

MAE 150 (4 units)
Computer-Aided Design

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

Course Coordinator(s): Nathan Delson

Textbooks/Materials:

1. Course Reader

Catalog Description: Design methodology, tolerance analysis, Monte Carlo analysis, kinematics and computer aided design of linkages, numerical calculations of moments of inertia, design of cams and cam dynamics, introduction to finite element analysis, design using Pro-E, Mechanical Motion and Mechanical Structures.

Prerequisites: Senior standing and grade of C- or better in MAE 130A (or SE 101A or BE 110), MAE 107 (or SE 121), and MAE 3.

- Required Course
- Technical Elective Course
- Other: _____

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 (C, Fortran).

Objective 3

3.1 Students will demonstrate the application of commercially available software such as Pro-E and Mechanica 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)

Objective 1: To teach students how to solve typical engineering design problems with the use of computers (1a, 3c, 11k, ME14).

Objective 2: To teach students to develop their own software for the solution of engineering design problems (3c, 5e, 11k).

Objective 3: To teach students how to use typical commercially available design software for the solution of engineering design problems (3c, 11k, ME14).

Course Topics:

1. Principles of design and design methodology
2. Tolerance analysis in design
3. Monte Carlo analysis
4. Numerical calculation of moments of inertia for arbitrary cross sections
5. Kinematics and design of four bar linkages
6. Introduction to Pro-E
7. Design of cams and dynamics of cams
8. Numerical solution of ordinary differential equations
9. Finite element analysis
10. Introduction to Mechanical Motion and Mechanical Structures
11. Hydrodynamic lubrication

Prepared by: Frank E. Talke, March 2000

Revised: F. Talke and H. Murakami April 2008 via Teaching Work Group Meeting

Reviewed: TWG, June 2010; August 2011

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