

Wallenpaupack Area School District

Wallenpaupack Area High School

Course Title: Introduction to Technology and Engineering

Length of Course: Semester – 1 credit

District Policies:

Academic Integrity:

Academic integrity is essential to the success of an educational community. Students are responsible for learning and upholding professional standards of research, writing, assessment, and ethics in their areas of study. Written or other work which students submit must be the product of their own efforts and must be consistent with appropriate standards of professional ethics. Academic dishonesty, which includes cheating, plagiarism, multiple submissions and other forms of dishonest or unethical behavior, is prohibited.

Assessment:

The goal of grading is to report student progress and achievement to the parents to strengthen the home-school connection. The grade should accurately reflect the student's performance in mastering the PA Standards and the WASD curriculum.

Attendance:

Regular school attendance is vitally important to academic success. Not only does attendance reinforce and enrich the learning process; it also establishes patterns and attitudes that will carry forward into adult work habits. Regular, consistent attendance is a prerequisite to successful school life. Children should be absent only in cases of illness or emergency.

Special Education:

Our commitment to each student is to ensure a free appropriate public education which begins with the general education setting, with the use of Supplementary Aids and Services. Inclusive education describes the successful education of all students with the appropriate supports and services to participate in and benefit from the general classroom settings and other educational environments.

Course Description:

This course will give students opportunities to obtain skills that will help them become future designers and engineers in various fields. Activities and topics include exercises in sketching, mechanical drawing, 3-dimensional representation, fundamentals of design, manufacturing processes and career exploration. Students will complete the course by participating in a technical design brief where they will produce a creative solution to a design problem and construct a working model. After completing this course, a variety of advanced courses may be elected.

Pennsylvania State Standards: Pennsylvania Science and Technology Standards

3.4.10.A1: Illustrate how the development of technologies is often driven by profit and an economic market.

3.4.10.A2: Interpret how systems thinking applies logic and creativity with appropriate comprises in complex real-life problems.

3.4.10.A3: Examine how technology transfer occurs when a new user applies an existing innovation developed for one purpose in a different function.

3.4.12.A3: Demonstrate how technological progress promotes the advancement of science, technology, engineering and mathematics.

3.4.10.B1: Compare and contrast how the use of technology involves weighing the trade-offs between the positive and negative effects.

3.4.10.B2: Demonstrate how humans devise technologies to reduce the negative consequences of other technologies.

3.4.10.B4: Recognize that technological development has been evolutionary, the result of a series of refinements to a basic invention.

3.4.10.C1: Apply the components of the technological design process.

3.4.10.C2: Analyze a prototype and/or create a working model to test a design concept by making actual observations and necessary adjustments.

3.4.12.C2: Apply the concept that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.

3.4.10.C3: Illustrate the concept that not all problems are technological and not every problem can be solved using technology.

3.4.12.C3: Apply the concept that many technological problems require a multi-disciplinary approach.

3.4.10.D1: Refine a design by using prototypes and modeling to ensure quality, efficiency, and productivity of a final product.

3.4.10.D2: Diagnose a malfunctioning system and use tools, materials, and knowledge to repair it.

3.4.12.D2: Verify that engineering design is influenced by personal characteristics, such as creativity, resourcefulness, and the ability to visualize and think abstractly.

3.4.10.D3: Synthesize data, analyze trends, and draw conclusions regarding the effect of technology on the individual, society, and the environment.

Course Objectives:

Students will demonstrate the ability to:

- Describe the history and importance of technical drawings.
- Explain the training needed to become an engineer, architect, designer, or drafter.
- Describe what career prospects and opportunities are available in the technical drawing field.
- Visualize and interpret the multiple views of an object.
- Describe linetypes, lineweights, and drafting standards.
- Explain the difference between first and third angle projection techniques.
- Describe the tools and techniques used in traditional drafting
- Convert between decimal, fraction and metric units
- Describe Computer Aided Drafting and the importance in today's design community
- Define what dimensions are and apply ASME, ISO and NCS standards
- Define isometric drawings and correctly orient lines, ellipses, fillets and rounds
- Define and describe how section views are used in technical drawings
- Define and describe how auxiliary views are used in technical drawings
- Define coordinates along X, Y and Z axes.
- Describe the Engineering Design Process and how it applies to the design and invention of everyday things

Students will master the skills of:

- Creating multiview sketches of objects including the correct placement and description of visible, hidden, and center lines.
- Using traditional drafting equipment and techniques to create accurate multiview drawings of objects
- Hand lettering of notes and dimensions on technical drawings that are clear and legible
- Creating and editing CAD files using AutoCAD commands
- Adding dimensions to mechanical engineering and architectural drawings
- Constructing isometric drawings in AutoCAD
- Using AutoCAD to create section views of an object
- Using AutoCAD to create auxiliary views of an object
- Utilizing AutoCAD to create mechanical working drawings
- Utilizing AutoCAD to create architectural working drawings
- Creating 3D models utilizing AutoCAD and Inventor

Major Activities to Support Course Objectives:

- College and Career exploration Activity
- Multiview sketch unit drawings
- Multiview AutoCAD unit drawings
- Sectional view unit drawings
- Auxiliary view unit drawings
- Mechanical working drawings assignment
- Architectural plan and modeling assignment
- Transportation Engineering Design Brief
- Manufacturing Engineering Design Brief

Student Responsibilities:

Attendance expectations:

It is expected that every student attend every class period or block. If a student is absent, they are responsible for the information and assignments that were covered in the missed class.

Homework expectations:

When homework is assigned it is expected that the student completes it to the best of their ability and hand it in on time. Late homework will not be graded.

Make-Up Work:

Students who miss school for legal reasons will be allowed as many days to make up any missed work as they were absent. As an example: If a student misses five days of school, he or she will have five school days to make up the work beginning when he or she returns and not counting any days he or she is subsequently absent.

Students who are on homebound are generally expected to be current with their schoolwork upon their return, but some latitude may be given in individual circumstances.

Students who have unexcused absences may receive a zero for the day and may not be allowed to make up work.

Late Work:

Students that hand work and assignments in late will receive loss of credit equaling no less than 1/10 of the assigned value for each day it is late.

Assessment:**Grading Components:**

- Homework
- Unit Reviews
- Class work
- Exams
- Projects

Quarter Grades:

Quarterly grades will be an accumulation of points from class work, drawing exercises, projects and exams.

Final Exam:

Final exam is valued at 14% of the student's final average

Content Pacing Guide:

| Topic | Major Assignments | Estimated Time |
|---|--|----------------|
| Technical Drawing | College and Career Exploration | 4 blocks |
| Multiview Drawings | Multiview Exercises | 7 blocks |
| Traditional Drafting | Traditional Drafting Projects | 7 blocks |
| AutoCAD Basics | Basic CAD Projects | 20 blocks |
| Dimensioning | Engineering and Architecture Dimensioning Projects | 6 blocks |
| Isometric Drawings | Isometric Drawing Projects | 7 blocks |
| Section Views | Sectioning CAD Project | 4 blocks |
| Auxiliary Views | Auxiliary Views CAD Projects | 5 blocks |
| Blocks | Block CAD Assignments | 3 blocks |
| Mechanical Working Drawings | Mechanical Working Drawing Assignment | 5 Blocks |
| Architectural Working Drawings | Architectural Working Drawing Assignment | 5 Blocks |
| 3D Modeling Basics | Solid Primitives Projects | 5 Blocks |
| Intro to the Engineering Design Process | Engineering Design Brief Projects | 12 blocks |