

High School Principles of Engineering and Technology



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Room 306

Website: www.andrewgatt.com –Helpful links and student work are posted here. If we use any video clips or visit any websites in class, you will be able to find links here. The QR code on the left will take you to andrewgatt.com.

Class Objective: This course is intended to help you familiarize yourself with engineering systems and technologies and to help you familiarize yourself with the process of engineering design and examine manufacturing technologies and processes. The class will meet daily for 90 minutes for one semester.

Curriculum: We have chosen to use the online course Principles of Engineering and Technology from Plato Courseware. I will add some classroom activities to the curriculum during the semester. A detailed curriculum for the course is printed on the following pages.

Materials: Students are expected to come to class with a notebook and pencil every day. There is also a \$15 supply fee which will be used to purchase materials and tools needed for the course. Please send in a check by Friday, August 18th, made out to Eno River Academy for \$15 with "High School Engineering" on the memo line.

Homework: Students will have few homework assignments in engineering, but may need to work on the course outside of class time if they start to fall behind.

Grading: Students will receive engineering grades based upon online quizzes, tests, classwork, projects, and homework assignments.

Syllabus

PLATO Course Principles of Engineering and Technology, Semester A

Course Overview

This one-semester course is intended to help you familiarize yourself with engineering systems and technologies. This course has thirteen lessons organized into three units. Each unit has a Unit Activity and each lesson contains one or more Lesson Activities.

This course will cover the evolution of engineering and technology, careers in engineering, and engineering systems and technologies.

You will submit the Unit Activity documents to your teacher, and you will grade your work in the Lesson Activities by comparing them with given sample responses. The Unit Activities (submitted to the teacher), and the Lesson Activities (self-checked) are the major components of this course. There are other assessment components, namely the mastery test questions that feature along with the lesson; the pre- and post-test questions that come at the beginning and end of the unit, respectively; and an end-of-semester test. All of these tests are a combination of simple multiple-choice questions and technology enhanced (TE) questions.

Course Goals

This course will help you meet the following goals:

- Understand the relationship between engineering and technology.
- Explore the evolution of engineering and technology.
- Assess how engineering and technology influence society and the environment.
- Describe modern technologies and how they interact.
- Describe high-precision measurement technologies.
- Analyze job-specific technologies and discuss the ethical issues related to the use of technology.
- Identify the branches of engineering and the technologies associated with them.
- Explore various career opportunities.
- Discuss the importance of various employability characteristics and teamwork.

- Examine simple and compound machines and their mechanisms.
- Explain the structure and applications of fluid systems.
- Describe thermal systems and their functions.
- Examine electrical systems and analyze electrical circuits.
- Describe the applications of biotechnology.
- Examine construction technologies and analyze structural designs.

Prerequisite Skills

Principles of Engineering and Technology Semester A has the following prerequisites:

- basic math knowledge
- ability to visualize and apply creativity and innovation
- familiarity with the writing process and following guidelines
- basic computer skills
- ability to structure and process information

General Skills

To participate in this course, you should be able to do the following:

- Perform basic operations on a computer.
- Perform online research using various search engines and library databases.
- Communicate through email and participate in discussion boards.

For a complete list of general skills that are required for participation in online courses, refer to the Prerequisites section of the Plato Student Orientation document, found at the beginning of this course.

Credit Value

Principles of Engineering and Technology Semester A is a 0.5-credit course.

Course Materials

- Notebook
- Computer with Internet connection and speakers or headphones

Course Pacing Guide

This course description and pacing guide is intended to help you stay on schedule with your work. Note that your course instructor may modify the schedule to meet the specific needs of your class.

Unit 1: Introduction to Engineering and Technology

Summary

In this unit, you will familiarize yourself with the advancements in technology and engineering. You will examine how technology has evolved and describe some modern technologies and their applications. You will examine job-specific technologies and demonstrate safe use of technological resources.

Day	Activity/Objective	Type
1 day: 1	Syllabus and Plato Student Orientation <i>Review the Plato Student Orientation and Course Syllabus at the beginning of this course.</i>	Course Orientation
5 days: 2–6	Engineering and Technology <i>Discuss engineering and technology in the context of human necessities, culture, society, and the environment.</i>	Lesson
5 days: 7–11	A Survey of Modern Technology <i>Identify key technologies, describe their use, and examine how they interact in modern society.</i>	Lesson
5 days: 12–16	Job-Specific Technologies <i>Demonstrate proficiency with job-specific technologies by selecting and safely using technological resources to accomplish work responsibilities in a productive manner.</i>	Lesson
1 day: 17	Space Jumble	Game
5 days: 18–22	Unit Activity/Threaded Discussion—Unit 1	Activity
1 day: 23	Post-test—Unit 1	Assessment

Unit 2: Career Exploration

Summary

In this unit, you will examine the different branches of engineering and the technologies associated with them. You will explore various careers in engineering. You will identify some important employability characteristics. You will discuss the importance of leadership skills and teamwork.

Day	Activity/Objective	Type
5 days: 24–28	Branches of Engineering <i>Identify the major branches of engineering and describe the emerging technologies associated with them.</i>	Lesson
5 days: 29–33	Careers in Engineering <i>Describe career opportunities in engineering and examine how an engineering team works.</i>	Lesson
5 days: 34–38	Positive Work Ethics <i>Demonstrate a positive work ethic by coming to work every day on time, a willingness to take direction, and motivation to accomplish the task at hand.</i>	Lesson
5 days: 39–43	Integrity <i>Demonstrate integrity by abiding by workplace policies and laws and demonstrating honesty and reliability.</i>	Lesson
1 day: 44	Para Jumble	Game
5 days: 45–49	Unit Activity/Threaded Discussion—Unit 2	Activity
1 day: 50	Post-test—Unit 2	Assessment

Unit 3: Engineering Systems and Technologies

Summary

In this unit, you will describe the components of mechanical systems and explain their mechanisms. You will examine fluid systems and their applications. You will describe thermal systems and their functions. You will identify the components of electrical systems and analyze electrical circuits. You will describe the applications of biotechnology. You will examine construction technologies and analyze structural designs.

Day	Activity/Objective	Type
6 days: 51–56	Mechanical Systems <i>Examine the concepts and components common to all mechanical systems.</i>	Lesson
5 days: 57–61	Fluid Systems <i>Explain the structure, functions, and applications of fluid systems.</i>	Lesson
5 days: 62–66	Thermal Systems <i>Analyze and describe systems in which energy is transferred in the form of heat.</i>	Lesson
5 days: 67–71	Electrical Systems <i>Examine the components of electrical systems and apply physical laws to analyze electrical circuits.</i>	Lesson
5 days: 72–76	Biotechnology <i>Describe the field of biotechnology and its applications in medicine and agriculture.</i>	Lesson
5 days: 77–81	Construction Technologies <i>Examine construction technologies, analyze structural designs, and identify safety laws.</i>	Lesson
1 day: 82	Thwack-A-Mole	Game
5 days: 83–87	Unit Activity/Threaded Discussion—Unit 3	Activity
1 day: 88	Post-test—Unit 3	Assessment
1 day: 89	Semester Review	
1 day:	End-of-Semester Test	Assessment

Syllabus

PLATO Course Principles of Engineering and Technology, Semester B

Course Overview

This one-semester course is intended to help you familiarize yourself with the process of engineering design and examine manufacturing technologies and processes. This course has seventeen lessons organized into four units. Each unit has a Unit Activity and each lesson contains one or more Lesson Activities.

This course will cover the concepts in engineering design, manufacturing processes and materials, communication skills, and team and resource management.

You will submit the Unit Activity documents to your teacher, and you will grade your work in the Lesson Activities by comparing them with given sample responses. The Unit Activities (submitted to the teacher), and the Lesson Activities (self-checked) are the major components of this course. There are other assessment components, namely the mastery test questions that feature along with the lesson; the pre- and post-test questions that come at the beginning and end of the unit, respectively; and an end-of-semester test. All of these tests are a combination of simple multiple-choice questions and technology enhanced (TE) questions.

Course Goals

This course will help you meet the following goals:

- Understand the design process.
- Examine methods for evaluating problems and generating creative solutions.
- Compare energy sources and explain the principles of electrical power generation and transmission.
- Analyze various manufacturing processes and materials.
- Examine the applications of different types of engineering control systems.
- Analyze safety systems and demonstrate safe working habits.
- Identify some important employability characteristics.
- Demonstrate good communication skills.

- Demonstrate time, task, and resource management.
- Discuss the importance of teamwork and demonstrate team management skills.

Prerequisite Skills

Principles of Engineering and Technology Semester B has the following prerequisites:

- basic math knowledge
- ability to visualize and apply creativity and innovation
- familiarity with the writing process and following guidelines
- basic computer skills
- ability to structure and process information

General Skills

To participate in this course, you should be able to do the following:

- Perform basic operations on a computer.
- Perform online research using various search engines and library databases.
- Communicate through email and participate in discussion boards.

For a complete list of general skills that are required for participation in online courses, refer to the Prerequisites section of the Plato Student Orientation document, found at the beginning of this course.

Credit Value

Principles of Engineering and Technology Semester B is a 0.5-credit course.

Course Materials

- Notebook
- Computer with Internet connection and speakers or headphones

Course Pacing Guide

This course description and pacing guide is intended to help you stay on schedule with your work. Note that your course instructor may modify the schedule to meet the specific needs of your class.

Unit 1: Engineering Design

Summary

In this unit, you will examine the process of engineering design and apply the principles of ideation and decision-making strategies in engineering design. You will explain the importance of creativity and resourcefulness in the workplace. You will describe the fundamental steps of analyzing and finding solutions to a problem.

Day	Activity/Objective	Type
1 day: 1	Syllabus and Plato Student Orientation <i>Review the Plato Student Orientation and Course Syllabus at the beginning of this course.</i>	Course Orientation
4 days: 2–5	The Engineering Design Process <i>Describe and analyze the stages of the engineering design process and identify the constraints in design.</i>	Lesson
4 days: 6–9	Creative Resourcefulness <i>Demonstrate creativity and resourcefulness by contributing new ideas and working with initiative.</i>	Lesson
3 days: 10–12	Critical Thinking and Problem Solving <i>Demonstrate critical-thinking and problem-solving skills by analyzing and resolving problems that arise in completing assigned tasks.</i>	Lesson
1 day: 13	Space Jumble	Game
4 days: 14–17	Unit Activity/Threaded Discussion—Unit 1	Activity
1 day: 18	Post-test—Unit 1	Assessment

Unit 2: Manufacturing and Safety

Summary

In this unit, you will compare energy sources and describe the principles of electrical power generation and transmission. You will analyze the properties of different types of engineering materials. You will describe manufacturing processes and examine industrial automation concepts. You will identify the components of various control systems and discuss their applications. You will analyze safety systems and demonstrate safe working habits.

Day	Activity/Objective	Type
4 days: 19–22	Energy Sources <i>Compare energy sources and describe power generation systems.</i>	Lesson
4 days: 23–26	Properties of Materials <i>Identify the major types of engineering materials and analyze their properties.</i>	Lesson
4 days: 27–30	Manufacturing Processes and Automation <i>Analyze manufacturing processes and describe industrial automation concepts.</i>	Lesson
4 days: 31–34	Control Systems <i>Describe the types of engineering control systems and explain their applications.</i>	Lesson
4 days: 35–38	Safety in Engineering <i>Demonstrate safe working habits and examine safety systems in engineering.</i>	Lesson
1 day: 39	Thwack-A-Mole	Game
4 days: 40–43	Unit Activity/Threaded Discussion—Unit 2	Activity
1 day: 44	Post-test—Unit 2	Assessment

Unit 3: Communication

Summary

In this unit, you will describe appropriate workplace etiquette. You will apply effective reading and writing strategies. You will demonstrate effective speaking and listening skills. You will analyze the use of various telecommunication devices and services. You will discuss strategies for providing improved customer satisfaction.

Day	Activity/Objective	Type
4 days: 45–48	Self-Representation <i>Demonstrate positive self-representation skills by dressing appropriately and using language and manners suitable for the workplace.</i>	Lesson
3 days: 49–51	Reading and Writing <i>Demonstrate effective reading and writing skills by reading and interpreting workplace documents and writing clearly.</i>	Lesson
3 days: 52–54	Speaking and Listening <i>Demonstrate effective speaking and listening skills by communicating effectively with customers and employees and following directions.</i>	Lesson
4 days: 55–58	Telecommunications <i>Demonstrate proficiency with telecommunications by selecting and using appropriate devices, services, and applications.</i>	Lesson
4 days: 59–62	Customer Service <i>Demonstrate customer service skills by identifying and addressing the needs of all customers and providing helpful, courteous, and knowledgeable service.</i>	Lesson
1 day: 63	Para Jumble	Game
4 days: 64–67	Unit Activity/Threaded Discussion—Unit 3	Activity
1 day: 68	Post-test—Unit 3	Assessment

Unit 4: Team Management

Summary

In this unit, you will learn how to prioritize tasks to meet timelines and demonstrate resource management skills. You will identify leadership qualities required to build an effective team. You will examine strategies to resolve workplace conflicts and demonstrate diversity awareness.

Day	Activity/Objective	Type
4 days: 69–72	Time, Task, and Resource Management <i>Demonstrate time, task, and resource management skills by organizing and implementing a productive plan of work.</i>	Lesson
4 days: 73–76	Teamwork <i>Demonstrate teamwork skills by contributing to the success of the team, assisting others, and requesting help when needed.</i>	Lesson
3 days: 77–79	Diversity Awareness <i>Demonstrate diversity awareness by working well with all customers and coworkers.</i>	Lesson
3 days: 80–82	Conflict Resolution <i>Demonstrate conflict-resolution skills by negotiating diplomatic solutions to avoid interpersonal and workplace issues.</i>	Lesson
1 day: 83	Space Jumble	Game
4 days: 84–87	Unit Activity/Threaded Discussion—Unit 4	Activity
1 day: 88	Post-test—Unit 4	Assessment
1 day: 89	Semester Review	
1 day: 90	End-of-Semester Test	Assessment