

Course Outline

COURSE: ENGR 10 **DIVISION:** 20 **ALSO LISTED AS:**

TERM EFFECTIVE: Spring 2022 **CURRICULUM APPROVAL DATE:** 06/14/2022

SHORT TITLE: INTRO TO ENGR

LONG TITLE: Introduction to Engineering

<u>Units</u>	<u>Number of Weeks</u>	<u>Type</u>	<u>Contact Hours/Week</u>	<u>Total Contact Hours</u>
3	18	Lecture:	2	36
		Lab:	3	54
		Other:	0	0
		Total:	5	90

COURSE DESCRIPTION:

Engineering 10 introduces students to the engineering profession. The course explains the engineering education pathways and explores effective strategies for students to reach their full academic potential. Topics will include an introduction to the various engineering disciplines; the role of engineers and engineering in society; the curriculum requirements for the various engineering disciplines at different four-year institutions; academic success strategies; personal and professional development techniques; an introduction to the engineering design process; an introduction to engineering problem-solving methodologies; engineering ethics; communication skills; and working as a member of a team. The lab component focuses on hands-on design projects, case studies, and problem-solving using computers. Lab topics include: brief introduction to CAD design, 3D printing, and micro-controllers. (C-ID: ENGR 110).

PREREQUISITES:

COREQUISITES:

CREDIT STATUS: D - Credit - Degree Applicable

GRADING MODES

L - Standard Letter Grade

REPEATABILITY: N - Course may not be repeated

SCHEDULE TYPES:

- 02 - Lecture and/or discussion
- 03 - Lecture/Laboratory
- 04 - Laboratory/Studio/Activity
- 04B - Laboratory - LEH 0.75
- 05 - Hybrid
- 71 - Dist. Ed Internet Simultaneous
- 72 - Dist. Ed Internet Delayed
- 73 - Dist. Ed Internet Delayed LAB
- 73B - Dist. Ed Internet LAB-LEH 0.75

STUDENT LEARNING OUTCOMES:

By the end of this course, a student should:

1. Use spreadsheets to support engineering design and analysis
2. Identify and use ethical reasoning to address and evaluate ethical dilemmas
3. Identify, compare and contrast the value of participation in professional activities
4. Use programming to support engineering design and analysis
5. Use CAD software to support engineering design and analysis

COURSE OBJECTIVES:

By the end of this course, a student should:

1. Write a simple engineering report and present the report orally
2. Explain engineering ethical principles and standards.
3. Apply basic physics concepts to the design and analysis of built systems
4. Summarize the steps of the engineering design process.
5. Apply teamwork skills and resolve team conflict
6. Explain principles of sustainability and how they affect engineering design
7. Use appropriate social skills to enhance learning and develop positive interpersonal relationships with diverse groups and individuals, satisfied by successful teamwork in lab activities
8. Describe the role of engineers in society and classify the different engineering branches, the functions of an engineer, and industries in which they work.
9. Identify and describe academic pathways to bachelor's degrees.
10. Develop and apply effective strategies to succeed academically.
11. Explain engineering ethical principles and standards.
12. Demonstrate knowledge of effective practices for writing technical engineering documents and making oral presentations
13. Analyze engineering problems using the engineering design process.
14. Demonstrate teamwork skills in working on an engineering design team.

CONTENT, STUDENT PERFORMANCE OBJECTIVES, OUT-OF-CLASS ASSIGNMENTS

Curriculum Approval Date: 06/14/2022

LECTURE CONTENT:

HOURS: 2 Lec

TOPICS:

Definition and history of engineering.
Introduction to various engineering disciplines.
Role of engineers and engineering in society.

HOURS: 2 Lec

TOPICS:

Keys to success in engineering studies.

Mindsets, Attitudes, ABET, Education models.

HOURS: 2 Lec

TOPICS:

Rewards and opportunities of an engineering career.

Greatest personal achievements

Greatest engineering achievements.

HOURS: 2 Lec

TOPICS:

Engineering Disciplines.

Job Functions.

Job Outlook.

Professional Societies.

Professional Registration.

HOURS: 2 Lec

TOPICS:

Learning and learning styles.

Become an expert learner.

Learning as a reinforcement process.

Seeking help.

HOURS: 2 Lec

TOPICS:

Making the most of how you are taught.

Strategies for early course preparation

Effective communication with peers and instructors.

HOURS: 2 Lec

TOPICS:

Making the learning process work for you.

Skills and tools to organize and prioritize their tasks.

HOURS: 2 Lec

TOPICS:

Orientation to the Engineering Education System.

Resumes, CVs and cover letters.

The Interview Process.

HOURS: 2 Lec

TOPICS:

Personal Growth and Development.

Strengths vs. Weaknesses

HOURS: 2 Lec

TOPICS:

Oral and written communication - PowerPoint presentation

Mental and Physical Wellness - diet and exercise

HOURS: 2 Lec

TOPICS:

Student Organizations

Internships

Co-curricular activities.

HOURS: 2 Lec

TOPICS:

Engineering Ethics.

Challenger explosion and the O-Ring.

HOURS: 2 Lec

TOPIC:

Final Research Project Guidelines

Project: How to become a -World-Class Engineering Student. (Written Report and Presentations)

HOURS: 4 Lec

TOPICS:

Problem-Solving Strategies.

Thinking like an Engineer.

Math and Science relationship to Engineering

HOURS: 2 Lec

TOPICS:

Professional Engineering Organizations

Engineering Societies and their value.

HOURS: 2 Lec

TOPICS:

Beyond the traditional roles of engineers.

Engineers of the future and interdisciplinary work.

HOURS: 2

TOPIC: Final Exam.

LAB CONTENT:

6 HOURS

TOPICS:

Engineering Computational Tools.

Introduction to an engineering programming language such as MATLAB/Octave and Python

Basic programming skills: plotting, arrays, addition, subtraction.

6 HOURS

TOPIC: Problem Solving Strategies - Thinking like an Engineer: Excel

Formulas, charts and graphs using computer software.

6 HOURS

TOPIC: Solar Cell Characterization

Derive the power output of an energy source by measuring voltage and current; identify the maximum power of a system with variable load; calculate the efficiency of a system; configure a system to match the source to the load so that it operates at maximum efficiency.

12 HOURS

TOPIC: Engineering Design Project

Sketching a design

3D CAD drawing

Physical prototype

Feedback and Optimization.

Oral presentation and written report.

9 HOURS

TOPIC: Arduino Projects

Basics of electronic circuits.

Programming using an Arduino.

LED light control

Generating sound using an active buzzer.

15 HOURS

TOPIC: Robotics Project

Design and programming using a robotic kit.

Building and programming a circuit board

Oral presentation and written report.

Total 54 hours.

METHODS OF INSTRUCTION:

Instruction will follow a standard lecture/discussion format with an additional laboratory period. Homework will be assigned in order to assure mastery of the concepts covered in class. During class discussion students will also be required to utilize engineering programs such as: Microsoft Excel, PowerPoint, MATLAB or OCTAVE (programming language). Throughout the course, students will be given opportunities to work together on problems given in class and group projects.

OUT OF CLASS ASSIGNMENTS:

Required Outside Hours 72

Assignment Description

Analyze and study pertinent text material, solved examples and lecture notes. Apply principles and skills covered in class by solving regularly-assigned homework problems. Regularly synthesize course materials in preparation for exams. Some of the assignments will be in the form of take home projects were students will work in group.

METHODS OF EVALUATION:

Writing assignments

Evaluation Percent 40

Evaluation Description

A combination of written homework assignments and projects.

Problem-solving assignments

Evaluation Percent 15

Evaluation Description

Homework assignments

Objective examinations

Evaluation Percent 20

Evaluation Description

There will be 2 equally weighted exams.

Skill demonstrations

Evaluation Percent 25

Evaluation Description

Lab activities: Projects and Project Presentations

REPRESENTATIVE TEXTBOOKS:

Studying Engineering, A Road Map to a Rewarding Career 4th Edition, Raymond Landis - Steffen Peuker - Jennifer Mott, Discovery Press, 2019 or a comparable textbook/material.

ISBN: ISBN-10: 0979348722.

Rationale: Updated to a new version.

12 Grade Verified by: David Argudo

For the Lab manual we will follow the documentation for SJSU labs: Excel Project, Solar Project, Wind Turbine Project and Robotics Project (<https://www.sjsu.edu/e10/labs/index.php>)

For the Arduino Labs we will follow the Lab manual provided by the developer: Elegoo Super Starter Kit for UNO (Please see attached files for manual)

ARTICULATION and CERTIFICATE INFORMATION

Associate Degree:

CSU GE:

IGETC:

CSU TRANSFER:

Transferable CSU, effective 202230

UC TRANSFER:

Not Transferable

SUPPLEMENTAL DATA:

Basic Skills: N

Classification: Y

Noncredit Category: Y

Cooperative Education: N

Program Status: 1 Program Applicable

Special Class Status: N

CAN:

CAN Sequence:

CSU Crosswalk Course Department: ENGR

CSU Crosswalk Course Number: 110

Prior to College Level: Y

Non Credit Enhanced Funding: N

Funding Agency Code: Y

In-Service: N

Occupational Course: E

Maximum Hours:

Minimum Hours:

Course Control Number: CCC000632783

Sports/Physical Education Course: N

Taxonomy of Program: 090100