ENGR A110H: INTRODUCTION TO ENGINEERING AND DESIGN HONORS

Item	Value
Curriculum Committee Approval Date	10/30/2024
Top Code	090100 - Engineering, General (requires Calculus) (Transfer)
Units	3 Total Units
Hours	54 Total Hours (Lecture Hours 54)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Open Entry/Open Exit	No
Grading Policy	Standard Letter (S), • Pass/No Pass (B)
Associate Arts Local General Education (GE)	• Area 5 Physical and Biological Sciences, Scientific Inquiry, Life Science (OB)
Associate Science Local General Education (GE)	• Area 5 Physical and Biological Sciences, Scientific Inquiry, Life (OSB)

Course Description

This course is an introduction to the field of engineering and the engineering design. It explores various branches of engineering in regards to academic preparation, opportunities and career options. It explains the engineering education pathways and explores effective strategies for students to reach their academic potential. Emphasis is also on the realization of the regional and global problems of engineering nature and the methods to find responsible solutions. Students are introduced to the applied engineering concepts, methods and tools of problem-solving and the engineering design process. Activities also include engineering design projects. Other topics include engineering ethics, professional and legal responsibilities of engineers as a member of the society, understanding of the global challenges and the engineer's role and responsibilities in finding possible solutions. Enrollment Limitation: ENGR A110; students who complete ENGR A110H may not enroll in or receive credit for ENGR A110. PREREQUISITE: Successful completion of a course at the level of elementary algebra or Appropriate OCC math placement. Transfer Credit: CSU. C-ID: ENGR 110.**C-ID:** ENGR 110.

Course Level Student Learning Outcome(s)

1. Demonstrate the teamwork skills working on engineering design problems using the engineering design process. Write effective technical documents and reports, and make oral presentations.
2. Collect, organize, and analyze experimental data and represent it in graphical form. Interpret the results obtained for a specific application, and use the related technologies.
3. Identify academic pathways, complete a plan of study towards his/her bachelor's degree, including a possible plan towards academic preparation beyond undergraduate studies according to his/her career plan. Develop and apply effective strategies for academic success.
4. Classify different engineering branches, describe the role and responsibilities of engineers in society, functions of an engineer and engineering code of ethics.

Course Objectives

- 1. Describe the role and responsibilities of engineers in society and describe and classify various engineering disciplines, functions of engineers, industries and other establishments in which engineers can work, and the job opportunities.
- 2. Identify and describe academic pathways to bachelorette degree in engineering and various options and pathways towards higher degrees.
- 3. Develop and apply strategies for successful completion of academic goals, and identify skills needed and utilize his/her personal traits to accomplish the objectives.
- 4. Use the available technologies and computational tools for solving engineering problems, to complete the design problems and learn to retrieve the reliable information useful for engineers and engineering profession.
- 5. Explain the engineering code of ethics and standards. Explain the profession, social, ethical, moral, and legal responsibilities of engineers. Identify local and global challenges and good and bad consequences of technological advances.
- 6. Demonstrate the knowledge of effective practices for writing technical engineering documents, make oral presentations and organize and analyze the collected data and present it graphical, in writing and orally.
- 7. Demonstrate the knowledge of various engineering fields through solving problems of engineering nature, and analyze open-ended engineering problems using design process.
- 8. Demonstrate the knowledge of the engineering design process working in teams.
- 9. Apply the basic principles of engineering and design to test and build simple engineering products.

Lecture Content

ENGINEERING PROFESSION Introduction to Various Engineering Disciplines Engineering Career Options Engineering Job Outlook (Regional Statewide, Out-of-state) International (optional) Comparison amoung Scientists, Engineers, Technologiests and Technicians Engineering Organizations ROLE AND RESPONSABILITIES OF ENGINEERS Code of Ethics of Engineers Ethical, Social, Legal and Professional Responsibilities Engineering Standards and Codes Global and Regional Challenges (space, clean water, energy, forest, air pollution, radiation, etc.) Positive and Negative Consequences of Designs, and Technological Advances ENGINEERING EDUCATION Elements of Undergraduate Engineering Curricula ABET Accreditation Transfer institutions and Engineering Departments Plan of Studies for Undergraduate Studies Time Management Advanced Degrees and Alternate Academic Options for Engineers ENGINEERING COMMUNICATION (TECHNICAL DOCUMENTATION AND PRESENTATION) Engineering Methods and Analysis Procedure Organization and Presentation of Problem/ Engineering Work Engineering Report Writing,

Progress Report, Executive Summary and Memos Oral Communication, Presentations Data Collection, Analysis and Presentation (Graphical) Curve Fitting (Linear, Power, Exponential, log ...) Graphic Communication INTRODUCTION TO COMPUTATIONAL TOOLS FOR ANALYSIS AND DESIGN PROJECT Introduction to MATLAB Excel for Engineers SolidWorks Powerpoint Introduction to MathType and/or MS Equation Editor INTRODUCTION TO ENGINEERING FUNDAMENTAL CONCEPTS FOR DESIGN Mechanical Concepts Material Balance, Material Properties Electrical Concepts Energy and power Chemical Engnieering Concepts Engineering Economics and Statistics (These concepts are introduced at basic level to facilitate engineering problem solving and the effective completion of students design projects) 7. ENGINEERING DESIGN Design as an Evolutionary Process (Evolution of Designs and (existing) Gadgets) Introduction to Engineering Design Process and Phases Engineering Group Design Projects (Analysis, Problem Definition, Criteria and Constraints, Alternative Design Solutions, Testing, Evaluation and Building the Final Design) Log-book and Final Design Documentations and Report Group Presentation to Defend the Design

Method(s) of Instruction

- Lecture (02)
- DE Live Online Lecture (02S)
- DE Online Lecture (02X)

Instructional Techniques

The primary mode of instruction is the lecture/demontration method.

Reading Assignments

2 hrs./week of readings from the textbook and articles.

Writing Assignments

1.75 hrs./week of writing assignments, including explanation and discussion of results and findings in light of the theory and the application related to problem solving, open-ended problems, and material research/design projects.

Out-of-class Assignments

3 hrs./week of problem solving, open-ended problems, and design projects.

Demonstration of Critical Thinking

Solving open-ended problems involving multiple engineering concepts and complete projects using the engineering design process, and propose and analyze the working model of the projects.

Required Writing, Problem Solving, Skills Demonstration

Open-ended exercises on exams, quizzes, homework assignments and projects. Technical documentation and written responses.

Eligible Disciplines

Engineering: Master's degree in any field of engineering OR bachelor's degree in any of the above AND master's degree in mathematics, physics, computer science, chemistry, or geology OR the equivalent. (NOTE: A bachelor's degree in any field of engineering with a professional engineer's license is an alternative qualification for this discipline.) Master's degree required. Title 5, section 53410.1

Textbooks Resources

1. Required Eide, A.R., Jenison, R.D., Mickelson, S.K., Northup, L.L.. Engineering Fundamentals and Problem Solving, 7th ed. McGraw Hill, 2018 2. Required Landis, R. B.. Studying Engineering: A Road Map to a Rewarding Career, 4th ed. Landis, 2013 Rationale: Support textbook 3. Required Moaveni, S.. Engineering Fundamentals: An Introduction to Engineering, 7th ed. Cengage Learning, 2024