

PRINCIPLES OF ENGINEERING AND TECHNOLOGY, SEMESTER B

Credits: 0.5

COURSE OVERVIEW AND GOALS

[Getting Started/Best Practices Template](#)

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.

Prerequisite courses: Principles of Engineering and Technology, Semester A

Foundational skills: In addition to general literacy and communication skills needed for all high school online courses, students should have general knowledge of algebra and physical science.

By the end of this course, you will be able to do the following:

- ❖ Evaluate engineering design processes and systems to solve complex technical problems.
- ❖ Analyze energy systems and materials to design sustainable engineering solutions.
- ❖ Analyze employability characteristics to develop professional workplace competencies.
- ❖ Evaluate manufacturing processes and automation systems in industrial contexts.
- ❖ Evaluate safety systems and apply safe working practices in engineering environments.
- ❖ Synthesize professional workplace communication strategies across multiple contexts.

- ❖ Analyze telecommunications systems and their impact on workplace operations.
- ❖ Design strategic career development plans using professional management skills.
- ❖ Evaluate the role of professional organizations in career and technical education.

COURSE COMPONENTS AND GRADING RUBRIC

The table gives a breakdown of the weight for each component in the course. Weight represents the percentage of the total score coming from each activity.

Course Components	Count	Weight *
Pretest. <i>A pretest is an optional assessment, typically designed for credit recovery. If a student shows mastery of a lesson objective, the student may be automatically exempted from the upcoming activities associated with the mastered objective. Pretests are not included as a component of the student's final grade.</i>	4	0%
Module. <i>Each module in this course contains an interactive tutorial or study and an associated mastery test. Tutorials and studies combine instruction and practice to prepare students for the mastery test, which is a computer-scored lesson-level summative assessment. The module score comes from a student's score on the mastery test.</i>	17	20%
Discussion. <i>A discussion activity is an opportunity for students to collaborate with their peers. An online threaded discussion mirrors the educational experience of a classroom discussion initiated when a teacher asks a complex, open-ended question. Students can engage in the discussion by responding both to the question and to the thoughts of others allowing for higher-order thinking about terminal objectives.</i>	4	20%
Unit Activity. <i>A Unit Activity is at the end of a unit and constitutes one or more small tasks. Its purpose is to deepen understanding of key unit concepts and tie them together. Each Unit Activity includes a simple rubric. The teacher versions include both a rubric and modeled sample answers. Unit Activities are teacher graded.</i>	4	20%
Posttest. <i>A posttest appears at the end of each unit.</i>	4	20%

Course Components	Count	Weight*
End-of-Semester Test. <i>An end-of-semester test (EOS) appears at the end of each course.</i>	1	20%
Total	34	100%

Weight* Teachers may manually adjust these weights if desired, per district grading requirements.

SCOPE AND SEQUENCE

UNIT 1: ENGINEERING DESIGN

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.

Activity	Activity Objective
Syllabus	Review the Course Syllabus at the beginning of the course.
The Engineering Design Process	Identify the stages of the engineering design process and the constraints in design.
Creative Resourcefulness	Identify methods for creative thinking, problem-solving, and resourcefulness in the workplace.
Critical Thinking and Problem Solving	Apply critical-thinking and problem-solving skills to solve problems.

UNIT 2: MANUFACTURING AND SAFETY

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.

Activity	Activity Objective
Energy Sources	Examine energy sources and power generation systems.
Properties of Materials	Identify the major types of engineering materials and their properties.
Manufacturing Processes and Automation	Examine manufacturing processes and industrial automation concepts.
Control Systems	Identify the types of engineering control systems and their applications.
Safety in Engineering	Recognize safe working habits and safety systems in engineering.

UNIT 3: COMMUNICATION

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.

Activity	Activity Objective
Self-Representation	Identify positive self-representation skills by dressing appropriately and using language and manners suitable for the workplace.

Activity	Activity Objective
Reading and Writing	Describe effective reading and writing skills by reading and interpreting workplace documents and writing clearly.
Speaking and Listening	Identify effective speaking and listening skills by communicating effectively with customers and employees and following directions.
Telecommunications	Examine the evolution of telecommunications and identify different telecommunications devices or services.
Customer Service	Recognize customer service skills and best practices, describe internal and external customers, and identify strategies for improving customer satisfaction.

UNIT 4: TEAM MANAGEMENT

In this unit, you will explain 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.

Activity	Activity Objective
Time, Task, and Resource Management	List time, task, and resource management skills and explain how to organize and implement a productive plan of work.
Teamwork	Identify teamwork and leadership skills needed to successfully lead a team.

Activity	Activity Objective
Diversity Awareness	Recognize the role and importance of diversity.
Conflict Resolution	Identify conflict-resolution skills by negotiating diplomatic solutions to avoid interpersonal and workplace issues.

COURSE MAP

You will achieve course level objectives by completing each lesson's instruction, assignments, and assessments. For a detailed look at how the materials meet these objectives, review the [course map](#).