MECHANICAL ENGINEERING PROGRAM

ABET COURSE SYLLABUS

ME 402: Applied Numerical Analysis (3 credit): Required Course

Course Description (2008-2010 Catalog):

Numerical analysis is used by engineers to solve problems which are either intractable or too difficult to solve using exact methods. In this course, the student will be introduced to the fundamental concepts and techniques commonly used by engineers to solve simultaneous equations, perform integration, and obtain solutions to ordinary and partial differential equations. *FORTRAN, C/C++, JAVA, MathCad, MATLAB, MAPLE,* or *Mathematica* can be used to write programs and graphical displays. *Maple 13 is recommended for the course.*

Prerequisite Course: MATH 431, ME 242

Prerequisite by Topic:

- Matlab
- Calculus and Differential equations

Textbook: Numerical Methods for Engineers, 6th ed., McGraw-Hill

Other Reference Material: N/A

Course Coordinator: Darrell Pepper, Professor

Course learning outcomes:

(a) Model governing equations employed in engineering problems using various numerical techniques.
(b) Develop computer programs that will operate on PCs using a preferred computer language or one of the commercial packages including Matlab, Maple, MathCad, or Mathematica.
(c) Understand the transient and steady state solutions of systems of equations and the effects of changes in the system variables on the output.
(d) Be familiar with ways to numerically solve matrices, discretize equations, and apply statistical measures to examine accuracy.

Relationship of Course to Mechanical Engineering Program Educational Outcomes:

Goal1 (3a): Provide mechanical engineering	Goal 2 (3e): Provide the mechanical	Goal 2 (3k): Provide the mechanical

graduates with ability to apply mathematics, science, and engineering	engineering graduates with ability to identify, formulate, and solve engineering problems	engineering graduates with ability to use techniques, skills and modern engineering tools.

Topics Covered:

1. Roots of equations
2. Systems of equations
3. Interpolating polynomials
4. Differentiation
5. Integration
6. Solution of ODEs
7. Curve Fitting
8. Statistics
9. Solution of PDEs

Laboratory Projects: None

Class/Laboratory Schedule: 75 minutes lecture two sessions per week

Assessment of Student Progress toward Course Objectives

Six written exams, homework (seven project-based), and final exam

Class/Laboratory Schedule: TTh 8:30-10:00 AM (Fall Semester)

Contribution of Course for meeting Professional Component:

(a) Mathematics and basic sciences:	2 credit
(b) Engineering Topics (Design/Science):	1 credit
(c) General Education:	0 credit
(d) Others:	0 credits

Prepared By: **Date:**

Darrell Pepper September 24, 2009