



Engineering Design and Development HN 2021 - 2022



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Prerequisites: IED, POE, CEA or AE
Credit: 1

I. Course Description

Engineering Design and Development is the final course in a five-course sequence program developed by Project Lead the Way (PLTW). It is an engineering research course in which students work in teams to 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 report and defend their solutions to a panel of outside reviewers at the end of the school year.

Course Standards

Standards can be found at:

<http://ed.sc.gov/instruction/career-and-technology-education/programs-and-courses/career-clusters/science-technology-engineering-and-mathematics/>

Additional information about PLTW can be found at: <https://www.pltw.org/our-programs/pltw-engineering>

II. 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.

III. Fees & Explanation

A fee of \$50 is assessed for instructional materials for classroom use.

IV. Textbook, Supplemental Materials, and Supplemental Reading(s)

There are no textbooks for this course. Students will be using Google Classroom and the PLTW website to access the course material. Assignments will be turned in through Google Classroom.

V. Other Requirements

Chromebook expectation: Each student is expected to bring their Chromebook each day.

Students will need to also have these items present each day.

- Basic Scientific Calculator
- Mechanical pencils, erasers, blue/black pens
- Project materials will vary by project.
- Engineering Notebook (will be given to each student)
- Students will watch the movies Apollo 13 and Flash of Genius- rating PG

VI. Major Curricular Topics / Instructional Organization

- Component 0: Project Management
 - Component 1: Researching a Problem
 - Component 2: Design a Solution
 - Component 3: Creating a Prototype and Testing Plan
 - Component 4: Evaluation and Reflection on the Design Process
 - Component 5: Presentation of the Design Process
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- First quarter students will determine the problem they wish to solve and present a 3-minute proposal in a “shark tank” like environment.
 - Second quarter will require students to complete a grant proposal application to seek funding from the D5 Education Foundation for the prototype and testing materials.
 - Third quarter, students will design, build and test their prototypes. Students will also create a tri-fold presentation poster of project progress to be juried by peers, instructors and experts in the field. They will participate in the District 5, Region II, and SC Junior Academy of Science (SC JAS) science and engineering fairs.
 - Fourth quarter will require a final presentation of the project to an expert panel.

VII. Course Grading Policies, Assessments, & Procedures

To access grades, attendance, and other information regarding your student, go to Lexington Richland District Five website and login to the PowerSchool Parent Portal.

Assessments/Grading: Types of assessments to be used:

- Uniform Grading Policy
 - A= 90-100; B= 80-89; C= 70-79; D= 60-69; F= Below 60
 - Semester 1 = Quarter 1 (40%) + Quarter 2 (40%) + Midterm Exam/Project (20%)
 - Semester 2 = Quarter 3 (40%) + Quarter 4 (40%) + Final Exam/Project (20%)
 - Final = Semester 1 (50%) + Semester 2 (50%)
 - Quarter Grade Weights
 - Formative Work: 30% (HW, practice quizzes, classwork, and practice presentations)
 - Summative Assessments: 40% (quiz, exams, and final presentations)
 - Employability: 20%
 - Parent Communication: 10% (Grade sheets, emails, etc.)
- **Formative Work:** A practice quiz regarding the formative work will be provided. Students will have multiple attempts to achieve 100.
- **Summative Assessments:** Quizzes and exams ARE BASED ON FORMATIVE work but are given as a single attempt assessment.
 - **Rubrics** are available on the Project Lead the Way website or Google Classroom. Rubrics will vary depending on the assignment to be assessed.
- **Employability** portion of the grade covers:
 - **Attendance** – Email prior to being absent will not count against the employability grade. Late buses will also not apply. In order to be eligible to receive credit for this course, the student must meet the attendance requirement as set by the State of South Carolina.
 - **Punctuality** – on time from class. Returns from breaks on time.
 - **Attitude/Cooperation** – Doing what is asked the first time.

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- **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 the teacher and classmates in a respectful way. Students deal with conflict in an appropriate manner.
- **Safety and General Housekeeping** – Dress is appropriate and follows the student handbook guidelines. 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 1 point. Assignments marked late will result in a loss of 1 point. For example: Student not emailing before being absent, or any of the other listed objects will also result in the loss of 1 point. A comment to the employability grade will be present for points lost other than late work.
- **Parent Communication:** Approximately every 3-weeks grade sheets should be reviewed by parents with their students. An email, google form, or physical paper report will be sent home for a signature that indicates you have reviewed Powerschool regarding your student’s grades. An assignment with “0” *indicates a student was absent and can make up the work without penalty.* Work turned in late will be given credit but will be marked late, resulting in a reduction of the employability grade. Please contact me if you have concerns throughout the course.

Additional Information:

- **Makeup Work:** It is the responsibility of the student to make up work missed during absences. Assignments are posted on Google Classroom and shown on the agenda. If a student has an issue with accessing an assignment, they must e-mail or leave a phone message regarding their issue during the time they were to do the assignment.
- **Plagiarism** assessment (see student handbook)
- **Cell Phones** cannot be charged during class. Cell phones may only be used with teacher’s permission.
- **Food:** No food or drink can be consumed during class. Water with a resealable cap may be consumed. A small package of crackers or a small bag of chips is acceptable as a snack.
- **20/20 Rule:** Nobody leaves class within 20 minutes of the start, or end of class.
- **Participation:** Students are expected to participate in class activities and prepare all assignments in a business-like manner.
 - **Teams:** Assignment grades are largely determined by the team’s and team member’s effort and completion. Students are encouraged to choose a team that will work toward academic success as well as good team dynamics.
 - **Homework:** Students will have homework and also need to work with their team partners outside of class-time to meet deadlines. This can be done virtually.

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- **Public speaking** is an essential 21st Century communication skill. To help develop this skill each student will be required to present projects during class, competitions, and other events.
 - **Important Dates** –Students are required to participate in these presentation events.
 - **October 6, 2021 - Piranha Pond (Virtual Evening Event)**
 - **January 26, 2022 - Poster Symposium Presentations (TBD Evening Event)**
 - **TBD – End of January - D5 Educational Foundation – Grant Recipient Award Night (if awarded)**
 - **TBD - District 5 Engineering and Science Fair (morning)**
 - **TBD – Mid-March 2021 USC Region II Science and Engineering Fair (usually afternoon to evening)**
 - **TBD – Typically, End of March 2021 South Carolina Junior Academy of Science (SCJAS) (Usually most of the day)**
 - **May 16, 2022 - EDD Final Presentations and Engineering Program Recognitions (TBD Evening Event)**
 - Due to Covid-19 – Some of these events may be planned virtually.
 - TBD Dates – students will receive dates with approximately 1 months’ advance notice. Exception may be the D5 Grant Recipient Award Presentation.
 - Missing a Required Presentation Event – Students have the opportunity to make-up by:
 - Students will need to arrange for three judges, 21 years of age or older, who are not immediate family members. One member of which will need to come from a higher learning institution. Depending on COVID-19 restrictions, the presentation may be in-person or online. The time and date will have to be approved by me so that I may attend and witness the presentation and should be within 1 week of the originally scheduled date. Online evaluation forms will be made available for the judges.
 - If this is not possible, then the student can write a 2500-word technical paper on a topic chosen from a list given by the instructor. This will result in a maximum score of a 70 for the assignment and will be due within 2 weeks of the original missed presentation date.
- **Final Technical Report** is due during the Final Exam week and cannot be exempted.

VIII. Honor Code

In order to foster an environment of mutual trust & respect, we believe, within the community of School District 5 of Lexington & Richland counties, each individual should accept the personal responsibility to exhibit & promote academic & social integrity. The Academic Honesty Policy is being implemented to ensure that students submit credible work that is evident of their content mastery. Students should be totally honest in their dealings with others. They should complete their own work and be evaluated based upon its originality. They should avoid academic dishonesty and misconduct in all its forms, including plagiarism, fabrication or falsification, cheating, and other academic misconduct.