



Project Lead The Way Engineering

Woodbridge Senior High School | 2019-20 School Year

Mr. Castro | Mr. DeFelice | Mrs. Hille

Gradebook Set-up and Grading Procedures

On average, grades will be entered on a weekly basis and a score out of 100 percentage points will be awarded for each assignment. To learn more about how we are supporting our students with reporting academic progress, [view this video](#).

Grades will be calculated based upon the following assessment categories:

50% - Quizzes/Projects: These assessments are a way for students to demonstrate that they have mastered learning target(s) that have been addressed during a unit of study. This type of assessment could occur during a unit or at the end of a unit. These assessments are often *high stakes*, which means that they have a high point value.

40% - Activities: These assessments is to *monitor student learning* to provide ongoing feedback towards a learning target that can be used by instructors to improve their teaching and by students to improve their learning.

10% - Essential Questions / Progress Checks: The goal of these assessments is to *monitor student learning* to provide ongoing feedback towards a learning target that can be used by instructors to improve their teaching and by students to improve their learning. These assessments are generally *low stakes*, which means that they have low or no point value.

The Prince William County Public Schools' grading scale will be used and is as follows:

A = 90-100%	C+ = 77-79%	D = 60-66%
B+ = 87-89%	C = 70-76%	F = 59% and below
B = 80-86%	D+ = 67-69%	

Multiple Opportunities to Demonstrate Mastery

Students will be allowed to reassess quizzes. In order to do so, students must demonstrate that they have prepared for the reassessment by ensuring that they have submitted all related activities and skill practices associated with the quiz. In addition, the instructor may assign additional practice opportunities that they feel would better prepare the student for the reassessment.

Late Work Policy

Late work will be accepted up to two weeks past the assigned due date published in ParentVUE and Google Classroom. In the event that the dates are not consistent, the later date will be used to determine

late work. Students will be given one week after the assignment is graded to re-submit the assignment if they wish to improve their grade but only if the original assignment was submitted on time. This policy applies only to activities and skills practices and not quizzes or projects.

Projects are a large summative assessment, comparable to a large unit test. As such, it is not possible to turn in projects late. Students will be given explicit timelines and guidelines for submission of such projects and must submit them on time.

Attendance

Students who miss 10 or more classes, excused or unexcused, are at risk of failing and will be placed on No Credit Status.

PLTW End-of-Course Assessment (EoC)

All students will take the summative End of Course Assessment as prescribed by Project Lead the Way regardless of their yearlong grade in the class. It will count as a summative grade for the fourth quarter and cannot be reassessed.

Electronic Devices

All electronic devices are to be put away once entering the classroom. They are not to be in use during lessons, class discussions, quizzes, or tests. When devices are allowed to be used, they must be used for productive classwork, i.e. scanning, research, Google Classroom, or quietly working with headphones.

Google Classroom

Google Classroom will be used as an extension of the classroom. Announcements will be regularly be updated for current unit of study and assessments dates. Assignments can be found here as well and a link to the notes on mypltw.org. Parents with a connected email can get regular email updates about their students. Students should be checking here regularly, especially when they are absent.

Suggested Material

To be organized and successful in this class, it is suggested that you have the following materials: An engineering notebook (graph ruled and bound--cannot be removed and replaced easily), pencils with an eraser, and colored pens/pencils.

Assessment Policy

If a student is absent for a quiz or test, then the student will complete the assessment in-class on the first day the student returns. It is the student's responsibility to make up the work and/or notes missed in class while absent and while taking the quiz. Assessment days will not change due to a student's absence.

Communication

Email is the preferred method of communication for general student questions and parent questions. If any questions arise, please feel free to send an email. The email will be addressed within 24 hours of receipt. Students with questions on a specific assignment should use the comment section of that assignment on google classroom.

Extra help

Teachers are available for extra help during flex periods or after school by appointment. Please contact your teacher directly via email or set up an appointment in class. If you are seeing a teacher for extra help, make sure you come with specific questions and concerns and bring all of the required materials.



Project Lead the Way Introduction to Engineering Design (IED) 2019 – 2020

Mr. DeFelice

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Twitter: @DeFelice_WSHS

Woodbridge Website: <http://woodbridgehs.pwcs.edu/>

Project Lead the Way: <http://mypltw.org/>

Learning Management System: Google Classroom

Objectives:

Ever tried to design something new or draw up an idea you wanted to share with your friends and wondered how you could communicate your idea? Or, have you wondered how someone designed that new MP3 player or sleek new phone? The major focus of this course is to learn how to take an idea through a design process that will eventually be manufactured or produced. As you learn about various aspects of engineering and engineering design, such as how engineering communicate through drawings and modeling, you will apply what you learn through various activities, projects, and problems. The course covers the following topics:

- Design Process
- Technical Sketching and Drawing
- Measurement and Statistics
- Modeling Skills
- Geometry of Design
- Reverse Engineering
- Documentation
- Advanced Computer Modeline
- Design Challenges

In addition to the topics stated above, you will use Autodesk Inventor, which is a state of the art 3-D design software package, to help you design solutions to different design projects. Working in teams, you will learn about documenting your solutions, solving problems, and communicating your solutions to other students and members of the professional community of engineering and engineering design.

Competencies:

The competencies that will be covered this year can be accessed at the following website:
<http://www.cteresource.org/verso/courses/8439/introduction-to-engineering-design-pltw-tasklist>

Learning Management System:

As a part of the effort to provide content and support materials, this class will use two online resources called “Learning Management Systems” or LMS for short. The PLTW LMS includes course notes, PowerPoints, reference documents, and other resources. This is essentially an interactive online textbook. You will be required to log into this website frequently inside and outside of class. Google classroom will include assignments, schedules, due dates, quizzes, discussion board posts, and other resources. You will also be required to submit your work via Google classroom. It is imperative that you log into your Google account frequently to check for class updates and to submit assignments. I will update the site often in an effort to keep students and parents up to date in all the class happenings. Parents and students are encouraged to visit the site regularly to stay informed.



Google Classroom



Required Materials:

Each student will be expected to purchase the following items that will be used every day in class.

- ✓ Engineering notebook (must be graph ruled and bound)
- ✓ Pencils (class notes and sketches)
- ✓ Pens (documentation in engineering notebook)
- ✓ Flash drive (4 GB minimum—document storage)

Students are responsible for keeping course documents, notes, projects, assignments, quizzes, and tests in their engineering notebooks and on their flash drives. Engineering notebooks can be stored safely in class and will be graded often. Flash drives should not be stored in class. It is highly recommended that a backup of your flash drive be created and updated throughout the year (monthly at a minimum). Loss of files is not an excuse for not submitting an assignment or submitting late. If you choose to take your engineering notebook or flash drive home they MUST return the next class period!

Student Requirements:

Students will be required to have these materials and will be required to follow Prince William County School policies regarding student behavior. Computers will be used to complete projects and assignments. If the computers are abused or software is used for anything other than course related material, students will be given alternate assignments and disciplined accordingly.

Classroom Rules:

1. When the instructor speaks, you are silent and you are listening.
2. Follow and abide by all rules and computer procedures outlined in the Prince William County Student Code of Behavior.
3. Follow the classroom routines.
4. Be prepared for class at all times. Have your materials ready for each class.
5. Act in a professional manner at all times. No profanity, no gum, no food or drinks.
6. Be respectful to all people, their belongings, and their projects at all times.

Contacting and Meeting with Mr. DeFelice:

Block	Class	Room
1	Construction Technology	1419
2	Civil Engineering and Architecture (CEA)	1208
3	Introduction to Engineering Design (IED)	1208
4	Engineering Design and Development (EDD) Online (Potomac HS)	1208
5	Civil Engineering and Architecture (CEA)	1208
6	Engineering Design and Development (EDD)	1208
7	Planning	-

If you have any questions, concerns, or special needs, please do not hesitate to contact me via email or phone. I will be available before and after school for any possible meetings. My door is always open and I check my e-mail frequently. Let's have a GREAT year!

Introduction to Engineering Design (PLTW)

Learning Targets

UNIT 1: DESIGN PROCESS

- 1.3 (A) – I can utilize an engineering notebook to clearly and accurately document the design process according to accepted standards and protocols to prove the origin and chronology of a design.
- 1.3 (B) – I can explain the concept of proportion and how it relates to freehand sketching.
- 1.4 – I can identify and describe a variety of brainstorming techniques and rules for brainstorming.
- 1.5 (A) – I can identify the steps in an engineering design process and describe the activities involved in each step of the process.
- 1.5 (B) – I can describe the design process used in the solution of a particular problem and reflect on all steps of the design process.
- 1.6 (A) – I can identify and differentiate between the work of an engineer and the work of a scientist.
- 1.6 (B) – I can identify and differentiate between mechanical, electrical, civil, and chemical engineering fields.
- 1.8 – I can generate and document multiple ideas or solution paths to a problem through brainstorming
- 1.9 – I can differentiate between invention and innovation.

UNIT 2: TECHNICAL SKETCHING AND DRAWING

- 2.1 – I can identify line types used on a technical drawing and can explain the purpose of each line.
- 2.2 – I can identify and define technical drawing representations including isometric, orthographic projection, oblique, and perspective views.
- 2.3 – I can identify the proper use of each technical drawing representation including isometric, orthographic projection, oblique, and perspective views.
- 2.4 – I can apply tonal shading to enhance the appearance of a pictorial sketch and create a more realistic appearance of a sketched object.
- 2.5 – I can hand sketch isometric views of a simple object or part at a given scale using the actual object, a detailed verbal description of the object, a pictorial view of the object, or a set of orthographic projections.
- 2.6 – I can hand sketch 1-point and 2-point perspective pictorial views of a simple object or part given the object, a detailed verbal description of the object, a pictorial view of the object, and/or a set of orthographic projections.
- 2.7 – I can select flat patterns that fold into geometric solid forms.
- 2.8 – I can hand sketch orthographic projections at a given scale and in the correct orientation to fully detail an object or part using the actual object, a detailed verbal description of the object, or a pictorial and isometric view of the object.
- 2.9 – I can determine the minimum number and types of views necessary to fully detail a part.
- 2.10 – I can choose and justify the choice for the best orthographic projection of an object to use as a front view on technical drawings.

UNIT 3: MEASUREMENT AND STATISTICS

- 3.1 – I can identify general rules for dimensioning on technical drawings used in standard engineering practice.
- 3.2 – I can distinguish between sample statistics and population statistics and know appropriate applications of each.
- 3.3 – I can distinguish between precision and accuracy of measurement.
- 3.4 – I can measure linear distances with accuracy using a scale, ruler, or dial caliper and report the measurement using an appropriate level of precision.
- 3.5 – I can use units to guide the solution to multi-step problems through dimensional analysis and choose and interpret units consistently in formulas.
- 3.6 – I can convert quantities between units in the SI and the US Customary measurement systems.
- 3.7 – I can convert between different units within the same measurement system including the SI and US Customary measurement systems.
- 3.8 – I can dimension orthographic projections of simple objects or parts according to a set of dimensioning standards and accepted practices.
- 3.9 – I can identify and correct errors and omissions in the dimensions applied in a technical drawing based on accepted practice and a set of dimensioning rules.
- 3.10 – I can calculate statistics related to central tendency including mean, median, and mode.
- 3.11 – I can calculate statistics related to variation of data including standard deviation and range.
- 3.12 – I can represent data with plots on the real number line.
- 3.13 – I can use statistics to quantify information, support design decisions, and justify problem solutions.
- 3.14 – I can use a spreadsheet program to store and manipulate raw data.
- 3.15 – I can use a spreadsheet program to perform calculations using formulas.
- 3.16 – I can use a spreadsheet program to create and display a histogram to represent a set of data.

UNIT 4: MODELING SKILLS

- 4.1 – I can explain the term “function” and identify the set of inputs for the function as the domain and the set of outputs from the function as the range.
- 4.2 – I can identify the terminology related to and the use of a 3D solid modeling program in the creation of solid models and technical drawings.
- 4.3 – I can differentiate between additive and subtractive 3D solid modeling methods.
- 4.4 – I can develop and use graphical, computer, physical and mathematical models as appropriate to represent or solve problems.
- 4.5 – I can fabricate a simple object from technical drawings that may include an isometric view and orthographic projections.
- 4.6 – I can create 3D solid models of parts within CAD from sketches or dimensioned drawings using appropriate geometric and dimensional constraints.
- 4.7 – I can generate CAD multi-view technical drawings, including orthographic projections and pictorial views, as necessary, showing appropriate scale, appropriate view selection, and correct view orientation to fully describe a simple part according to standard engineering practice.
- 4.8 – I can construct a testable prototype of a problem solution.

- 4.9 – I can analyze the performance of a design during testing and judge the solution as viable or non-viable with respect to meeting the design requirements.
- 4.10 – I can create a set of working drawings to detail a design project.
- 4.11 – I can organize and express thoughts and information in a clear and concise manner.
- 4.12 – I can utilize project portfolios to present and justify design projects.
- 4.13 – I can use a spreadsheet program to graph bi-variate data and determine an appropriate mathematical model using regression analysis.
- 4.14 – I can construct a scatter plot to display bi-variate data, investigate patterns of association, and represent the association with a mathematical model (linear equation) when appropriate.
- 4.15 – I can solve equations for unknown quantities by determining appropriate substitutions for variables and manipulating the equations.
- 4.16 – I can use function notation to evaluate a function for inputs in its domain and interpret statements that use function notation in terms of a context.
- 4.17 – I can build a function that describes a relationship between two quantities given a graph, a description of a relationship, or two input-output pairs.
- 4.18 – I can interpret a function to solve problems in the context of the data.
- 4.19 – I can interpret the slope and the intercept of a linear function in the context of data.
- 4.20 – I can compare the efficiency of the modeling method of an object using different combinations of additive and subtractive methods.

UNIT 5: GEOMETRY OF DESIGN

- 5.1 – I can identify types of polygons including a square, rectangle, pentagon, hexagon, and octagon.
- 5.2 – I can differentiate between inscribed and circumscribed shapes.
- 5.3 – I can identify and differentiate geometric constructions and constraints and the results when applied to sketch features within a 3D solid modeling environment.
- 5.4 – I can distinguish between the meanings of the terms weight and mass.
- 5.5 – I can define the term “physical property” and identify the properties of length, volume, mass, weight, density, and surface area as physical properties.
- 5.6 – I can identify 3D objects generated by rotations of 2D shapes and vice-versa.
- 5.7 – I can solve real world and mathematical problems involving area and surface area of two- and three-dimensional objects composed of triangles, quadrilaterals, polygons, cubes, right prisms, cylinders, and spheres.
- 5.8 – I can create 3D solid models of parts within CAD from sketches or dimensioned drawings using appropriate geometric and dimensional constraints and model features.
- 5.9 – I can measure mass with accuracy using a scale and report the measurement using an appropriate level of precision.
- 5.10 – I can measure volume with accuracy and report the measurement with an appropriate level of precision.
- 5.11 – I can calculate a physical property indirectly using available data or perform appropriate measurements to gather the necessary data.
- 5.12 – I can solve volume problems using volume formulas for rectangular solids, cylinders, pyramids, cones, and spheres.
- 5.13 – I can use physical properties to solve design problems.

5.14 – I can assign a specific material to a part and use the capabilities of the CAD software to determine the mass, volume, and surface area of an object for which a 3D solid model has been created.

5.15 – I can assign a density value to a new material and apply the material to a 3D solid model within CAD software in order to determine the physical properties of the object.

UNIT 6: REVERSE ENGINEERING

6.1 – I can identify and describe the visual principles and elements of design apparent in a natural or man-made object.

6.2 – I can describe the process of reverse engineering.

6.3 – I can explain the various reasons to perform reverse engineering including discovery, documentation, investigation, and product improvement.

6.4 – I can explain how the visual elements and principles of design affect the aesthetics and commercial success of a product.

6.5 – I can perform a functional analysis of a product in order to determine the purpose, inputs and outputs, and the operation of a product or system.

6.6 – I can perform a structural analysis of a product in order to determine the materials used and the form of component parts as well as the configuration and interaction of component parts when assembled.

6.7 – I can select and utilize technology (software and hardware) to create high impact visual aids.

UNIT 7: DOCUMENTATION

7.1 – I can identify and differentiate between size dimensions and location dimensions.

7.2 – I can identify and correctly apply chain dimensioning or datum dimensioning methods to a technical drawing.

7.3 – I can identify dimensioning standards commonly used in technical drawing.

7.4 – I can identify the shapes of two-dimensional cross sections of three dimensional objects.

7.5 – I can identify, define and explain the proper use of a section view in technical drawing.

7.6 – I can read and interpret a hole note to identify the size and type of hole including through, clearance, blind, counter bore, and countersink holes.

7.7 – I can identify and differentiate among limit dimensions, a unilateral tolerance, and a bilateral tolerance.

7.8 – I can differentiate between clearance and interference fit.

7.9 – I can explain each assembly constraint, its role in an assembly model, and the degrees of freedom that it removes from the movement between parts.

7.10 – I can hand sketch a scaled full or half section view in the correct orientation to fully detail an object or part given the actual object, a detailed verbal description of the object, a pictorial view of the object, or a set of orthographic projections.

7.11 – I can generate section views using CAD according to standard engineering practice.

7.12 – I can dimension a section view of a simple object or part according to a set of dimensioning standards and accepted practices.

7.13 – I can annotate working drawings according to accepted engineering practice.

- 7.14 – I can create specific notes on a technical drawing to convey important information about a specific feature of a detailed object, and create general notes to convey details that pertain to information presented on the entire drawing.
- 7.15 – I can model and annotate through, clearance, blind, counter bore, and countersink holes.
- 7.16 – I can compare the effect of chain dimensioning and datum dimensioning on the tolerance of a particular specified dimension.
- 7.17 – I can determine the specified dimension, tolerance, upper limit, and lower limit for any given dimension and related tolerance shown on a technical drawing.
- 7.18 – I can determine the allowance between two mating parts of an assembly based on dimensions given on a technical drawing.
- 7.19 – I can identify the type of fit given a drawing, a description, or a physical example of two mating parts.
- 7.20 – I can create assemblies of parts in CAD and use appropriate assembly constraints to create an assembly that allows correct realistic movement among parts. Manipulate the assembly model to demonstrate the movement.
- 7.21 – I can create a CAD assembly drawing. Identify each component of the assembly with identification numbers and create a parts list to detail each component using CAD.
- 7.22 – I can analyze information gathered during reverse engineering to identify shortcoming of the design and/or opportunities for improvement or innovation.
- 7.23 – I can define and justify a design problem and express the concerns, needs, and desires of the primary stakeholders.
- 7.24 – I can present and justify design specifications, and clearly explain the criteria and constraints associated with a successful design solution.
- 7.25 – I can write a design brief to communicate the problem, problem constraints, and solution criteria.
- 7.26 – I can support design ideas using a variety of convincing evidence.
- 7.27 – I can jointly develop a decision matrix based on accepted outcome criteria and constraints.
- 7.28 – I can clearly justify and validate a selected solution path.
- 7.29 – I can create a set of working drawings to detail a design project.

UNIT 8: ADVANCED COMPUTER MODELING

- 8.1 – I can identify, define, and explain the proper use of an auxiliary view in technical drawing.
- 8.2 – I can use advanced modeling features to create three-dimensional solid models of complex parts and assemblies within CAD and with little guidance given the actual part using appropriate geometric and dimensional constraints.
- 8.3 – I can formulate equations and inequalities to represent relationships between quantities.
- 8.4 – I can create relationships among part features and dimensions using parametric formulas.
- 8.5 – I can create an exploded assembly view of a multi-part product while identifying each component of the assembly with identification numbers and create a parts list to detail each component.
- 8.6 – I can perform a peer review of technical drawings and offer constructive feedback based on standard engineering practices.
- 8.7 – I can hand sketch an auxiliary view in the correct orientation to fully detail an object or part given the actual object, a detailed verbal description of the object, a pictorial view of the object, or a set of orthographic projections.

8.8 – I can generate an auxiliary view using CAD according to standard engineering practice.

UNIT 9: DESIGN TEAM

9.1 – I can identify and describe the steps of a typical product lifecycle.

9.2 – I can identify and explain how the basic theories of ethics relate to engineering.

9.3 – I can identify team member skill sets needed to produce an effective team.

9.4 – I can define the term group norms and discuss the importance of norms in creating an effective team environment.

9.5 – I can identify the advantages and disadvantages of virtual design teams compared to traditional design teams.

9.6 – I can assess the development of an engineered product and the impact of the product on society and the environment.

9.7 – I can utilize research tools and resources to validate design decisions and justify a problem solution.

9.8 – I can summarize key ideas in information sources including scientific and engineering texts, tables, diagrams, and graphs.

9.9 – I can deliver organized oral presentations of work tailored to the audience.

9.10 – I can organize and express thoughts and information in a clear and concise manner.

9.11 – I can participate on a virtual team using remote collaboration tools to support team collaboration and problem solving.

9.12 – I can identify appropriate technology to support remote collaboration among virtual design team members.

9.13 – I can demonstrate positive team behaviors and contribute to a positive team dynamic.

9.14 – I can contribute equitably to the attainment of group goals based on assigned roles.

9.15 – I can practice appropriate conflict resolution strategies within a team environment.

9.16 – I can identify an appropriate mode of two-way communication based on the audience and intended goal of the communication.

9.17 – I can use an appropriate and professional tone and vernacular based on the audience of the correspondence.

9.18 – I can document correspondence and conversations in an accurate and organized manner.

9.19 – I can create and utilize a Gantt chart to plan, monitor, and control task completion during a design project.

9.20 – I can adjust voice and writing style to align with audience and purpose.

9.21 – I can deliver organized oral presentations of work tailored to the audience.

UNIT 10: DESIGN CHALLENGES

10.1 – I can identify the steps in an engineering design process and describe the activities involved in each step of the process.

10.2 – I can develop and document an effective solution to a problem that meets specific design requirements.

10.3 – I can document and describe the design process used in the solution of a problem and reflect on all steps of the design process.

Take a photo of this portion and upload to Google Classroom!

- We have read and understood Mr. DeFelice's PLTW Introduction to Engineering Design syllabus and classroom expectations and will work together to make this a successful and exciting year.
- We understand that our student will be issued lab supplies and tools to perform many of the hands on assignments and that it will be his/her responsibility to treat all materials with proper respect.
- We understand that students may be asked to find and/or purchase materials to bring in to use with their projects and that every effort will be made to minimize the cost and impact to the student.
- We understand that our student will need to be ready to start participating in the class by the second meeting of the class. As such he/she will need to have the materials outlined in class.
- We understand that safety is of primary importance and expect our student to respect and comply with Mr. DeFelice's instructions.
- We understand that cell phones and other personal devices will be allowed if they are used to scan images from an engineering notebooks and to take pictures of projects to incorporate in assignments to submit for grading. There will be no use of such devices during lecture times.

I certify that I have read and understand the information stated above and I will direct any questions I have to Mr. DeFelice.

Student signature

Print name

Block

Parent/Guardian signature

Print name

Date

Parent/Guardian email

Daytime phone

Evening phone

Welcome to another great year at Woodbridge Senior High School!