

# ENGR 0110 - INTRODUCTION TO ENGINEERING DESIGN

## Catalog Description

Hours: 54 lecture

Description: Explores the branches of engineering, the functions of an engineer, and the industries in which engineers work. Explains the engineering education pathways and explores effective strategies for students to reach their full academic potential. Presents an introduction to the methods and tools of engineering problem solving and design including the interface of the engineer with society and engineering ethics. Develops communication skills pertinent to the engineering profession. Introduces the fundamentals of engineering design, problem solving, planning, prototyping and some fabrication. (C-ID ENGR 110) (CSU, UC)

## Course Student Learning Outcomes

- CSLO #1: Identify, compare, and contrast the different disciplines within engineering.
- CSLO #2: Apply basic engineering principles to solve simple problems.
- CSLO #3: Identify the educational steps required to become an engineer.
- CSLO #4: Analyze the role of engineering professionals working in the local area.
- CSLO #5: Demonstrate the skills of identifying an engineering problem, propose several engineering solutions to the problem, select the optimal solution, then apply that solution through a design and build process.

## Effective Term

Fall 2022

## Course Type

Credit - Degree-applicable

## Contact Hours

54

## Outside of Class Hours

108

## Total Student Learning Hours

162

## Course Objectives

Through class discussion, specific classroom exercises (including homework), projects and written assignments:

1. Identify the different branches of engineering and distinguish between them
2. Identify the wide spectrum of work functions that engineers perform
3. Assess engineering as a suitable personal career choice
4. Describe the engineering design process
5. Demonstrate the ability to apply the engineering design process

6. Identify behaviors that will support success in becoming an engineer
7. Identify transfer programs related to personal goals
8. Develop a student educational plan for transfer
9. Participate in multiple engineering problem solving exercises
10. Identify the skills and characteristics required for good leadership and teamwork
11. Use computer software to solve basic engineering problems
12. Prepare and present a technical report

## 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 will participate in an examination that includes topics presented during lecture and contained within the reading. Sample Exam Questions: The critical path (limiting factor) as to how long an individual will spend at Sierra College in engineering before transferring to a four-year college is the math courses: T / F. According to topics presented in lecture, Mechanical Engineering is best described as: A: Designing and building of roads, property boundary, and bridges B: Optimizing a production factory for maximized output C: Working to make and program electrical products such as computers and cell phones D: Working with energy, heat, fluid flow, and robotics.
- Projects
  - Example: Students will design and build a mechanical assembly to complete a specified engineering task. For example, design and build a small robotic car to navigate and retrieve an object from a predetermined course. The object may be something like a racquetball. A report may be required upon completion of the project.
- Reports
  - Example: All students will write a 2 page report based on information presented during lecture outlining a self-examination of their role within engineering academics and engineering as a career goal. The paper is graded based upon it's coherence in relation to topics presented during the course. Rubric grading. Writing Assignment Sample: 1. Write about which branch of engineering you are most interested in and one of the colleges/universities of your choice. Some topics to cover are listed below: 1.1 How and why did you choose engineering (or choose to take this class)? 1.2 How far along are you in your scholastic career? 1.3 Which branch of engineering interests you most? Why? 1.4 Which college/university do you plan to attend? 1.5 How do you plan to choose your college/university? 1.6 What are the justifications for your choices (use research)? 1.6.1 Salary info. 1.6.2 Job opportunity / demand. 1.6.3 Scholastic reputation / ranking. 1.6.4 Personal decisions / other factors. \* If you are not comfortable with this topic (you may not want to major in engineering), write about which major most interests

you and why. \*Include reasons for your decision and outline your educational plan for the next two years.

## Repeatable

No

## Methods of Instruction

- Lecture/Discussion

Lecture:

1. Instructor will explain the differences between engineering disciplines. Students will be divided into small groups to identify questions about engineering disciplines.
2. Instructor will describe the requirements for an educational plan and a career plan. Students will work in small groups to develop their own plan.

## Typical Out of Class Assignments

### Reading Assignments

1. Read the online or handout material for each engineering discipline area and analyze the benefits and detriments related to your career goals.
2. Research the future trends related to one career area and analyze its employment potential.

### Writing, Problem Solving or Performance

1. Research and prepare a report on the basic employment requirements to enter a selected engineering discipline/field.
2. Research and prepare a report on the required academic and experience preparation to obtain a position in the engineering profession.

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

1. Participate in an engineering design project which requires engineering design and building (example: design an automated vehicle to navigate a course, pickup a tennis ball, and bring it back)
2. Prepare a technical term report, which includes engineering analysis and problem solving, designed around a current social need.

## Required Materials

- Studying Engineering
  - Author: Raymond B. Landis
  - Publisher: Discovery Press
  - Publication Date: 2014
  - Text Edition: 4th
  - Classic Textbook?:
  - OER Link:
  - OER:
- Engineering Design: A Project Based Introduction
  - Author: Clive Dym
  - Publisher: Wiley
  - Publication Date: 2014
  - Text Edition: 4th
  - Classic Textbook?:

- OER Link:
- OER:
- Introduction to Engineering Analysis
  - Author: Kirk Hagen
  - Publisher: Pearson
  - Publication Date: 2014
  - Text Edition: 4th
  - Classic Textbook?:
  - OER Link:
  - OER:

- Engineering Your Future: A Comprehensive Introduction to Engineering
  - Author: William C. Oakes
  - Publisher: Oxford University Press
  - Publication Date: 2018
  - Text Edition: 9th
  - Classic Textbook?:
  - OER Link:
  - OER:

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