

ENGINEERING DESIGN AND DEVELOPMENT (PLTW)

Engineering Design and Development is an engineering research course in which students work in teams to research, design, test and construct a solution to an open-ended engineering problem. The product development life cycle and a design process are used to guide the team to reach a solution to the problem. The team presents and defends their solution to a panel of outside reviewers at the conclusion of the course. The EDD course allows students to apply all the skills and knowledge learned in previous pre-engineering courses. The use of 3D design software helps students design solutions to the problem their team has chosen. This course also engages students in critical thinking and problem-solving skills, time management and teamwork skills, a valuable set for students' future careers. **NOTE: Use of the PLTW Course number is limited to schools that have agreed to be part of the Project Lead the Way network and follow all training and data collection requirements.**

- DOE Code: 4828
- Recommended Grade Level: Grade 12
- Required Prerequisites: Introduction to Engineering Design, Principles of Engineering Design, and one pre-engineering specialty course
- Credits: 2 semester course, 2 semesters required, 1 credit per semester, maximum of 2 credits
- Fulfills a Directed Elective or Elective requirement for all diploma types
- Qualifies as a quantitative reasoning course

Application of Content and Multiple Hour Offerings

Intensive laboratory applications are a component of this course and may be either school based or work based or a combination of the two. Work-based learning experiences should be in a closely related industry setting. Instructors shall have a standards-based training plan for students participating in work-based learning experiences.

Content Standards

Domain – Defining a Problem

Core Standard 1 Students integrate research and documentation skills from a design process to identify problems.

Standards

- EDD-1.1 Create documentation to support a design process and results
- EDD-1.2 Summarize research findings in visual and verbal form
- EDD-1.3 Analyze current and past products to inform the creation of a problem statement
- EDD-1.4 Identify research that validates and justifies problem statements
- EDD-1.5 Distinguish between credible and non-credible sources while conducting research
- EDD-1.6 Analyze the market to justify whether solving the problem is necessary
- EDD-1.7 Validate data collected during market research

Domain – Design & Prototype to a Solution

Core Standard 2 Students design and build a prototype solution for the problem.

Standards

- EDD-2.1 Identify criteria and constraints for the design of a product
- EDD-2.2 Create multiple potential solutions to a problem
- EDD-2.3 Distinguish between practical and potentially successful design solutions
- EDD-2.4 Refine and optimize conceptual ideas to effectively solve a problem
- EDD-2.5 Communicate design concepts using visual and written documentation
- EDD-2.6 Verify the product design based on a variety of design factors and implement design changes to improve the product
- EDD-2.7 Create a set of drawings to document proposed product design
- EDD-2.8 Compare the consequences of the product design to determine the ethical implications of product development
- EDD-2.9 Develop a document to present the proposed design and provide justification for further development of a product
- EDD-2.10 Apply engineering concepts to design a prototype
- EDD-2.11 Evaluate types of materials and assembly procedures for a prototype design
- EDD-2.12 Create designs of the prototype using a 3D software package
- EDD-2.13 Develop document resources needed to build prototype
- EDD-2.14 Choose methods for testing a prototype
- EDD-2.15 Create a plan for building prototype
- EDD-2.16 Construct an operational prototype
- EDD-2.17 Evaluate and document prototypes for modifications

Domain – Test, Evaluate & Refine Solution

Core Standard 3 Students choose the appropriate statistical analysis tools to test and evaluate prototype for results on how to refine prototype for a viable solution.

Standards

- EDD-3.1 Choose testing criteria to evaluate the prototype for success of solution
- EDD-3.2 Create a valid method for testing accurately the effectiveness of the design solution
- EDD-3.3 Develop documentation for test procedures to be used on the design solution
- EDD-3.4 Justify the validity of the selected test procedures
- EDD-3.5 Perform testing on prototype
- EDD-3.6 Identify modifications to the design based upon test data

Domain – Communicate Results

Core Standard 4 Students validate the design process used to solve the problem for presentation of the final product.

Standards

- EDD-4.1 Organize data and information compiled throughout the process of the design solution
- EDD-4.2 Utilize presentation aids to enhance and clarify the presentation
- EDD-4.3 Discuss research findings on the chosen solution in a formal presentation

Career and Technical Student Organizations

Career and Technical Student Organizations are considered a powerful instructional tool when integrated into Career and Technical Education programs. They enhance the knowledge and skills students learn in a course by allowing a student to participate in a unique program of career and leadership development. Students should be encouraged to participate in a Career and Technical Student Organization, such as the **Technology Student Association (TSA)**.