

Mt. San Jacinto College
Integrated Course Outline of Record

Form B

Submitted by: James Bae

Date: 11/12/2020

Department	Subject	Course Number	Title
Engineering: Technologies	Engineering: Technologies ENGR	180	Introduction to Engineering

Units/Hours

- Each lecture unit requires 1 hour per week of class time, and 2 hours per week of study outside of class.
- Each laboratory unit requires 3 hours per week of class time.
- Each activity unit requires 2 hours per week of class time and 1 hour per week of study outside of class.

Lecture Units	Total Units
2.00	2.00
Lecture Contact Hours	Total Contact Hours
32.00 - 36.00	32.00 - 36.00
Lecture Homework Hours	
64.00 - 72.00	

Stand Alone:

Program Applicable

AA/AS Degree General Ed Breadth Area(s):

-none-

General Education Justification:

Maximum Enrollment:	40
Maximum Enrollment Justification:	Justification:
Grading Method:	Letter Grade or P/NP
TOP code:	0999.00*

Can be Taken 1 time(s) for credit (max 4)

- ☐
- Visual or Performing Arts course that is required to meet major requirements for UC/CSU
-
- ☐
- Intercollegiate athletics course
-
- ☐
- Academic/vocational competition course

Catalog Description:

(Please do not refer to transferability or degree, certificate, or employment concentration applicability. Please only describe the course).
(75 words or less in gray box below).

This course introduces the career opportunities and skills needed to become an engineer or work as engineering support. Students will learn engineering communication standards for laboratory report writing, graphical presentations, and problem solving. Methods will include the scientific method and introduction to engineering design processes. This course is recommended for all students considering a career in engineering or engineering support.

Schedule Description:

(Please do not refer to transferability or degree, certificate, or employment concentration applicability. Please only describe the course).
(25 words or less in gray box below).

This introductory course covers engineering fields, kinds of work performed, and experimental methods used in engineering.

Need for the course:

This course is needed to support the required courses for a student to be awarded AS or Certificate in Engineering: Drafting Technology. The student will be introduced to the engineering profession, course of study, and resources. Students will learn engineering design and analysis, software tools, and ethics in engineering. Further, it lays a foundation for students to continue their education at a 4-year program in engineering.

Prerequisite(s):

Prerequisites go through a separate approval process. See Forms E1-E6 for details.
(For further clarification, contact the Prerequisite Subcommittee)

-none-

Corequisite(s):

Corequisites go through a separate approval process. See Forms E1-E6 for details.

-none-

Recommend Preparation:

Recommended Preparation goes through a separate approval process. See Forms E1-E6 for details.

-none-

Other Enrollment Criteria:

-none-

Learning Objectives:

(please number each objective and express in behavioral terms)
Upon the completion of the course the student will be able to do the following:

1. Identify the most common engineering disciplines.
2. Identify current employment opportunities, internships and trends in the engineering field.
3. Identify and describe academic pathways to bachelor’s degrees.
4. Inventory the transfer information from multiple four year colleges offering engineering degrees.

- 5. Explain engineering ethical principles and standards.
- 6. Analyze and validate the engineering field as a value to society for its continued and modernizational growth.
- 7. Describe the role of engineers in society and classify the different engineering branches, the functions of an engineer, and industries in which they work.
- 8. Evaluate the opportunities for "green" engineering in regards to the environment for safe economic growth.
- 9. Analyze engineering problems using the engineering design process.
- 10. Demonstrate teamwork skills in working on an engineering design team.
- 11. Compose the results of laboratory experiments using the scientific method.
- 12. Demonstrate knowledge of effective practices for writing technical engineering documents and making oral presentations.
- 13. Develop and apply effective strategies to succeed academically.

Course Content:

(please number the outline of main topics and subtopics)

- 1. Engineering Overview
 - 1. Relationship between Engineering, Science and Technology
 - 2. Common engineering disciplines
 - 1. Mechanical
 - 2. Chemical
 - 3. Electrical
 - 4. Civil
 - 5. Computer
 - 6. Aerospace
 - 3. Careers in Engineering
 - 1. Branches
 - 2. Functions
 - 3. Industries
 - 4. Careers
 - 5. Job outlook
 - 6. Entrepreneurship
 - 4. Current development of interest
 - 1. Research
 - 2. Practices
- 2. Modern engineering tools and practices
 - 1. Units, a sense of scale, dimensional analysis
 - 2. Engineering design, creativity, and problem-solving processes
 - 3. Technical communication
 - 1. Vocabulary
 - 2. Report writing
 - 3. Presentation writing
 - 4. Communication Skills - Oral presentations
 - 4. Software tools for communication (presentations, word processing, graphics)
 - 1. Spreadsheets and Numerical Analysis
 - 2. Word Processing
 - 3. Presentation Software
 - 4. Engineering Drawing software - CAD, SolidWorks, Microstation
 - 5. Potential Software packages - Office 360, Google, MiniTAB, CAD
 - 5. Problem solving processes
 - 1. Scientific Method - Hypothesis, Data Collection, Data Analysis, Conclusion
 - 2. Project approaches - PDCA, DMAIC, others
- 3. Design project
 - 1. Background
 - 2. Analytical tools

3. Design tools
 1. Solidworks
 2. Microstation
4. Working as a team member on an engineering design project
5. Written and oral communication skills related to engineering
 1. Technical writing and reports
 2. Presentation writing
 3. Oral presentations
4. Engineering education:
 1. Academic success strategies, preparation for upper division coursework
 2. CSM Resources
 3. Transfer schools and majors
 4. Educational Planning - curriculum and pathways
5. Modern engineering tools and practices
 1. Measurement and data acquisition
 2. Introduction to statistical analysis
 3. Software tools for analysis (spreadsheet, computational tools and such as MATHLAB)
 1. Microsoft Office 360 Suite
 2. Google Productivity Tools
 3. CAD and related software
 4. Others
6. Engineers and Society
 1. Roles in society and societal impact
 2. Professionalism and Ethics in engineering
 3. Modernizational growth
 4. Discussion of "Green" Environmental Engineering and "Sustainable" Engineering
 5. Social Entrepreneurship
 6. Engineering "Challenges"
7. Wrap up
 1. Review
 2. Internships
 3. Resume writing
 4. Interviewing

Methods of Instruction:

Methods of instruction may include, but are not limited to the following:

- **Method:** Lecture
Integration: Lectures will introduce new material and topics such as engineering disciplines, laboratory experiments, trends, employment opportunities, and growth in engineering fields.
- **Method:** Textbook and web-based reading assignments
Integration: Textbook and web based reading assignments will be used to expand knowledge of the engineering field.
- **Method:** Group activities
Integration: Group activities will be used to develop familiarity with design, communication, and analytical tools used in engineering.
- **Method:** Group design projects
Integration: Group design projects will develop technical and communication skills necessary for the various engineering disciplines.
- **Method:** Field trips
Integration: Field trips to engineering firms and/or laboratories, as appropriate, will expose students to engineering careers in the real-world.

Methods of Evaluation:

A student's grade shall be determined by the instructor using multiple measures of performance related to the course objectives. Methods of evaluation may include but are not limited to the following:

- **Method:** Homework
Integration: Homework assignments will cover Engineering disciplines, application of analytical tools and engineering education. Work will be graded on both the answers provided and where applicable the reasoning supporting the answers in a variety of different formats including multiple-choice and short responses.
- **Method:** Class Work
Integration: Students will be asked in class to complete work that is related to the topic of the lecture, including engineering research and explanation, analysis and calculation of engineering problems. Classwork will be graded on accuracy and reasoning of the provided answers - through a rubric where applicable.
- **Method:** Group Work
Integration: Groups of students will research an engineering topic/question or problem set and provide a written response during class or as a project. Groups will be evaluated on the accuracy and reasoning provided in the written responses through a rubric where applicable.
- **Method:** Exams/Tests
Integration: Exams will cover engineering disciplines, analysis tools and approaches, and educational opportunities. Students' exams will be graded on both the answers provided and where applicable the reasoning supporting the answers in a variety of different formats including multiple-choice and short responses.

Examples of Assignments:

Students will be expected to understand and critique college level texts or the equivalent. Reading and writing, as well as out of class assignments are required. These assignments may include but are not limited to the following:

1. Write a short-answer and essay on the various forms of "Green" and "Sustainability" issues in regards to engineering.
2. Solve the provided structural application problems. Show all work. Example:The cantilevered beam AB is additionally supported using a tie rod BD. By using the virtual work method determine the force in the rod and draw the bending moment diagram.Neglect the effect of axial compression and shear in the beam.
3. Prepare an essay on schools within California for continued education in engineering and the requirements necessary to become certified and practicing Engineer of your choice.

Textbooks:

- Hagen, K. D. (2013). *Introduction to Engineering Analysis* Prentice Hall. ISBN: 9780133485080
- Pond, R. J., Rankinen, J.L. (2014). *Introduction to Engineering Technology* Prentice Hall. ISBN: 9780132840118
- Oakes, William C., and Les L. Leone (2016). *Engineering Your Future: A Brief Introduction to Engineering* Oxford University Press. ISBN: 9780190279332

Other Resources:

Minimum Qualification

- Engineering (Masters Required) **or**
- Engineering Technology (Masters Required)