

Department of Mechanical Engineering
MEEN 3350 – Computer-Aided Engineering
Required Course
Spring 2006 Semester

2004-2006 Catalog Data: MEEN 3350 – Computer-Aided Engineering. Credit: 3 hours.

Overview of simulation-based design, including parametric 3-D solids modeling and finite element analysis and their application in mechanical engineering. Course focuses on the modeling aspects of mechanical systems simulation for static stress and deflection analysis.

Prerequisites: MEEN 2302, CVEN 2372

Textbook: R. Toogood, Pro/Engineer Wildfire 2.0 Tutorial, SDC Publications, 2004

References: R. Toogood, Pro/Engineer Wildfire 2.0, Mechanica Tutorial, SDC Publications, 2004

Instructor: Dr. Paul R. Corder, Professor of Mechanical Engineering.

Course Objectives:

1. To provide junior mechanical engineering students with modern computer design analysis tools and techniques to model and analyze mechanical components.
2. To establish a practical mindset in students so they will apply good engineering judgment when using and interpreting computer models and results, especially finite element analysis results.

Prerequisites by Topic:

1. Engineering mechanics (statics)

Topics:

1. Computer lab use and procedures (one week)
2. Fundamentals and simulation-based design concepts (two weeks)
3. Exercises and assignments which built on previously learned knowledge (eleven weeks)
4. Tests (one week)

Computer Usage:

The students are introduced to a new way of viewing mechanical design, namely, Simulation-Based Design. The instructor perceives this to be the way mechanical design is going in industry. The students build progressively more complex parametric 3-D solid models of mechanical objects using ProEngineer on the computers in the college's (or the department's) computer lab. In the latter part of the course the students are introduced to finite element analysis concepts when the ProEngineer parts they build are analyzed using Mechanica, a finite element analysis program.

Laboratory Exercises:

No specific laboratory project assignment is made. The three hours per laboratory session per week is intended to grow the student's knowledge, and understanding of developing 3-D models of mechanical objects. Dimensioned engineering drawings are made from these objects in the form of three-view plus isometric view of the object. Early in the course, the students are introduced to the required procedures of producing engineering drawings of the ProEngineer parts. These drawings are transmitted by a word-

processed transmittal memo. The importance of communicating design intent is stressed. The laboratory exercises and the exams are graded only on the printed drawing of the assigned object.

ABET professional components as estimated by the faculty member who prepared this course description:

Engineering: 3 credits or 100%

ABET Outcomes Applicable:

- (a) an ability to apply knowledge of mathematics, science and engineering
- (c) an ability to design a system, component or process to meet desired needs
- (e) an understanding of professional and ethical responsibility
- (f) an ability to communicate effectively
- (g) the broad education necessary to understand the impact of engineering solutions in a global and societal context
- (i) a knowledge of contemporary issues
- (j) an ability to use techniques, skills and modern engineering tools necessary for modern engineering practice

Prepared by: Dr. Paul R. Corder

April 2006