RADNOR HIGH SCHOOL
Course Overview

Introduction to Engineering & Design Honors
Project Lead The Way
Course # 1250

General Information

Credits: 1.0
Weighted: Yes
Prerequisite: N/A

Length: Full Year
Format: Meets Daily
Grade: 9-12

Course Description

Introduction to Engineering Design (IED) is a high school level course that is appropriate for 9th or 10th grade students who are interested in design and engineering. The major focus of the IED course is to expose students to design process, research and analysis, teamwork, communication methods, global and human impacts, engineering standards, and technical documentation. IED gives students the opportunity to develop skills and understanding of course concepts through activity-, project-, and problem-based (APPB) learning. Used in combination with a teaming approach, APPB-learning challenges students to continually hone their interpersonal skills, creative abilities and understanding of the design process. It also allows students to develop strategies to enable and direct their own learning, which is the ultimate goal of education.

The course assumes no previous knowledge, but students should be concurrently enrolled in college preparatory mathematics and science. Students will employ engineering and scientific concepts in the solution of engineering design problems. In addition, students use a state of the 3D solid modeling design software package to help them design solutions to solve proposed problems. Students will develop problem-solving skills and apply their knowledge of research and design to create solutions to various challenges that increase in difficulty throughout the course. Students will also learn how to document their work, and communicate their solutions to their peers and members of the professional community.

Introduction to Engineering Design is one of three foundation courses in the Project Lead The Way high school pre-engineering program. The course applies and concurrently develops secondary level knowledge and skills in mathematics, science, and technology.

Unit: 1 – Design Process
Unit: 2 – Technical Sketching and Drawing
Unit: 3 - Measurement and Statistics
Unit: 4 - Modeling Skills
Unit: 5 – Geometry of Design
Unit: 6 – Reverse Engineering
Unit: 7 – Documentation
Unit: 8 - Advanced Computer Modeling
Unit: 9 – Design Team
Unit: 10 - Design Challenges
Course Wide Common Core Standards:
3.4.10.A1. Illustrate how the development of technologies is often driven by profit and an economic market.
3.4.12.A1. Compare and contrast the rate of technological development over time.
3.4.10.A2. Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems.
3.4.10.A3. Examine how technology transfer occurs when a new user applies an existing innovation developed for one purpose in a different function.
3.4.12.A3. Demonstrate how technological progress promotes the advancement of science, technology, engineering and mathematics (STEM).

3.4.12.A3. Demonstrate how technological progress promotes the advancement of science, technology, engineering and mathematics (STEM).
3.4.10.B1. Compare and contrast how the use of technology involves weighing the trade-offs between the positive and negative effects.
3.4.12.B1. Analyze ethical, social, economic, and cultural considerations as related to the development, selection, and use of technologies.
3.4.10.B2. Demonstrate how humans devise technologies to reduce the negative consequences of other technologies.
3.4.10.B3. Compare and contrast how a number of different factors, such as advertising, the strength of the economy, the goals of a company and the latest fads, contribute to shaping the design of and demand for various technologies.
3.4.10.B4. Recognize that technological development has been evolutionary, the result of a series of refinements to a basic invention.
3.4.10.C1. Apply the components of the technological design process.
3.4.10.C2. Analyze a prototype and/or create a working model to test a design concept by making actual observations and necessary adjustments.
3.4.12.C2. Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.
3.4.10.C3. Illustrate the concept that not all problems are technological and not every problem can be solved using technology.
3.4.12.C3. Apply the concept that many technological problems require a multi-disciplinary approach.
3.4.10.D1. Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of a final product.
3.4.10.D2. Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.
3.4.12.D2. Verify that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.
3.4.10.D3. Synthesize data, analyze trends, and draw conclusions regarding the effect of technology on the individual, society, and the environment.