College of San Mateo
Official Course Outline

1. **COURSE ID:** DRAF 130 **TITLE:** Mechanical Design with CAD
   Units: 3.0 units **Hours/Semester:** 32.0-36.0 Lecture hours; 48.0-54.0 Lab hours; 64.0-72.0 Homework hours; 144.0-162.0 Total Student Learning hours
   Method of Grading: Letter Grade Only
   Prerequisite: DRAF 111, and DRAF 121

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

3. **COURSE DESCRIPTIONS:**
   Catalog Description:
   Preparation of working drawings including: detail, assembly drawings and engineering change procedures; threads and fasteners; dimensioning and tolerancing, pictorial projections; intersections and developments using AutoCad and Solidworks. This is a PC-based course, and educational versions of the software will be provided.

4. **STUDENT LEARNING OUTCOME(S) (SLO'S):**
   Upon successful completion of this course, a student will meet the following outcomes:
   1. Use a systematic procedure to analyze a proposed design from the point of view of assembly and manufacturing.
   2. Evaluate quantitatively the impact of design choices on manufacturing cost.
   3. Use modern quality control concepts and approaches in final drawings.
   4. Use software tools to accurately model parts for specific manufacturing operations.

5. **SPECIFIC INSTRUCTIONAL OBJECTIVES:**
   Upon successful completion of this course, a student will be able to:
   1. Present and discuss assembly drawings including complete parts lists.
   2. Explain geometric tolerancing.
   3. Present to a client sectional perspective projection of simple and complex parts.
   4. Present and discuss sheet metal layouts and mold making processes.

6. **COURSE CONTENT:**
   Lecture Content:
   1. Detail Drawing
      A. Selection and creation of proper views
      B. Selection and proper placement of necessary dimensions
      C. Application of fabrication notes
      D. Document control including engineering change notices and updating drawings
   2. Threads and Fasteners
      A. Standard thread symbols for drawings
      B. Standard thread callouts
      C. Standard hardware commonly used on mechanical assemblies
   3. Assembly Drawing
      A. Orthographic assemblies - assembled and exploded
      B. Pictorial assemblies - assembled and exploded
      C. Part numbers - selection and placement
      D. Parts lists
      E. Notes
   4. Tolerance
      A. Nomenclature: tolerance, allowance and types
      B. Tolerance calculations for interchangeable parts
   5. Intersection and Developments
      A. Developing simple shapes
      B. Calculating bend allowances

C. Intersection of simple shapes
D. Flat pattern layouts with proper notations

Lab Content:

1. LAB portion of class supports each lecture through design problems that support the given lecture theme.

7. **REPRESENTATIVE METHODS OF INSTRUCTION:**

Typical methods of instruction may include:

A. Lecture
B. Lab
C. Critique
D. Discussion
E. Guest Speakers
F. Individualized Instruction
G. Observation and Demonstration
H. Other (Specify): The primary method of instruction is lecture, including demonstrations and extensive discussions. Past student experiences and student participation is utilized in all lecture and discussions. Drawing demonstrations on a white board and on a CAD computer are used for showing efficient drawing, design and problem solving strategies. Computer demonstrations are used to show modern techniques. All units of instruction have lab activities where the student designs and draws drawing (using CAD). These activities are designed to incorporate the new knowledge introduced in each of the units of instruction.

8. **REPRESENTATIVE ASSIGNMENTS**

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

Writing Assignments:

1. Design Intent papers for each project.
2. The major means of communication is formal standardized mechanical drawings. Approximately 12 extensive projects will be assigned which require problem solving, information gathering, and critical thinking. All of the assignments including the final project is of the student's own design conforming to a set of teacher-driven parameters.
3. Students write production outlines for projects and write justifications for their designs in the form of a Design Intent.
4. Final Project is of the student's own design. It is a culmination of the extensive information learned throughout the drafting program and requires a Design Intent paper as well as critiques of similar products.

Reading Assignments:

1. All reading assignments are from weekly handouts which distill a myriad of textbooks and information from current industry magazines.
2. Information gathering on the internet.

Other Outside Assignments:

A. Homework consists of reading of syllabus; completion of work sheets, and lab books. Approximately four extensive design projects are used which require problem solving and critical thinking. The major means of communication is formal standardized mechanical drawing, however the students do written production outlines for all parts designed. In addition to production outlines, the students write justifications for their designs.

9. **REPRESENTATIVE METHODS OF EVALUATION**

Representative methods of evaluation may include:

A. Class Participation
B. Class Performance
C. Class Work
D. Exams/Tests
E. Homework
F. Lab Activities
G. Portfolios
H. Quizzes
I. Written examination
J. 1. Sketches of Planned Drawings- to reflect students' ability to summarize a strategy in drawing assembly strategies. 2. Completion of Timed Assigned Drawings – to demonstrate students' ability to use evidence and reasoning skills to complete work. 3. Written Exams – to reflect students' knowledge of theories, concepts, recognize and use evidence and skills presented in class lectures, text and discussions. 4.

Participation – to demonstrate students' involvement in class discussions, giving feedback on projects to fellow classmates, doing lab projects and homework assignments. 5. Final Project – to reflect students' knowledge of theories, concepts, ability to organize information, and apply reasoning skills presented throughout the semester.

10. **REPRESENTATIVE TEXT(S):**
    Possible textbooks include:
    A. Planchard, David. *Engineering Design with SOLIDWORKS 2022*, ed. SDC Publications, 2022
    Other:
    A. There are extensive handouts used that cover a myriad of textbooks and reference material since drafting and design is dynamic.

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Course Originator: Valeria Vorobey