



Syllabus: Introduction to Engineering Design (IED) (Project Lead The Way)

Course Overview:

This course introduces students to the design process and the tools used in product development. Students will experience first-hand the activities in which engineers engage throughout the design cycle. Development of design briefs, sketching, 3D solid modeling, and prototyping through computer-aided drafting are part of the course. Students will have the opportunity to learn ways in which design techniques apply to many fields, such as healthcare, business, art and animation, manufacturing, engineering, etc. Problem-solving and math as it applies to producing products and services for today's society are emphasized.

(Dual/transcripted credit is offered by Milwaukee School of Engineering [MSOE] with transfer possibilities to other colleges and universities.)

Department: Technology & Engineering	Department/Course Website (if applicable): Insert here
Course Number: TEC1010	Instructor: Ignacio Retana
Credits Earned/Length of Course: 1/semester	Office Hours: available during lunch and 3:30- 5 pm tues,wed, fri
Prerequisites: Algebra	Instructor Contact Info: Phone: 608-204-3697 Email: retana@madison.k12.wi.us
Required Materials: Pencils, erasers, black/blue pen, 3 ring binder, calculator	Other: College credit possible if grade of A or B and score of 7 or above on End of Course Exam
	Pathway(s): STEM: Engineering

Course Standards:

- [Common Core State Standards for Literacy in All Subjects](#)
- [Common Core State Standards for Mathematics -- Standards for Mathematical Practice](#)
- [Next Generation Science Standards](#)
- [Wisconsin Common Career Technical Core Standards](#)



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- [Wisconsin Standards for Technology and Engineering](#)

Course Assessment(s):

- Summative assessments for units
- Team and Individual projects
- EOC assessments PLTW online

Course Outline (including Unit(s) of Time and Essential Questions):

Unit 1 Design Process (8 days)

Unit Essential Questions

- How might we create the best possible solution to a problem?
- What is the most effective way to generate potential solutions to a problem?
How many alternate solutions should you generate?
- What are the most pressing engineering/technical problems of our time?
- What is an engineer? What types of work do engineers do?

Unit 2 Technical sketching and drawing (6 days)

Unit Essential Questions

- How can we clearly convey the intent of a design to someone unfamiliar with the original problem or the solution?
- How is technical drawing similar to and different from artistic drawing?
- What can cause a technical drawing to be inadequate or misinterpreted?

Unit 3 Measurement and Statistics (7 days)

Unit Essential Questions

- How can statistical data and analysis be used to inform, justify, and validate a design or process?
- If error is unavoidable in measurement, how can we indicate our confidence in the precision of a measurement we make?
- What is dimensional analysis and how can it help solve problems involving quantities?
- Why do engineers generally adhere to a set of dimensioning standards and guidelines?

Unit 4 Modeling skill (9 days)

Unit Essential Questions

- What is the role of models in the design process?
- How can we use technology to make the design and manufacture of a product more efficient and less prone to error?



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- What is the purpose of a portfolio? How do you decide what information to include in a portfolio?

Unit 5 Geometry of Design (7 days)

Unit Essential Questions

- What are physical properties and why are they important to the design of a product?
- What advantage does Computer Aided Design and Drafting (CAD) provide over traditional paper and pencil design?
- How does the material chosen for a product impact the design of the product?

Unit 6 Reverse Engineering (7 days)

Unit Essential Questions

- What considerations should be made in when reverse engineering?
- What makes a product aesthetically pleasing or eye-catching?
- How are principles and elements of design used with engineering practice to develop a successful product?

Unit 7 Documentation (12 days)

Unit Essential Questions

- .How do you define a problem so that it can be effectively communicated and yield the best possible solution?
- How does one know that a given design solution is the best possible solution?
- How might a given solution be more or less acceptable to various types of stakeholders?
- How do you select the best possible solution from multiple alternatives?
- How do engineers communicate an object's dimensional information including the margin of acceptable error?

Unit 8 Advanced Computer Modeling (7 days)

Unit Essential Questions

- How do you decide what to include in a set of working drawings? What views are needed? What other information is important?
- How can assembly models, exploded assemblies, and animated assemblies of an object or a proposed design be used in the design process? Beyond the design process?

Unit 9 Design Team (16 days)

Unit Essential Questions

- What are the advantages and disadvantages of a design team approach versus an individual approach in the problem solving process?



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- How do engineers and technical professionals impact society and the environment?
- What strategies, skills, and tools are effective in facilitating communication and problem solving among team members that cannot meet face-to-face?
- How can the use of a project schedule positively influence the design process?

Unit 10 Design Challenges (6 days)

Unit Essential Questions

- How might we create the best possible solution to a problem?
- What does one need to know in order to design the solution to a problem?

Unit 11 Career Development/21st Century Skills (Ongoing)

- How do the skills and knowledge I am learning in this class get applied within a job setting?
- How can I work with a team to develop an answer to a question or solution to problem?
- How I apply the skills that my future employers will value?

Texts, Technology, and Resources:

- PLTW website LMS
- Inventor 3D modeling software

Behavior/Attendance Policy:

Part of the grade is employability skills. Students are expected to behave and attend as if at a place of employment. This includes use of cell phone, teamwork and completion of assignments. Behavior and attendance will impact grades. Students are responsible for completing missed work.

Grading Policy:

100-90	A
89-80	B
79-70	C
69-60	D
59>	F



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As a student I agree to not use my cell phone for personal use and only use it in class for assistance in completing my work with permission of the classroom teacher/adult. If I use it without permission, I will hand over my cell phone immediately when asked by the teacher/adult. I also agree to complete all assignments and make up any work due to absences or tardies.

_____ date: _____

As a parent I agree to supporting the teacher by encouraging my student to finish all assignments by seeking support during lunch or after school when necessary.

_____ date: _____