



SCHOOL DISTRICT OF MONROE

Preparing for the Future, One Child at a Time

Principles of Engineering

Course Description:

The curriculum for this course is a high school honors level specialization course in the national **Project Lead the Way (PLTW) Engineering Program**, and is developed in alignment with the [Wisconsin Standards for Technology and Engineering](#). This course is a foundational course within the Project Lead the Way curriculum. This is a 2 Trimester Course in which students will develop skills in problem solving, research, and design while learning strategies for documentation, collaboration, and presentation. Through problems that engage and challenge, students will explore a broad range of engineering topics, including mechanisms, the strength of structures and materials, and automation. The information in this course overview outlines what students should understand and be able to do by the end of the year.

Mastery Standards:

Students will analyze the core concepts of technology, including the use of technological systems, tools and materials, mechanisms, electronic systems, control systems, and structures. (BB1.a, BB1.b, BB1.c, BB1.d, BB1.e, BB1.f)

Students will analyze and apply engineering design theory design theory, including the role of troubleshooting, research and development, invention and innovation and experimentation in problem solving. (ENG1.a, ENG2.a, ENG2.b, ENG3.a, ENG3.b)

Students will develop abilities to apply the design process, including executing and receiving evaluations and feedback on projects which is vital to learning and improving skills. (ENG4.a, ENG4.c, ENG5.a)

Students will be able to select and use manufacturing technologies for specific tasks, and create and communicate alternative solutions. (MNF1.a, MNF1.b)

Unit	Description of Unit and Learning Targets
Unit Title: 1 <u>Essential Questions:</u> <ul style="list-style-type: none">What questions must designers and engineers ask when solving engineering problems?	Students will... <u>Learning Targets:</u> <ul style="list-style-type: none">I can identify and explain which real-life problems are some of the major engineering fields trying to solve.I can explain and demonstrate how the basic mechanisms of most machines work with energy sources and power to design solutions for everyday problems.
Unit Title: 2 <u>Essential Questions:</u> <ul style="list-style-type: none">Why must engineers and designers calculate forces acting on bodies and structures?	Students will... <u>Learning Targets:</u> <ul style="list-style-type: none">I can calculate how forces will act on different materials and structures, and use that understanding to design structures which will perform to meet the desired design criteria.I can apply my prior learning and understanding of the engineering design process, with my force calculations, to solve engineering problems that fit the constraints and specifications of a design brief.I can write computer code for mechanisms that will control devices to creatively and efficiently solve engineering problems.
Unit Title: 3 <u>Essential Questions:</u> <ul style="list-style-type: none">Why is it critical for designers and	Students will... <u>Learning Targets:</u>

engineers to use statistics and data interpretation throughout the design process?

- I can collect and statistically interpret theoretical and experimental data for informative decision-making regarding the probability of being able to achieve the desired outcome for my engineering designs.