

PRINCIPLES OF MANUFACTURING, SEMESTER A

Credits: 0.5

COURSE OVERVIEW AND GOALS

Principles of Manufacturing, Semester A, is a one-semester course intended to help you familiarize yourself with the evolution of manufacturing and describes manufacturing processes and systems. This course has twelve 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 history and evolution of manufacturing, manufacturing processes, engineering design, and production systems.

You will submit the Unit Activities 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.

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

- ❖ Summarize the evolution of manufacturing and engineering, including processes and systems.
- ❖ Analyze materials, processes, equipment, materials, and tools used in engineering and manufacturing.
- ❖ Evaluate the skills and characteristics needed for positions in the manufacturing industry.
- ❖ Examine the materials, processes, technology, and instruments used in manufacturing and engineering.
- ❖ Create and assess engineering drawings in the manufacturing process.
- ❖ Produce a production schedule using knowledge of the manufacturing process.
- ❖ Compare mass, lean, and agile production.

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>	3	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>	12	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>	3	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>	3	10%
Posttest. <i>A posttest appears at the end of each unit.</i>	3	20%
Course Activity. <i>A Course Activity is similar to a Unit Activity in scope but may be found at any point in the course, either to prepare the student for new learning or to act as a performance-based activity required for a learning objective. Like Unit Activities, Course Activities include simple rubrics, and sample answers are available for teachers. Course Activities are teacher graded.</i>	1	10%
End-of-Semester Test. <i>An end-of-semester test (EOS) appears at the end of each course.</i>	1	20%

Course Components	Count	Weight*
Total	26	100%

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

SCOPE AND SEQUENCE

UNIT 1: ENGINEERING AND MANUFACTURING

In this unit, you'll describe the evolution of technology and advancements in the field of engineering. You'll also describe information technology skills required to use computers and software/programs effectively. In addition, you'll explain the evolution of manufacturing and describe various manufacturing processes, systems, and concepts.

Activity	Activity Objective
Syllabus	Review the Course Syllabus at the beginning of the course.
Engineering and Technology	Describe the evolution of technology and advancements in the field of Engineering.
Information Technology	Name the key features of various information technology tools and state their applications in business.
Evolution of Manufacturing	Explain the evolution of manufacturing and describe various manufacturing processes, systems, and concepts.
Unit Activity: Engineering and Manufacturing	Describe the history of mass production and assembly lines and discuss some future trends in the automobile industry.

UNIT 2: MANUFACTURING PROCESSES AND ENGINEERING DRAWINGS

In this unit, you'll describe different materials used in manufacturing and their applications. You'll also explain different manufacturing processes and describe their use of various tools, equipment, machines, and materials. Then, you'll describe the evolution of measuring instruments and types of precision instruments. Finally, you'll apply basic mathematical formulae used in manufacturing and analyze engineering drawings.

Activity	Activity Objective
Materials in Manufacturing	Describe different materials used in manufacturing and their applications.
Manufacturing Processes	Explain different manufacturing processes and describe their use of various tools, equipment, machines, and materials.
Measurement and Instrumentation	Describe the evolution of measuring instruments and types of precision instruments.
Manufacturing Mathematics and Engineering Drawings	Apply basic mathematical formulae used in manufacturing and analyze engineering drawings.
Unit Activity: Manufacturing Processes and Engineering Drawings	Collect information and analyze results in written form.

UNIT 3: COMPUTER-AIDED DESIGN AND PRODUCTION

In this unit, you'll explain computer-aided design and manufacturing. You'll also explain and compare mass, lean, and agile production. Then, you'll describe how to set goals and manage time and resources effectively. In addition, you'll explain the importance of critical-thinking and problem-solving skills and describe the fundamental steps in analyzing and resolving problems. Finally, you'll explain the importance of creativity and resourcefulness and describe various methods for evaluating problems and generating creative solutions.

Activity	Activity Objective
Computer-Aided Design, Simulation, and Manufacturing	Explain computer-aided design and manufacturing.
Mass, Lean, and Agile Production	Explain mass, lean, and agile production and discuss production careers.
Time, Task, and Resource Management	List time, task, and resource management skills and explain how to organize and implement a productive plan of work.
Critical Thinking and Problem Solving	Identify critical-thinking and problem-solving concepts, workplace applications, and analytical steps.
Creative Resourcefulness	Identify methods for creative thinking, problem-solving, and resourcefulness in the workplace.
Unit Activity: Computer-Aided Design and Production	Prepare a scheduling chart for product manufacturing.
Course Activity: Engineering Drawings	Practice technical drawing and describe the assembly process.

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](#).