

Introduction to Engineering Design (IED)

2015-16 Course Syllabus

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Course Description:

Introduction to Engineering Design is the first foundation course in the **Project Lead The Way (PLTW)** Pathway To Engineering sequence. This course will give students an opportunity to explore the engineering design process while developing problem solutions. We will focus on developing teamwork, communication, and technical documentation skills which will be used throughout the design process. 3D computer solid modeling software will be used as a tool to develop virtual models of solutions. **This course meets every day of the 6 day cycle and has a 1.03 weighted grade point value.**

Objectives:

Upon successful completion of the course, students will be able to:

- A. Identify the primary engineering disciplines and differentiate between science and engineering.
- B. Create detailed technical drawings.
- C. Convert units of measurement between and within the US Customary and SI measurement systems.
- D. Make predictions using inferential statistics.
- E. Create mathematical, physical, and computer generated solid models to evaluate potential solutions within the design process.
- F. Describe physical and geometric properties of solid objects such as volume, density, and mass.
- G. Analyze the aesthetic and functional elements of an existing product's design and evaluate potential improvements.
- H. Thoroughly document and present the design process used for the development of a problem solution.
- I. Create a complete set of working drawings for a product using 3D computer solid modeling software.
- J. Describe the potential societal and environmental impacts of decisions made within the engineering design process.
- K. Work as an effective team member to develop solutions to problems.
- L. Continue to the next foundation class in the PLTW Pathway to Engineering course sequence: Principles of Engineering.

Grading Procedures:

A = 93-100 B = 85-92 C = 77-84 D = 70-76 F = Below 70

Grading Procedure Percentage Breakdown:

Students will be graded on classroom behavior, participation, homework, classwork, activities, projects, quizzes and tests. Percentage grades will be assigned based on each student's accumulated points compared to the total available points.

A comprehensive PLTW end of course assessment will be taken by all students at the completion of the course.

Late Work:

Late work is generally accepted with a one-time 10% reduction in credit (unless prior arrangements were made) until the end of the marking period in which the assignment was given.

Online Course Access:

Each student will have their own individual account to access the PLTW Learning Management System (LMS) where all course materials are available. The LMS is accessible anywhere students can connect to the internet.

Course Topics:

Unit 1: Design Process – The engineering design process is introduced and students explore the engineering profession and begin keeping records of their work in an engineering notebook.

Unit 2: Technical Sketching and Drawing – Technical sketching is introduced as a tool to communicate ideas visually.

Unit 3: Measurement and Statistics – Measurement and statistics are used to establish acceptable ranges of error and how that is incorporated into design.

Unit 4: Modeling Skills – Computer solid modeling will be used by students to begin creating virtual models within the design process.

Unit 5: Geometry of Design – Properties of geometric shapes and solids are used to calculate physical properties of objects.

Unit 6: Reverse Engineering – Reverse engineering is applied to find how products “work” and how they might be improved.

Unit 7: Documentation – Documentation skills are developed through annotating technical drawings, creating decision matrices, developing design briefs, and writing technical reports.

Unit 8: Advanced Computer Modeling – Students will create complex animated models of design solutions.

Unit 9: Design Team – Virtual design teams will work together using virtual communication methods to experience how geographic and time separation affects design collaboration.

Unit 10: Design Challenges – Design challenges will be completed in pairs so that students can completely apply the design process from problem introduction to solution presentation.

Classroom Expectations:

1. Please come prepared for class each day:
 - **Each student should have a 1” (minimum) three ring binder dedicated to this class** to hold and organize class notes and work
 - **Bring a ball point pen (black or blue) and pencil to class every day.** We will be writing and/or sketching every day.
 - Homework will be assigned periodically and will be checked and graded for completion which includes showing all of your work.
 - **A personal scientific calculator will be helpful** but classroom calculators will be available.
2. Please come to class on time. All unexcused tardiness will be reported to the office in accordance with NHS policy.
3. Classroom interruptions will not be tolerated. We’re all here to learn and work together to reach our course objectives.
4. Cell phone use will generally not be allowed in the classroom. I will specifically let you know if there are times when they may be used. Violations will be handled in accordance with NHS policy.
5. Eating is not allowed in my classroom. A clear, colorless water bottle is allowed in accordance with NHS policy.
6. Classes are short and time is precious. Any work time given in class is understood to be for IED work.
7. If you miss class, it is your responsibility to make up any missed work. Check with a classmate and/or the LMS to see what you missed. You will have as many days as you missed to make up work per school policy.
8. **If you need help, please ask.** I am generally available before and after school. We may also be able to find time during the school day. If you are making an honest effort, I will do my best to help you succeed.

Parent (print): _____ Sign: _____

Student (print): _____ Sign: _____