

Curriculum at a Glance

Project Lead The Way-Engineering Design and Development

Grade 12

Engineering Design and Development (EDD) is the capstone 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. Engineering Design and Development is a high school level course that is appropriate for 12th grade students. Since the projects on which students work can vary with student interest and the curriculum focuses on problem solving, EDD is appropriate for students who are interested in any technical career path. EDD should be taken as the final capstone PLTW course since it requires application of the knowledge and skills introduced during the PLTW foundation courses.

Unit Description	Content and/or Skills
Unit 1: Project Management	Topics student will study and skills they will refine are: (α) – The EDD Design Process and Project Management (β) – Documenting the Engineering Design Process (γ) – Teams, Timelines, and Contacting Experts (δ) – Project Evaluations and Classroom Management (ϵ) – Intellectual Property
Unit 2: Research	<ul style="list-style-type: none">• Students will identify a problem for which they will design a solution during the remainder of the course.• Students will write a clear problem statement and validate the problem by documenting

	<p>credible sources that indicate that the problem exists. Validation is carried out through research and input from experts and mentors.</p> <ul style="list-style-type: none"> ● Students are asked to perform additional research in order to justify the problem by confirming that the expense and effort involved with solving the problem is warranted based on need and cost. Students will explore and analyze prior solution attempts. Based on their research, student will create a testable design requirement which will be used to explore possible solutions. ● Students will present a project proposal to ensure the project is justified and that all prior solution attempts have been explored. <ul style="list-style-type: none"> ○ Element A – Identification and Justification of the Problem ○ Element B – Documentation and Analysis of Prior Solution Attempts ○ Element C – Presentation and Justification of Solution Requirements
Unit 3: Design	<ul style="list-style-type: none"> ● 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 will select the best potential solution to pursue. ● Students will refine the final selected solution path and provide evidence that the solution selected is viable. <ul style="list-style-type: none"> ○ Element D – Design Concept Generation, Analysis, and Selection ○ Element E – Application of STEM Principles and Practices ○ Element F – Consideration of Design Viability
Unit 4: Prototype and Test	<ul style="list-style-type: none"> ● Students will create a testable prototype and an unbiased testing plan based on the defined design requirements to determine the effectiveness of the solution created. <ul style="list-style-type: none"> ○ Element G – Construction of a Testable Prototype ○ Element H – Prototype Testing and Data Collection Plan ○ Element I – Testing, Data Collection, and Analysis
Unit 5: Evaluation of Project and Process	<ul style="list-style-type: none"> ● At this point in the design process, it is critical to seek and document feedback from all stakeholders. ● The designer(s) should reflect on all design decisions and the analysis that was generated from the testing process. Finally, the designer(s) can begin to formulate next steps. <ul style="list-style-type: none"> ○ Element J – Documentation of External Evaluation

	<ul style="list-style-type: none"> ○ Element K – Reflection on the Design Project ○ Element L – Presentation of Designer’s Recommendations
<p>Unit 6: Reflection and Presenting the Design Process</p>	<ul style="list-style-type: none"> ● At the conclusion of the design process, students will be asked to present and defend the process and decision. <ul style="list-style-type: none"> ○ Element M – Presentation of the Project and Project Portfolio ○ Element N – Writing Like an Engineer
<p>Unit 7: Going Beyond EDD</p>	<ul style="list-style-type: none"> ● Many opportunities exist for students to receive tangible value for their work beyond the classroom walls. ● These opportunities range from competitions, scholarships, and university admission notoriety, to ● interest from business representatives to further develop the ideas created in EDD classrooms. ● This section of the curriculum is dedicated to providing resources, examples, and suggestions for ● helping your students obtain tangible value for their work. Below you will find examples of ● student success stories related to College Recognition, Competitions, and Business Opportunities. <ul style="list-style-type: none"> ○ Design and Problem Solving Competitions ○ Scholarship and Internship Opportunities ○ Product and Business Development Opportunities ○ Patents ○ Admission Preference or College Level Recognition