

MAE 150  
Computer-Aided Design (4 units)

**Class/Laboratory Schedule:** four hours of lecture, eight hours of outside preparation  
12 hours/week total

**Course Coordinator(s):** James Friend, Michael Tolley, Frank Talke

**Textbooks/Materials:**

1. Course Reader from UCSD Bookstore

**Catalog Description:** Computer-aided analysis and design. Design methodology, tolerance analysis, Monte Carlo analysis, design of cams and cam dynamics; finite element analysis, kinematics and computer-aided design of linkages, open and closed linkages, mechanical design using SolidWorks or Creo-Pro, hydrodynamic lubrication.

**Prerequisites:** MAE 130A or SE 101A or BENG 110, MAE 107 or SE 121, MAE 3, and Senior Standing in Engineering Major, or consent of instructor

**Course Type:** Required

**Performance Criteria:**

Objective 1

1.1 Students will demonstrate an understanding of the basic principles underlying design and design using computers as a tool.

Objective 2

2.1 Students will demonstrate the development of simple programs for the solution of typical engineering problems using commonly available programming languages (Matlab).

Objective 3

3.1 Students will demonstrate the application of commercially available software such as SolidWorks, Creo-Pro, and FEMAP for the solution of engineering design problems.

3.2 Students will be exposed to the shortcomings of commercially available software by comparing the results obtained by developing their own software with results obtained from commercially available software.

**Course Objectives:**

**(Numbers in parentheses refer to MAE Program Outcomes)**

1. To teach students how to solve typical engineering design problems with the use of computers. (1, 2, 6, ME8, ME9, ME10, ME11)
2. To teach students to develop their own software for the solution of engineering design problems. (1, 2, 6, ME8, ME9, ME11)
3. To teach students how to use typical commercially available design software for the solution of engineering design problems. (1, 2, 6, ME8, ME9, ME11)

**Course Topics:**

1. Principles of design and design methodology
2. Tolerance analysis in design
3. Monte Carlo analysis
4. Kinematics and design of four bar linkages; open and closed linkages
5. Introduction to SolidWorks or Creo Pro
6. Design of cams and dynamics of cams
7. Numerical solution of ordinary differential equations
8. Finite element analysis
9. Hydrodynamic lubrication

Last Updated: 22<sup>nd</sup> July 2019