Course: Pre-Engineering and Design

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Overview:

PLTW Engineering is more than just another middle school engineering program. It is about applying engineering, science, math, and technology to solve complex, open-ended problems in a real-world context. Students focus on the design process, and develop the ability to innovate, think critically, and collaborate to resolve problems. Students are introduced to the concept that there are many ways to design and solve a problem. The emphasis is on the ability to reflect, discover, and then create, not on getting the "right" answer. They learn how to apply STEM knowledge, skills, and habits of mind to make the world a better place through innovation. STEM education is at the heart of today's high-tech, high-skill global economy. For America to remain economically competitive, our next generation of leaders must develop the critical-reasoning and problem-solving skills that will help make them the most productive in the world. PLTW sparks ingenuity, creativity, and innovation in all our students.

Skills and Strategies:

Students will develop these skills below:

- Utilize standard procedures to use and maintain an engineering notebook.
- Use guidelines for developing and maintaining an engineering notebook to evaluate and select pieces of one's own work for inclusion in a portfolio.
- Describe the relationship between science, technology, engineering, and math.
- Describe the elements of design.
- Recognize design criteria and constraints.
- Use the design process to solve a technical problem.
- Demonstrate the ability to measure accurately with different devices and scales using both the standard and metric systems.
- Create thumbnail, perspective, isometric, and orthographic sketch.
- Accurately interpret one- and two-point perspective drawings.
- Communicate ideas for a design using various sketching methods, notes, and drafting views.
- Dimension an orthographic sketch following the guidelines of dimensioning.
- Create a three-dimensional (3D) model of an object using a C.A.D. Program.
- Apply geometric and dimension constraints to design CAD-modeled parts.
- Assemble the product using the CAD modeling program.
- Create and build a prototype.
- Print prototypes using a 3-D printer.

Course Learning Goals:

Three main objectives will be focused on in class:

- Students will be exposed and navigate through the Common Core State Standards for Mathematics, English Language Arts, and the Next Generation Science Standards. Specific emphasis placed on all types of engineering professions.
- Develop proficient ways to communicate their ideas in engineering journals, C.A.D drawings, and scaled prototypes.
- Students will develop highly transferable skills in collaboration, communication, and critical thinking, which are relevant for any coursework or career.

Student Expectations:

Students will be expected to be positive, polite, and prompt. They are encouraged to do their best work the first time. High expectations in class and at school will be maintained throughout the year using student planners, engineering journals/portfolios, and bi-weekly grade checks.

Workload:

Most of the workload will be done in class. Students will routinely bring their engineering journals home to share their progress. Students that are absent must get a SAC pass to come in and make up their work.

Grading:

Grading Categories:

90 - 100%	**3.7 - 4.0**
80 - 89%	**2.7 - 3.6**
70 - 79%	**1.7 – 2.6**
60 - 69%	**1.0 – 1.6**
0 - 59%	**0.0 – 0.9**