ENGR R101: INTRODUCTION TO ENGINEERING

Originator
jwmiller

College
Oxnard College

Discipline (CB01A)
ENGR - Engineering

Course Number (CB01B)
R101

Course Title (CB02)
Introduction to Engineering

Banner/Short Title
Intro to Engineering

Credit Type
Credit

Start Term
Fall 2021

Catalog Course Description
This course explores the branches of engineering, the engineering profession, the interface of the engineer with society, and engineering ethics, and the engineering education process while exploring effective strategies to help students to reach their full academic potential. The course introduces the methods of engineering analysis, engineering design and problem solving. Students will analyze and present data in engineering design, and develop written, computer, oral communication, and problem solving skills.

Taxonomy of Programs (TOP) Code (CB03)
0924.00 - *Engineering Technology, General (requires Trigonometry)

Course Credit Status (CB04)
D (Credit - Degree Applicable)

Course Transfer Status (CB05) (select one only)
A (Transferable to both UC and CSU)

Course Basic Skills Status (CB08)
N - The Course is Not a Basic Skills Course

SAM Priority Code (CB09)
D - Possibly Occupational

Course Cooperative Work Experience Education Status (CB10)
N - Is Not Part of a Cooperative Work Experience Education Program

Course Classification Status (CB11)
Y - Credit Course

Educational Assistance Class Instruction (Approved Special Class) (CB13)
N - The Course is Not an Approved Special Class

Course Prior to Transfer Level (CB21)
Y - Not Applicable

Course Noncredit Category (CB22)
Y - Credit Course

Funding Agency Category (CB23)
Y - Not Applicable (Funding Not Used)

Course Program Status (CB24)
1 - Program Applicable

General Education Status (CB25)
Y - Not Applicable

Support Course Status (CB26)
N - Course is not a support course

Field trips
May be required

Faculty notes on field trips; include possible destinations or other pertinent information
Field trips may be taken to allow students to see various engineering facilities as well as different aspects of the various fields of engineering. This may include visiting local company sites such as HAAS, Astro Aerospace, the Port of Hueneme, and Advanced Water Purification Facility of Oxnard.

Grading method
Letter Graded

Alternate grading methods
Credit by exam, license, etc.

Does this course require an instructional materials fee?
No

Repeatable for Credit
No

Is this course part of a family?
No

Units and Hours

Carnegie Unit Override
No

In-Class

Lecture
Minimum Contact/In-Class Lecture Hours
17.5
Maximum Contact/In-Class Lecture Hours
17.5

Activity

Laboratory
Minimum Contact/In-Class Laboratory Hours
52.5
Maximum Contact/In-Class Laboratory Hours
52.5

Total in-Class

Total in-Class
Total Minimum Contact/In-Class Hours
70
Total Maximum Contact/In-Class Hours
70

Outside-of-Class

Internship/Cooperative Work Experience

Paid

Unpaid

Total Outside-of-Class

Total Outside-of-Class
Minimum Outside-of-Class Hours
35
Maximum Outside-of-Class Hours
35

Total Student Learning

Total Student Learning
Total Minimum Student Learning Hours
105
Total Maximum Student Learning Hours
105

Minimum Units (CB07)
2
Maximum Units (CB06)
2

Student Learning Outcomes (CSLOs)

	Upon satisfactory completion of the course, students will be able to:
1	Students will solve a simple problem considering the distribution of force over a given area.
2	Students will write a report on the importance of engineering, detailing at least 3 different branches of the field.
3	Students will design, produce and analyze a bridge constructed from tongue depressors.

Course Objectives

	Upon satisfactory completion of the course, students will be able to:
1	Classify the different engineering branches, describe the role of engineers in society, the functions of engineers, and the industries in which they work
2	Identify and describe academic pathways to four-year degrees.
3	Develop and apply effective strategies to reach full academic potential.
4	Explain the role of professional engineers and apply the principles of engineering ethics and standards.
5	Demonstrate knowledge of effective practices for research, gathering of data, writing technical engineering reports, and making oral presentations.
6	Analyze engineering problems using the engineering design process.

7	Demonstrate basic computational, data manipulation, manual and computer-aided drawing skills.
8	Demonstrate teamwork skills necessary for successful completion of engineering design projects.

Course Content

Lecture/Course Content

1. Introduction to engineering
   a. Roles of engineers in society
   b. Comparison of engineering, science, and technology
2. Engineering professions
   a. The branches of engineering
   b. The functions of engineers
   c. The industries the utilize engineers
   d. Careers and job outlook pertaining to engineers
3. Formulas and analysis
   a. The use of mathematical formulas
   b. Obtaining data
   c. Analyzing data
   d. Reading and producing graphs
   e. Using spreadsheets
4. Introduction to engineering design
   a. Engineering design process
   b. Sustainability in design
   c. Material selection
   d. Team work
   e. Conflict resolution
5. Engineering communication skills
   a. Presentation of engineering work
   b. Solution of engineering problems
   c. Technical report writing
   d. Oral communication and presentation
   e. Graphical presentation
6. Engineering Drawings
   a. Importance of engineering drawings
   b. Orthographic, sectional, isometric
   c. Dimensioning and tolerancing
   d. The use of symbols
7. Professionalism and ethics
   a. Being Professional
   b. The honorable profession of engineering
   c. Engineering code of ethics
   d. Engineering marvels and disasters
8. Concepts, quantities, and systems in engineering
   a. Length, mass, and time
   b. Newton's Laws
   c. Pressure and stress
   d. Work and energy
   e. Machines, efficiency, and power
   f. Electrical current and voltage
   g. AC and DC circuits
9. Materials in engineering
   a. Materials properties
   b. Selection of the proper material
10. Engineering education
    a. Academic success
    b. Curriculum

c. Pathways
d. Preparation for upper division coursework

Laboratory or Activity Content

In order to successfully complete engineering design projects, gain exposure to modern engineering tools and practices, learn how to problem solve, and gain experience working in teams, students will proceed with laboratory experiments and activities.

1. Data collection and analysis: Making Measurements of Length; Calculations of area, volume, and density; Systematic and random errors in measurements; Averages and standard deviations.
2. Modern engineering tools: Units of measurements; Significant figures; Using Microsoft Excel spreadsheets.
3. Project 1: Design and construct a bridge with tongue depressors and toothpicks that will bear a minimum load.
4. Scientific report and presentation 1: Produce a report documenting the construction of the project and make a presentation to the class.
5. Project 2: Design and construct a mechanical car the will go a precise distance.
6. Scientific report and presentation 2: Produce a report documenting the construction of the project and make a presentation to the class.
7. Project 3: Design and construct a solar heater.
8. Scientific report and presentation 3: Produce a report documenting the construction of the project and make a presentation to the class.
9. Project 4: Design and construct your own project (subject to instructor approval).
10. Scientific report and presentation 4: Produce a report documenting the construction of the project and make a presentation to the class.

Methods of Evaluation

Which of these methods will students use to demonstrate proficiency in the subject matter of this course? (Check all that apply):

Problem solving exercises
Written expression

Methods of Evaluation may include, but are not limited to, the following typical classroom assessment techniques/required assignments (check as many as are deemed appropriate):

Computational homework
Essays
Group projects
Individual projects
Laboratory activities
Laboratory reports
Objective exams
Oral presentations
Projects
Problem-Solving Assignments
Problem-solving exams
Quizzes

Instructional Methodology

Specify the methods of instruction that may be employed in this course

Computer-aided presentations
Distance Education
Demonstrations
Field trips
Guest speakers
Instructor-guided interpretation and analysis
Laboratory activities
Lecture
Small group activities

Describe specific examples of the methods the instructor will use:

1. Computer aided presentation: The instructor may employ the computer to aid in the presentation of course materials which would include PowerPoint and computerized simulations of specific phenomena/systems such as the flow of electrons through an electrical circuit.
2. Demonstrations: The instructor will demonstrate physical principals by employing equipment and other items such as an electrical circuit with an LED or a fulcrum. For instance; the instructor my use a fulcrum, meter stick and various masses to demonstrate the concept of static equilibrium.

3. Distance Education (Lecture): When applicable, recordings of lectures will be used to convey subject matter. Also, the use of discussion boards and live virtual meetings will be used to further instruct and allow students to ask questions regarding the course and its material.
4. Distance Education (Lab): Laboratory activities, as noted below, will take place in a virtual setting. The lab projects will be tailored to utilize computer simulations, live online meetings, and message boards where questions can be asked and answered.
5. Field Trips: Trips to various facilities that employ engineers and/or rely on tangible aspects of engineering may be used to allow students to obtain firsthand knowledge of the many engineers fields of engineering.
6. Guest Speakers: Special guests engineers may visit the class and present the details of what they do as an engineer, why they choose their field, and answer questions that students may have for them.
7. Instructor guided analysis: The instructor will work through course problems during lecture that investigate a given notion in which the students will follow along, answering questions posed by the instructor. This will also serve as a forum for students to ask particular questions regarding the logic and methods employed to come to certain conclusions regarding said problem/system.
8. Laboratory activities: Students will preform an laboratory experiments and projects reinforcing notions and systems discussed in lecture. These experiments and projects will direct the students into a deeper understanding of the material at hand by immersing them in a hands on environment. For instance; in project 1 the students will build a bridge from tongue depressors that must be able to withstand a certain amount of applied force. This requires that the students work together (in a small group), understand the application of Newton's Laws and the distribution of force, and employ feasible creativity in their construction.
9. Lecture: The instructor will deliver the course subject matter via in person lectures to the students. For example, a lecture on the various types of engineers.
10. Small group activities (Lecture): These may be employed in the form of group quizzes where students work together in small groups to solve some elementary problems or answer conceptual questions regarding current material.
11. Small group activities (Lab): The students will work in small groups while preforming the labs and projects where applicable.

Representative Course Assignments

Writing Assignments

1. Answers to short explanatory (conceptual) questions from the textbook, often assigned from among those at the end of each chapter or posed by the instructor, typically assigned weekly; a typical question might be “In your own words, describe what type of communication skills are needed by engineers in general and why they are important ”.
2. Laboratory project reports detailing the construction of said project are assigned for each project given.

Critical Thinking Assignments

Answering a wide array of homework, quiz, and exam questions requiring the analysis of a given physical system or circumstance in order to come to the correct conclusion and/or answer regarding the question and/or desired outcome. For instance; given a budget and a list of raw materials and their cost, students are to design a simple apparatus for a particular purpose. Students must then account for all items to be used, staying within budget, and explaining their reasoning for each material used.

Reading Assignments

1. Regular textbook readings that reinforce the concepts and notions discussed or demonstrated during the class meetings; these readings typically include general information pertaining to aspects of engineering, theory and principles, descriptions of engineering feats, definitions, problem-solving examples, and practical applications of engineering in everyday life and in specialized environments.

Skills Demonstrations

None

Other assignments (if applicable)

None

Outside Assignments

Representative Outside Assignments

1. Assigned reading from the textbook typically amounting to 1 hour per week of reading.
2. Assigned conceptual and problem solving based homework that further investigates and explores the notions and theories discussed throughout the course. Typically, homework sets will require 1 hour to fully complete and will be due on a weekly basis.
3. Studying and preparing for quizzes and exams.

District General Education

A. Natural Sciences

B. Social and Behavioral Sciences

C. Humanities

D. Language and Rationality

E. Health and Physical Education/Kinesiology

F. Ethnic Studies/Gender Studies

CSU GE-Breadth

Area A: English Language Communication and Critical Thinking

Area B: Scientific Inquiry and Quantitative Reasoning

Area C: Arts and Humanities

Area D: Social Sciences

Area E: Lifelong Learning and Self-Development

CSU Graduation Requirement in U.S. History, Constitution and American Ideals:

IGETC

Area 1: English Communication

Area 2A: Mathematical Concepts & Quantitative Reasoning

Area 3: Arts and Humanities

Area 4: Social and Behavioral Sciences

Area 5: Physical and Biological Sciences

Area 6: Languages Other than English (LOTE)

Textbooks and Lab Manuals

Resource Type
Textbook

Description
Moaveni, S. (2020). *Engineering Fundamentals: An Introduction to Engineering.* (6th). Brooks/Cole. Pacific Grove

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Distance Education Addendum

Definitions

Distance Education Modalities
Hybrid (51%–99% online)
Hybrid (1%–50% online)
100% online

Faculty Certifications

Faculty assigned to teach Hybrid or Fully Online sections of this course will receive training in how to satisfy the Federal and state regulations governing regular effective/substantive contact for distance education. The training will include common elements in the district-supported learning management system (LMS), online teaching methods, regular effective/substantive contact, and best practices.

Yes

Faculty assigned to teach Hybrid or Fully Online sections of this course will meet with the EAC Alternate Media Specialist to ensure that the course content meets the required Federal and state accessibility standards for access by students with disabilities. Common areas for discussion include accessibility of PDF files, images, captioning of videos, Power Point presentations, math and scientific notation, and ensuring the use of style mark-up in Word documents.

Yes

Regular Effective/Substantive Contact

Hybrid (1%—50% online) Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Other DE (e.g., recorded lectures)	The students will watch recorded lecture videos that go over the pertinent subject matter of the course.
Synchronous Dialog (e.g., online chat)	The students will join live, online meetings in which they will receive instruction, be reminded of all upcoming assignments/events, and be allowed to ask questions pertaining to the lecture and lab material. Recordings will be made available of all live meetings. Students may also be put into small groups to discuss a given class problem.
Asynchronous Dialog (e.g., discussion board)	Students will have access to a discussion board in which they can ask questions regarding the course material.
Face to Face (by student request; cannot be required)	Face to face meetings can be arranged when needed.

Hybrid (51%—99% online) Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Other DE (e.g., recorded lectures)	The students will watch recorded lecture videos that go over the pertinent subject matter of the course.
Synchronous Dialog (e.g., online chat)	The students will join live, online meetings in which they will receive instruction, be reminded of all upcoming assignments/events, and be allowed to ask questions pertaining to the lecture and lab material. Recordings will be made available of all live meetings. Students may also be put into small groups to discuss a given class problem.
Asynchronous Dialog (e.g., discussion board)	Students will have access to a discussion board in which they can ask questions regarding the course material.
Face to Face (by student request; cannot be required)	Face to face meetings can be arranged when needed.

100% online Modality:

Method of Instruction	Document typical activities or assignments for each method of instruction
Other DE (e.g., recorded lectures)	The students will watch recorded lecture videos that go over the pertinent subject matter of the course.
Synchronous Dialog (e.g., online chat)	The students will join live, online meetings in which they will receive instruction, be reminded of all upcoming assignments/events, and be allowed to ask questions pertaining to the lecture and lab material. Recordings will be made available of all live meetings. Students may also be put into small groups to discuss a given class problem.
Asynchronous Dialog (e.g., discussion board)	Students will have access to a discussion board in which they can ask questions regarding the course material.

Examinations

Hybrid (1%–50% online) Modality
Online
On campus

Hybrid (51%–99% online) Modality
Online
On campus

Primary Minimum Qualification
ENGINEERING

Review and Approval Dates

Department Chair
09/04/2020

Dean
09/04/2020

Technical Review
09/23/2020

Curriculum Committee
09/23/2020

Curriculum Committee
12/09/2020

CCCCO
MM/DD/YYYY

Control Number
CCC000579738

DOE/accreditation approval date
MM/DD/YYYY