ME 360L- Mechanical Engineering Design III, Spring 2014

Course website: http://www.unm.edu/~heinrich/

Prerequisites: ME 260L, CE 302, Math 264L, Math 316
Instructor: Dr. Juan. C. Heinrich, heinrich@unm.edu
Office hours: M-W 10:00-11:00, or by appointment, ME 430
Co-Instructors: Jesse Nord, jnord1@unm.edu
                        Anthony Menicucci, amen@unm.edu
Grader: Vahid Hatamipour, hatami@unm.edu
Schedule, Lectures: M - W 9:00 - 9:50, Centennial Auditorium
Laboratory: M - W 10:00 - 10 :50, ME 310 or DS 141, check to which one you have been assigned.

Catalog description:

Finite element analysis and its use in the design process, computer aided design, engineering ethics, design economics and project management.

Textbooks/required:

A First Course in the FINITE ELEMENT METHOD, Daryl L. Logan, Cengage Learning 2012
Creo Simulate Tutorial, Roger Toogood ,Releases 1.0 & 2.0.

Course topics:

1. Mathematical background
2. One-dimensional finite elements
3. Two-dimensional finite elements
4. Beams and frames
5. Isoparametric finite elements
6. Special topics

Course Objectives:

1. Introduce students to modern engineering design analysis using the Finite Element Method.
2. Introduce the students to the use of software design tools such as Pro Engineer that are heavily used in industry and practice, and their use in a design setting.
3. Give students a chance to use previous course knowledge (e.g. CAD, Mechanics of materials and Statics)
4. Introduce students to ethics in engineering practice and in particular to how it relates to this course
5. Introduce students to the economics involved in designing engineering products

Assessment Tools:

1. Homework 10%
2. Exam 1 25%, Wednesday February 26
3. Exam 2 25%, Wednesday April 23
4. Group Project 25%, Project presentations Friday May 9
5. Lab Participation 15%

Homework:

Homework must be turned in at the time of the class on the day it is due. You can also turn it in at the ME office and have it stamped for date and time. Late homework is subject to a penalty in the grade if turned in by Friday, no homework will be accepted after Friday of the week in which it was due. Moreover, the solutions must be organized and presented in a clear and easily understandable way or they will not be graded.

IMPORTANT:

You have to take both exams. Make-ups are not given. If for any reason you expect that you will not be able to attend on February 26 or April 23 let the instructor know this immediately. Only medical and emergency situations will be valid reason to miss one of the exams.

Course Outcomes:

1.1 Students understand the mathematical foundations for finite elements used to solve structural problems.
1.2 Students are able to perform matrix algebra
1.3 Students are able to analyze/solve simple structural problems by hand calculations

2.1 Students understand the capabilities and limitations of finite element analysis.

3.1 Students can use finite element software to perform structural and thermal analysis.

4.1 Students can work in groups to complete a design involving CAD geometry and finite element analysis.
4.2 Students can write an engineering report detailing their design.
4.3 Students can prepare an oral report and present it to the class.

5.1 Students understand the professional and ethical responsibilities of a design engineer.

6.1 Students are able to perform simple engineering economic analysis