

ENGR 0137 - MANUFACTURING PROCESSES

Catalog Description

Formerly known as ENGR 37

Advisory: Completion of ENGR 151 with grade of "C" or better

Hours: 90 (36 lecture, 54 laboratory)

Description: Application of multiple fabrication techniques including tools and materials required for the manufacture of a mechanical assembly. Introduction to design and documentation of a final product. Manufacturing processes in the areas of forming, joining, material removal, casting, welding, assembly and prototyping which includes hands on use of manufacturing equipment. Each student fabricates a final project based on principles of manufacturing. (CSU, UC)

Course Student Learning Outcomes

- CSLO #1: Analyze and interpret engineering drawings.
- CSLO #2: Set up and operate common manufacturing machines (shaping and joining using the mill, lathe, welder, 3D printer, etc.)
- CSLO #3: Summarize and utilize best practices for operating hand tools found in a common machine shop.
- CSLO #4: Write, describe, and produce the concepts of dimensioning and tolerancing and show the capability of both machining and measuring to those constraints.

Effective Term

Fall 2022

Course Type

Credit - Degree-applicable

Contact Hours

90

Outside of Class Hours

72

Total Student Learning Hours

162

Course Objectives

Lecture Objectives:

1. Demonstrate proficiency in interpreting and analyzing engineering drawings.
2. Demonstrate the method used to accurately measure linear distance and perform calculations (example: area, volume).
3. Demonstrate safe techniques for operation of manufacturing equipment (mill, lathe).
4. Compare and contrast the benefits and limitations of different engineering materials.

5. Demonstrate how to evaluate a tolerance and how to enhance manufacturing operations that improve the ability to hold a tight tolerance.
7. Explain standard assembly practices in manufacturing.
8. Compare and contrast different manufacturing processes as they relate to efficiency and the ability to create a quality final product.

Laboratory Objectives:

1. Demonstrate the method used to accurately measure linear distance and perform calculations (example: area, volume).
2. Demonstrate safe techniques for operation of manufacturing equipment (mill, lathe).
3. Demonstrate how to evaluate a tolerance and how to enhance manufacturing operations that improve the ability to hold a tight tolerance.
4. Demonstrate how to operate common manufacturing machines and tools.
5. Demonstrate standard assembly practices in manufacturing.

General Education Information

- Approved College Associate Degree GE Applicability
- CSU GE Applicability (Recommended-requires CSU approval)
- Cal-GETC Applicability (Recommended - Requires External Approval)
- IGETC Applicability (Recommended-requires CSU/UC approval)

Articulation Information

- CSU Transferable
- UC Transferable

Methods of Evaluation

- Objective Examinations
 - Example: Students must pass a written safety examination with 100% based on safe operation of all equipment used in the Lab. Example question: It is permitted to adjust safety guards on equipment while that equipment is running: T / F 2. Students will be evaluated using short quizzes on topics relating to manufacturing processes. Example: Which tool/machine is best suited to cut a .065" chamfer into 1095 steel. A) Grinder B) File C) Hack Saw D) Knife
- Projects
 - Example: A term project is assigned that requires students to create and construct a pneumatic engine. This engine is to be made from raw materials processing (machining raw materials into usable parts) on tools and assembly of these parts to complete a working model. The model will be evaluated (measured) according to design drawings. The evaluation (grade) will formulate based on how well the model's measurements conform to the design standard.
- Skill Demonstrations
 - Example: The student will demonstrate skills to the instructor on the various fabrication machines listed in the course content outline. This will be a student demonstration on the ability of that student to operate the particular machine in a safe and efficient manner, while using the particular machine to make something (example: Face to size and turn down an outer diameter of raw bar stock to a particular size on this HAAS lathe). The evaluation will be based upon the student's skill demonstration.

Repeatable

No

Methods of Instruction

- Laboratory
- Lecture/Discussion

Lab:

1. The student will now perform this same operation themselves. Students will be evaluated on their ability to perform this activity correctly. This includes performing the activity in a safe manner, the ability to hit the target dimension (diameter measurement), the ability to hold a specific tolerance (the measurement may not vary too much), and the ability of the newly manufactured part to fit together into a greater assembly.

Lecture:

1. Reading assigned by the instructor. Example: Read the textbook section on the proper method to turn down a shaft using a lathe machine. Come to class prepared to discuss this activity at our next meeting. Listen to the instructor lecture on the topic and participate in a discussion on how this process is done properly. Watch closely as the instructor demonstrates this skill on the machine.

Typical Out of Class Assignments

Reading Assignments

1. Read the section on drilling and tapping a hole. Come to class prepared to discuss the techniques that are found in the reading and how those will be applied in the term project. 2. Read the section on applying the proper torque to a bolt. In class, demonstrate the techniques learned in the reading by setting the proper torque to a bolt on the term project.

Writing, Problem Solving or Performance

1. Create a report that summarizes the term project. This should include how it was designed, parts manufactured, assembly, and testing. 2. Fabricate and assemble all parts required to create the term project. These parts will be evaluated on how close their actual measurements relate to the plan (design given by instructor).

Other (Term projects, research papers, portfolios, etc.)

1. Term Project. Example: Build an Air/Steam Drive Engine.

Required Materials

- Manufacturing Engineering and Technology
 - Author: Kalpakjian & Schmid
 - Publisher: Pearson, Prentice Hall
 - Publication Date: 2019
 - Text Edition: 8th
 - Classic Textbook?:
 - OER Link:
 - OER:

Other materials and-or supplies required of students that contribute to the cost of the course.

calculator memory device (USB flash memory drive)