

# EEE 244 Electrical Engineering Computational Methods and Applications

**Graduate Core Course**

**Date: February 10, 2007**

**Course Coordinator:** John Oldenburg

**2006 – 2008 Catalog Data:** EEE 244. Electrical Engineering Computational Methods and Applications. Computational methods for solving problems in engineering analysis. Topics include variational methods, finite difference analysis, optimization methods, and matrix methods. Focuses predominantly on applications of the methods, and students are required to solve real world, engineering problems on the computer. 3 units

**Prerequisites:** EEE 180.

**Text:** Chapra, S.C., and Canale, R.P., Numerical Methods for Engineers, 5<sup>th</sup> Edition, McGraw-Hill, 2002 (ISBN 0-07-291873-X); Author's Website: <http://www.mhhe.com/chapra>; Pratap, R., Getting Started with MATLAB, Oxford University Press, NY, 2002 (ISBN 0-19-515014-7) [Recommended but not required.]

**Additional Resources:** MATLAB Student Version, Learning MATLAB 7, Release 14, The Math Works, Inc., 2004 (ISBN 0-9755787-2-3) Learning MATLAB 7 only (ISBN 0-9755787-0-7)

## **Course Objectives:**

1. To provide the student with an understanding of numerical analysis techniques and their application to Electrical Engineering analysis and design.
2. To provide the student with the capability to use MATLAB software as a tool in engineering analysis and design in future courses, design projects, and professional work assignments.

## **Prerequisites by Topic:**

1. Knowledge of a structured programming language (i.e. C++, Fortran or Pascal).
2. Understanding of fundamental electrical engineering topics: Circuit Theory, Electro-mechanics, Electric Power, Electronics, and Electromagnetic Theory.

## **Topics Covered:**

1. Physical Systems Modeling and Analysis/Design Software.
2. Matrix Methods in Linear Algebra
3. Numerical Integration and Differentiation
4. Ordinary Differential Equations
5. Partial Differential Equations

**Evaluation:** Eight Analysis/Design Problems, 10 pts. Each. Total: 80 pts.

One Mid-term Exam (40 pts.) One Final Exam (80 pts.) Class grades will be curved, with the average representing a B grade. An Honor Policy will be enforced for all assignments. (See below.)

**Honor Policy:** Each student will be required to include this signed statement at the end of each problem assignment submission.

*"I certify that the work presented here is my own. I have not plagiarized the work of another author. I recognize that the penalty for violation of this honor policy will be a zero grade for this work."*

## Course Outline/Schedule

<i>Week</i>	<i>Topic</i>	<i>Text Reference</i>
1 - 3	Modeling, Software, and Approximations	Ch. 1 - 4
4 - 6	Matrix Methods in Linear Algebra	Ch. 9 - 12
7	Midterm Examination	Ch. 1 - 4 & 9 - 12
7 - 9	Numerical Differentiation and Integration	Ch. 21 - 24
10 - 12	Ordinary Differential Equations	Ch. 25 - 28
13 - 15	Partial Differential Equations	Ch. 29 - 32
16	Final Examination	Ch. 21 - 32