College of San Mateo
Official Course Outline

1. **COURSE ID:** ENGR 100 **TITLE:** Introduction to Engineering
   Units: 3.0 units **Hours/Semester:** 32.0-36.0 Lecture hours; and 48.0-54.0 Lab hours
   Method of Grading: Letter Grade Only
   Prerequisite: MATH 130
   Recommended Preparation:
   Eligibility for ENGL 838 or ENGL 848.

2. **COURSE DESIGNATION:**
   Degree Credit
   Transfer credit: CSU; UC
   AA/AS Degree Requirements:
   CSM - GENERAL EDUCATION REQUIREMENTS: E5d. Career Exploration and Self-Development

3. **COURSE DESCRIPTIONS:**
   Catalog Description:
   Introduction to the engineering profession, courses of study and resources for engineering students, engineering design and analysis, software tools, ethics in engineering. Individual and group work; oral and written presentations. Some assignments may require use of campus computer facilities outside of class hours.

4. **STUDENT LEARNING OUTCOME(S) (SLO'S):**
   Upon successful completion of this course, a student will meet the following outcomes:
   1. Describe different fields of engineering and the different types of work carried out by engineers.
   2. Develop an educational plan to support transfer into an engineering major.
   3. Design a device or process to meet desired needs within specified constraints.
   4. Begin to use the techniques and tools of engineering practice, including problem solving strategies, analytical skills, and standard software.
   5. Work in teams on both highly specified and open-ended projects.
   6. Communicate orally and through text and graphics.
   7. Recognize the need for and demonstrate the skills needed to engage in life-long learning.
   8. Begin to understand the impact of engineering solutions on society and the corresponding need for ethical professional behavior.

5. **SPECIFIC INSTRUCTIONAL OBJECTIVES:**
   Upon successful completion of this course, a student will be able to:
   1. Describe different fields of engineering and the different types of work carried out by engineers.
   2. Develop an educational plan to support transfer into an engineering major.
   3. Design a device or process to meet desired needs within specified constraints.
   4. Begin to use the techniques and tools of engineering practice, including problem solving strategies, analytical skills, and standard software.
   5. Work in teams on both highly specified and open-ended projects.
   6. Communicate orally and through text and graphics.
   7. Recognize the need for and demonstrate the skills needed to engage in life-long learning.
   8. Begin to understand the impact of engineering solutions on society and the corresponding need for ethical professional behavior.

6. **COURSE CONTENT:**
   Lecture Content:
   1. Engineering as a field (approximately 2 weeks)
      A. What is engineering?
      B. Engineering disciplines
      C. Careers in engineering
      D. Current developments of interest
   2. Engineering tools, Part 1 (approximately 3 weeks)
      A. Units, a sense of scale, dimensional analysis
      B. Problem solving strategies

C. Vector analysis
D. Software tools for analysis (spreadsheets)
E. Software tools for communication (word processing, presentations, graphics)

3. Design project 1 (approximately 2 1/2 weeks)
   A. Background
   B. Analytical tools
   C. Design tools
   D. Group work
   E. Presentations
4. Studying Engineering (approximately 2 weeks)
   A. Success strategies
   B. CSM Resources
   C. Transfer schools and majors
   D. Educational planning
5. Engineering tools, Part 2 (approximately 2 1/2 weeks)`
   A. Digital logic
   B. Microprocessors, sensor, actuators
   C. Introduction to programming concepts
6. Design project 2 (3 weeks)
   A. Background
   B. Analytical tools
   C. Design tools
   D. Group work
   E. Presentations
7. Engineers and Society (1 week)
   A. Societal impacts
   B. Ethics in engineering
8. Wrap up (1 week)
   A. Review
   B. Summer jobs and internships

Note: Design projects are selected to expose students to different engineering fields. Design projects may overlap with other topics if desired (to provide more calendar time for background and introduction of analytical tools). Order of topics may be changed to support design projects, guest speakers, field trips, or other activities.

Lab Content:

Typical lab topics

Icebreakers: getting to know classmates, campus resources
Order of magnitude approximation (group work and presentations)
Mini-design project (e.g. joint venture paper tower or bridge)
Introduction to Excel
More advanced Excel functions
Vector analysis (individual or group work)
First design project (2 to 3 lab sessions)
Exam 1
Transfer resources
Arduino exercises (2 to 3 lab sessions)
Second design project (2 to 3 lab sessions total)
Exam 2
Ethics case studies

7. **REPRESENTATIVE METHODS OF INSTRUCTION:**

Typical methods of instruction may include:

A. Lecture
B. Lab
C. Field Trips
D. Guest Speakers
E. Other (Specify): Lectures to introduce new material and topics. Textbook and web-based reading assignments to expand knowledge. Individual take-home problems and lab work to develop skills. Group activities to develop familiarity with design, communication, and analytical tools. Group design projects to

develop technical and communication skills. Guest speakers and optional field trips to extend experience.

8. **REPRESENTATIVE ASSIGNMENTS**

Representative assignments in this course may include, but are not limited to the following:

Writing Assignments:

Individual assignments requiring short-answer and essay responses.
Group design projects requiring coordinated oral and written (text and graphics) presentation.

Reading Assignments:

Most weekly assignments include reading -- about the profession (for example, through the profiles of engineers available at careercornerstone.org), about current developments reported in the popular press and in professional magazines, or in support of the technical content of the course.

Other Outside Assignments:

Individual problem-solving assignments.
Individual and group use of software and hardware tools.

9. **REPRESENTATIVE METHODS OF EVALUATION**

Representative methods of evaluation may include:

A. Class Work
B. Exams/Tests
C. Group Projects
D. Homework
E. Lab Activities
F. Individual assignments requiring short-answer and essay responses. Individual problem-solving assignments. Group problem-solving assignments. Group design projects requiring coordinated oral and written (text and graphic) presentation. Individual short answer and problem-solving exams.

10. **REPRESENTATIVE TEXT(S):**

Possible textbooks include:

A. Landis, R. B.. *Studying Engineering – A Road Map to a Rewarding Career*, 4th ed. Los Angeles: Discovery Press, 2013
B. Brockman, J.B.. *Introduction to Engineering - Modeling and Problem Solving* , 1st ed. Hoboken, NJ: Wiley, 2009
C. Moaveni, Saeed. *Engineering Fundamentals: An Introduction to Engineering*, 4th ed. Boston, MA: Cengage Learning, 2011

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