

Engineering Multidisciplinary Integrated Curriculum Units

IED Unit 1: Ship Shape

Integrated Curriculum Unit related to Naval Architecture

This unit is intended for use in conjunction with the PLTW Introduction to Engineering Design (IED) course. This integrated unit focuses on the theme of naval architecture. Students are introduced to naval engineering and the history of sailing and ship design, both romantic and pragmatic. Students explore the science and math associated with designing seaworthy vessels, and the unit culminates in a design challenge where students prepare the design for a series of ships, including drawings, technical documents, and a prototype.

IED Unit 2: Reverse Engineering

Integrated Curriculum Unit related to Design Engineering

This unit is intended for use in conjunction with the PLTW Introduction to Engineering Design (IED) course. Students are introduced to design engineering and the process of reverse engineering in research and development. Students study the historical impact of a classic example of reverse engineering—the Enigma machine. The unit culminates in their tearing down and redesigning a common household mechanical object.

POE Unit 1: Bridge Builder

Integrated Curriculum Unit related to Civil Engineering

This unit is intended for use in conjunction with the PLTW Principles of Engineering (POE) course. Students are introduced to application physics and trigonometry in bridge engineering, as well as the potential ecological impact of large-scale construction. The building of the Brooklyn Bridge serves as a case study for students to examine geographic, political, and technological change in the Gilded Age. The unit culminates in a design challenge where students design, build, and test truss bridges made of balsa wood.

POE Unit 2: Bombs Away

Integrated Curriculum Unit related to Aerospace Engineering

This unit is intended for use in conjunction with the PLTW Principles of Engineering (POE) course. Students are introduced to the science and math that govern objects that follow a ballistic trajectory and examine the history of the use of various ballistic weapons in conflicts of the 20th century, including evaluation of the rationale and ethical issues surrounding the aftermath of these conflicts. The unit culminates in a design challenge where students design their own adjustable ballistic device and compete against each other in a Battleship game.

IN PARTNERSHIP WITH:



DE Unit 1: Rock Your Vote

Integrated Curriculum Unit related to Integrated Circuit Design

This unit is intended for use in conjunction with the PLTW Digital Electronics (DE) course. Students learn how to design an integrated circuit. Using the context of designing an electronic voting machine, students are introduced to the basic math and science underlying electrical circuits, which are applied in the study of combination circuit design and sequential logic. Students also explore the concept of government, how elections are intended to represent the will of the people, and how the outcome of elections can be shaped, both through persuasion of the populace and through selection of a voting system. The unit culminates with the design and use of the voting machine in a series of classroom “elections.”

DE Unit 2: Autonomous Rovers

Integrated Curriculum Unit related to Autonomous Exploration Vehicles

Forthcoming in Summer 2010

CEA Unit 1: Retrofit Renovation

Integrated Curriculum Unit related to Residential Design and Construction

This unit is intended for use in conjunction with the PLTW Civil Engineering and Architecture (CEA) course. Students learn how to renovate an existing home to improve energy efficiency. In the integrated unit, students use the context of building/renovating an efficient home to explore a variety of topics, including how industrial development has shaped historical attitudes about the environment. The unit also introduces math and science concepts underlying the development and calculation of design and building measures used to conserve energy and natural resources. The unit culminates with a project where students synthesize their learning from CEA and their academic classes to renovate an existing home plan to prioritize incorporating green components and technologies.

CEA Unit 2: Green Design

Integrated Curriculum Unit related to Commercial Building Design and Construction

This unit is intended for use in conjunction with the PLTW Civil Engineering and Architecture (CEA) course. Students focus on environmental considerations associated with the design and engineering of building. In CEA, students are introduced to the principles, methods, and tools used in the site planning, architectural design, and structural engineering of buildings. In the integrated unit, students begin by exploring contemporary concerns about renewability of resources and energy consumption. Students use this context to investigate the different building technologies in use and under development that will address the need and desire for energy and resource efficiency in current and future construction. The unit culminates with a project that has students synthesize their learning from CEA and their academic classes to design and present plans for a LEED-certified addition to their school or other local building.

IN PARTNERSHIP WITH:

