra weight is given to honors (.5) and AP (1.0) courses. This policy also establishes that courses may not be dropped after the fifth (5th) day in a semester class or after the tenth (10th) day in a yearly class without penalty.

Students may only retake a class at the same difficulty under the following conditions: Only a course in which a D or F was earned may be retaken.

The course must be retaken at the first opportunity within the next year. The student's record will reflect all courses taken and the grade earned, except for courses taken prior to the ninth grade.

XIII. Student/Teacher and Parent/Teacher Communication

- A. All students should use district issued email accounts for communicating with teachers (studentnumber@stu.lexrich5.org).
- B. All students should check school email, Google Classroom and Google Calendar every school day.
- C. Parents and students should check the teachers' websites for classroom calendars/assignment sheets.
- D. Parents may contact teachers via email in order to receive invitations to Google Classroom parent/guardian signup. Parents will receive an email from Google and then need to register to receive emails from Google Classroom. Once a parent is registered to receive emails from one class, he/she will receive emails from all Google Classroom groups. It is not necessary to contact all teachers to register.
- E. Emails and phone calls to teachers will be returned within two business days.
- F. Parents and students who would like access to the parent/student PowerSchool portals should visit the DFHS attendance office for login information.

XIV. School Attendance and Make-up Work Policy

Students are encouraged to attend school regularly. If, however, a student must be absent from school for any reason, it is his/her responsibility to make-up all missed work.

Students who miss more than one half of an instructional block will be marked absent for that block of instruction. See the Student Handbook on the school website for full attendance and absence policy.

Since it is in the student's best interest to make up all missed work as quickly as possible, the following guidelines have been established for make-up work:

- A. *When a student misses a class meeting*, all previously assigned work that was due the day of the absence is due no later than the beginning of the next class meeting in which the student is present. All work missed as a result of the absence is to be completed by the beginning of the second class meeting from the absence.

- B. *When a student misses two consecutive class meetings*, all previously assigned work due while the student was absent and all work missed as a result of the absence should be completed by the beginning of the second class meeting from the absence.
- C. *When a student misses three or more consecutive class meetings*, he/she must make specific arrangements for make-up work with each teacher the day he/she returns to class. The amount of time given for completion of work will be up to the teacher's discretion based on the amount of work missed and the level of difficulty of the material.
- D. Long term projects and papers are due when the teacher says they are due. In the event of an absence, the student or the student's parent should notify the teacher in advance or upon immediate return to school.
- E. Students are responsible for the work they miss while on a field trip or attending any other school event. Students should contact each of the teachers whose classes they will be missing to make specific arrangements with them regarding all make-up work. Teachers may choose for work to be submitted in advance. If the student does not follow the teacher's guidelines, the student will receive the academic penalty as assigned by the teacher.
- F. Students must make every effort to complete all make-up work according to these established guidelines. If the student has not submitted his/her make-up work within the specified timeframes outlined above or as directed by the teacher, the teacher has the option of not accepting the work. As with anything, regular communication with the teacher is encouraged.

XV. Syllabus Acknowledgement and Information Form

Your syllabus acknowledgment may be done online via this link [Parent Acknowledgement Form](#).