



SCHOOL DISTRICT OF MONROE

Preparing for the Future, One Child at a Time

PLTW: Engineering Design & Development

Course Description:

The curriculum for this course is developed by Project Lead The Way (PLTW). This elective course is a 2 Trimester Course. In this Project Lead the Way engineering capstone course, students work in teams to design and develop an original solution to a valid open-ended technical problem by applying the engineering design process. Students perform research to choose, validate and justify a technical problem. After carefully defining the problem, teams design, build and test their solutions while working closely with industry professionals who provide mentoring opportunities. Finally, student teams present and defend their original solution to an outside panel. Students that successfully complete all of the requirements for this course can apply for credit through St Cloud State University. The class is a fully weighted class. The information in this course overview outlines what students should understand and be able to do by the end of the trimester.

Mastery Standards:

ENG1.a.11.h: Argue design processes vary slightly. However, key elements of any design process include: defining a problem, identifying criteria, generating solutions, creating a model or prototype, testing and evaluating, refining design and communicating processes and results.

ENG2.a.4h: A prototype is a working model used to test a design concept by making actual observations and necessary adjustments.

ENG3.a.7.h: Research and development is a specific problem solving approach that is used extensively in business and industry to prepare devices and systems for the marketplace.

ENG4.a.5.h: Identify the design problem to solve and determine how to address it.

ENG4.a.6.h: Identify criteria and constraints and determine how these will affect the design process.

ENG4.c.6.h: Evaluate final solutions and communicate observation, processes and results of the entire design process, using verbal, graphic, quantitative, virtual and written means, in addition to design models.

ENG5.a.7.h: Document processes and procedures and communicate them to different audiences using appropriate oral and written techniques.

ENG6.b.3.h: Collect information and evaluate its quality.

Unit	Description of Unit and Learning Targets
<p>Unit Title: 1</p> <p><u>Essential Questions:</u></p> <ul style="list-style-type: none"> How do you utilize the engineering design process to solve a complex problem? 	<p>Students will...</p> <p><u>Learning Targets:</u></p> <ul style="list-style-type: none"> I can write a problem statement that answers the 5 essential questions. I can justify and validate the problem using various forms of research and market analysis. I can research various patents and existing products to identify and relate them to the problem statement. I can use prior knowledge to identify at least 5 design specifications directly related to solving the problem. I can sketch brainstorming ideas into a usable format.

- | | |
|--|---|
| | <ul style="list-style-type: none">● I can work cooperatively in my group to narrow brainstorming ideas into 5 detailed design briefs and then apply a decision matrix to narrow these 5 briefs to come up with one design to pursue.● I can identify the four main STEM areas and apply them to solving the given problem.● I can use 3D modeling software to create parts, orthographic drawings, and assemblies.● I can create a bill of materials for parts of the prototype.● I can read the detailed drawings and apply that to producing a testable prototype.● I can create a detailed testing procedure and a testing plan for the prototype from the design criterias.● I can test the prototype one step at a time using the testing procedures and document the results for a detailed report indicating the findings using data.● I can create a presentation using Google slides and communicate orally to an audience the design process and detailed elements of the solution to the problem.● I can interpret information from experts and evaluate the next steps in the design process. |
|--|---|