San Jose State University
Department of Electrical Engineering

EE104 Numerical Methods in Electrical Engineering Spring 1999

Course Objectives

To prepare students a broad mastery of numerical methods and analysis used in electrical engineering field and to prepare them the ability of programming for numerical calculations applied to electrical engineering problems.

Topics

- Vector matrix algebra
- Number representation and numerical errors
- Problem modeling and scientific programming
- Computational techniques applied to electrical engineering problems
- Interpolation and approximation
- Numerical integration and differentiation
- Monte Carlo method and random number generator
- Differential equations
- Linear and nonlinear equations and system of equations
- Initial value problems

Outcomes

For a general computation problem in electrical engineering, students should be able to:

- Select a numerical method
- Perform appropriate programming
- Analysis the results with sources of error

Outcome Assessment

- Class participation
- A midterm exam, a project, a comprehensive final exam, and homework assignments
- Semester-end course and instructor evaluation

Prerequisite

- EE110, EE118, and EE140 with grades C or better
- Familiarity with at least one high-level programming language such as Fortran, C
- For this course all programming will be done in MATLAB
Instructor: Dr. Thuy T. Le

Office hours: MW: 18:15 - 19:00 and 20:15 - 21:00 (ENGR355)

Contact inf.: (408)924-3963 or (408) 456-7480
thuytle@email.sjsu.edu or thuy@fujitsu.com

Meetings: TR 07:05 - 08:20, ENGR401


Lectures

The course will follow selected subjects as listed on the attached course schedule. Most of the topics discussed in Van Loan text will be covered in class as much as time permits. Theory and additional examples can be read from the reference, handouts, and will be discussed in class as much as possible.

- Students are responsible for the reading assignments from the text and handouts
- Students are responsible for following up the lecture materials
- Students are responsible for reading additional information and examples in order to understand the materials discussed in the lectures
- Lecture notes will be handed-out during the semester.

Exams

There will be a midterm exam and a comprehensive final exam. The date of the midterm exam will be determined. The final exam date is Thursday, May 20, 1999 (07:15 – 09:30)

- All exams will be opened-book, opened-note.
- Exams will cover the assigned reading materials and discussed materials in the lectures.
- There will be no make-up exams (in very special circumstances, written excuse and official proofs are required for making-up exam).

Homework assignments

Homework assignments will be given periodically and will be due in one week. Homework solutions will be made available after the due date.

- Homework assignments must be submitted on time. Late submissions will not be accepted.
- There is no make-up homework.
- Each homework will be graded as 1 or 0 point only
- To get credit for your homework assignments, submissions must be neat, clean, and must be done professionally and seriously.
Grading policy

The overall course grades (letter-grades) will be assigned based on overall class distribution. The weights of the homework assignments, exams, and project are listed as below:

- Class participation and homework assignments: 10%
- A midterm exam: 20%
- A project: 20%
- A comprehensive final exam: 50%

Laboratory

Homework assignments require using MATLAB (MATrix LABoratory) which is available on the PCs in room ENG387. If you have access to a Windows95 or NT based PC or to a Macintosh PowerPC and prefer to do the computational assignments elsewhere, you can purchase the Student Edition of Matlab from the Spartan Bookstore (manual + CD-ROM software). Versions 5 (5.1, 5.2, and 5.2) are the current versions of Matlab and requires Windows95 or NT and a reasonably powerful computer (486 or Pentium, 16MB RAM, 50 MB Hard Disk Space), or a comparable Macintosh PowerPC. The PCs in room ENG387 run an older version of Matlab (4.2c) on windows 3.1.

Laboratory hours and teaching assistant

T.A.
Contact inf.
Office
Lab hours

HONOR CODE

The Electrical Engineering Department will enforce the following Honor Code that must be read and accepted by all students.

“I have read the honor code and agree with its provisions. My continued enrollment in this course constitutes full acceptance of this code.

I will not:

- Take an exam in place of someone else, or have someone take an exam in my place
- Give information or receive information from another person during an exam
- Use more reference material during an exam than is allowed by the instructor
- Obtain a copy of an exam prior to the time it is given
- Alter an exam after it has been graded and return it to the instructor for re-grading
- Leave the exam room without returning the exam to the instructor.”
## Reading Assignments and Course Schedule

<table>
<thead>
<tr>
<th>Topics</th>
<th>Van Loan</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Introduction to numerical methods and computing</td>
<td></td>
<td>Yes</td>
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<tr>
<td>Number Representation and Errors</td>
<td>1.4.1, 1.4.4</td>
<td>Yes</td>
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<tr>
<td>Introduction to MATLAB</td>
<td>1.1, 1.2, 1.3.1</td>
<td></td>
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<tr>
<td>Power/Taylor Series, Polynomial Interpolation</td>
<td>1.4.2 - 1.4.3, 2.1 - 2.4.2</td>
<td>Yes</td>
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<tr>
<td>Piecewise Polynomial Interpolation</td>
<td>Chapter 3</td>
<td>Yes</td>
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<tr>
<td>General Least Squares Curve Fitting</td>
<td>7.1</td>
<td>Yes</td>
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<tr>
<td>Monte-Carlo Method and Random Number Generator</td>
<td>1.3.2</td>
<td>Yes</td>
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<tr>
<td>Numerical Integration and Differentiation</td>
<td>4.1 - 4.4</td>
<td>Yes</td>
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### Midterm Examination

<table>
<thead>
<tr>
<th>Topics</th>
<th>Notes</th>
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<tbody>
<tr>
<td>Linear Algebra Concepts</td>
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<td>Linear System of Equations, Errors and Norms</td>
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<td>Overdetermine and Underdetermine Systems</td>
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<td>Eigen-value and Eigen-vector Problems</td>
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<tr>
<td>Non-Linear Equations and Optimization</td>
<td>8.1, 8.2.1, 8.2.2</td>
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<tr>
<td>Initial Value Problems</td>
<td>Chapter 9</td>
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### Final Examination and Project Due

Thursday, May 20, 1999 (07:15 – 09:30)

**PLEASE DO NOT CONSUME FOOD OR DRINK IN THE CLASSROOM**