College of San Mateo
Official Course Outline

1. **COURSE ID:** ENGR 210 **TITLE:** Engineering Graphics
   Units: 4.0 units **Hours/Semester:** 48.0-54.0 Lecture hours; and 48.0-54.0 Lab hours
   Method of Grading: Letter Grade Only
   Prerequisite: MATH 130

2. **COURSE DESIGNATION:**
   Degree Credit
   Transfer credit: CSU; UC

3. **COURSE DESCRIPTIONS:**
   Catalog Description:
   Introduction to graphical communication and design for engineers. The engineering design process, visualization, sketching, orthographic projection, formal engineering drawings, descriptive geometry, manufacturing processes, dimensioning and tolerancing practices. Use of Computer-Aided Design (CAD) software to support engineering design. Students complete weekly homework assignments and group design projects that develop sketching, design, and 2-D and 3-D CAD skills. Assignments may require the use of CAD software outside of class hours (Spring only.)

4. **STUDENT LEARNING OUTCOME(S) (SLO'S):**
   Upon successful completion of this course, a student will meet the following outcomes:
   1. Apply rules of orthographic projection to create multiview drawings.
   2. Create pictorial images from orthographic views.
   3. Use CAD software to create 3-D models and assemblies and to produce 2-D engineering drawings (including working drawings and assembly drawings).
   4. Create auxiliary and sections views following accepted conventions.
   5. Apply standards of dimensioning and tolerancing to engineering drawings.
   6. Demonstrate awareness of design standards and codes.
   7. Working in a team setting, use the engineering design process to design and construct a device or to document the design of an existing device; present results orally and in writing (text and engineering drawings).

5. **SPECIFIC INSTRUCTIONAL OBJECTIVES:**
   Upon successful completion of this course, a student will be able to:
   1. Apply rules of orthographic projection to create multiview drawings.
   2. Create pictorial images from orthographic views.
   3. Use CAD software to create 3-D models and assemblies and to produce 2-D engineering drawings (including working drawings and assembly drawings).
   4. Create auxiliary and sections views following accepted conventions.
   5. Apply standards of dimensioning and tolerancing to engineering drawings.
   6. Demonstrate awareness of design standards and codes.
   7. Working in a team setting, use the engineering design process to design and construct a device; present results orally and in writing (text and engineering drawings).

6. **COURSE CONTENT:**
   Lecture Content:
   1. The engineering design process
   2. Sketching
   3. Orthographic projection and multiview drawings
   4. Solid modeling of parts
   5. Auxiliary views
   6. Section views
   7. Pictorial drawings
   8. Dimensioning (including GD&T)
   9. Manufacturing processes
   10. Tolerancing (including GD&T)
   11. Modeling of assemblies

12. Working drawings
13. Welding processes and symbols
14. Construction drawings
15. Developments (optional)
16. Group design project

Lab Content:

The engineering design process (including conceptual design and concept selection exercises)
Modeling parts in Solidworks
Modeling assemblies in Solidworks
Developing engineering drawings (orthogonal projections, auxiliary views, section views, isometric pictorials) in Solidworks
Dimensioning and tolerancing engineering drawings in Solidworks
Developing and annotating 2-D and 3-D models in AutoCAD
Group work on design/construction or mechanical dissection project documented through text and engineering drawings
Optional topics include additional work with assemblies and mates in Solidworks; field trips to manufacturing facilities, construction sites, or other facilities; additional work with AutoCAD or other modeling tools.

7. **REPRESENTATIVE METHODS OF INSTRUCTION:**

Typical methods of instruction may include:

A. Lecture
B. Lab
C. 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 engineering design process. Group design projects to develop technical and communication skills.

8. **REPRESENTATIVE ASSIGNMENTS**

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

Writing Assignments:

Group design project documented in text and drawings.

Reading Assignments:

Textbook and web-based reading assignments to expand knowledge.

Other Outside Assignments:

Individual take-home problems and lab work to develop skills. Group activities to develop familiarity with engineering design process. Group design projects to develop technical and communication skills.

9. **REPRESENTATIVE METHODS OF EVALUATION**

Representative methods of evaluation may include:

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

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

Possible textbooks include:

A. G.R. Bertonline et al.. *Fundamentals of Graphics Communication*, 6th ed. McGraw-Hill, 2011
B. Lieu, D.K., Sorby, S.. *Visualization, Modeling, and Graphics for Engineering*, 1st ed. Clifton Park, NY: Delmar Cengage Learning, 2009

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Course Originator: Laura Demsetz