Introduction to Engineering Design(IED)PTLW

Mehlville School District
STEM
Grades 9 - 12, Duration 1 Year, 1 Credit

Rationale

Today we live in the Age of Information with new inventions, improvements, and discoveries occurring exponentially every day. With the advancements of technology and the development of new materials, come more opportunities to broaden people's abilities to function more readily in society. Technology such as calculators, computers, and mechanical pencils are evidence of the improvements made possible by the work of many types of engineers. This class will provide opportunities for the student to build and integrate basic knowledge and lifetime skills that are essential in the study of engineering in our ever changing world of technology.

Course Description

Through the Project Lead the Way curricula, the student will look at how a product is developed, both artistically and technically. The student learns specific methods, known as the design process, for solving programs related to the development and innovation of products. Portfolios are developed by the student, containing different mediums, such as drawings, sketchings, digital pictures, film clips, and computers files, to record and illustrate their design process. Concepts of careers, design, techniques, forms and shapes, geometry, graphing, adaptations, quality control, packaging, and cost analysis are taught in a logical fashion and applied in this hands-on curriculum.

Prerequisites

Concurrently enrolled in Algebra or higher

Credit: 1 Unit - Two Semesters (Practical Arts)
Weighted: 0.75

Course Objectives

1. The student will research and identify career opportunities in a given engineering field and list the educational requirements for each profession with 80% accuracy. (CA3; 1.4, 1.5, 3.1) Locally assessed. (A+: Research)

2. The student will identify, collect, and display examples of the application of the principles and elements of design utilized in products, print media, and art forms with 80% accuracy. (CA3; 1.2, 3.2) Locally assessed.

3. The student will develop a portfolio, using the PLTW Design, to organize and display evidence of their work, such as, annotated sketches, graphical representation of given data, and modeling materials to complete a three-dimensional model with 80% accuracy. (CA3; 1.2, 3.2) Locally assessed.

4. The student will demonstrate the ability to modify a sketch or feature of a model and recognized the use and need of work planes, axes, and points in the development of a computer model with 80% accuracy. (CA3; 1.2, 3.2) Locally assessed.

5. The student will read and explore technical literature and demonstrate assembly modeling skills to solve a variety of design problems and to successfully construct a multi-part object with 80% accuracy. (CA3; 1.4, 1.5, 3.1, 3.2) Locally assessed. (A+: Reading)

6. The student will list and explain the various mass property calculations, such as volume, density, mass, surface area, centroid, moment of inertia, products of inertia, radii of gyration, principal axes, and principal moments, and how they are used to evaluate a parametric model with 80% accuracy. (CA3, MA1; 1.2, 3.2) Locally assessed. (A+: Writing)

7. The student will interpret and use correct tolerancing techniques and demonstrate appropriate dimensioning rules and practices with 80% accuracy. (CA3, MA1; 1.2, 1.4) Locally assessed.

8. The student will understand and formulate general and proprietary specification to further communicate information relating to product design with 80% accuracy. (CA3; 1.2, 1.4) Locally assessed.

9. The student will demonstrate the following communication techniques: voice variation, eye contact, posture, attire, practice and preparation, and projecting confidence, and consider the audience and level of formality, selecting the most appropriate type of written documentation for a presentation, and using various forms of visual aids with 80% accuracy. (CA3; 1.2, 1.4, 1.5) Locally assessed. (A+: Speaking)

10. The student will evaluate material characteristics for manufacturing a specific product and identify the correct manufacturing process needed to produce that product with 80% accuracy. (CA3; MA1, 1.2, 1.4) Locally assessed.

11. The student will formulate a product cost analysis, explain the JIT process, and interpret data to ensure product quality with 80%

accuracy. (CA3, MA1; 3.3, 3.8) Locally assessed.

BOE 11-6-14