

Math 467: Numerical Analysis
Fall 2002

1. Overview of the course:

We'll use the computer to solve a variety of mathematical problems in this course- the issue is that computers cannot store exact real numbers, and this leads to errors in the algorithms. We can think of Numerical Analysis in these broad terms- analysis of error, and analysis and construction of algorithms. The pool of problems we will analyze will come from Calculus, Linear Algebra and Differential Equations, and this is the general path the course will take.

2. Textbook:

Burden and Faires, "Numerical Analysis", 7th Edition. If you already have the 6th Edition, you may need to make some changes- be sure you have a friend that has the 7th Edition! This text, while somewhat pricey, is a classic textbook- one that will be on your shelf for a very long time!

3. Programming Requirements:

From the overview, you'll see that the construction and analysis of algorithms will be a critical part of the course- thus the prerequisite of Math 167. The textbook comes with many algorithms written in a variety of programming languages- Maple, C and Matlab among others.

For symbolic computations, we will want to use Maple, and for numerical computations, you have a choice between Maple, C (or C++), or Matlab¹. Ideally (not a requirement), you will have the experience to move between all three languages, since each is suited to particular types of problems.

You will need to be able to read and understand the given code, be able to modify it appropriately, and write some code yourself- We're not talking about thousands of lines of code; a typical routine might take 10-20 lines of code.

4. Outline of the Course: We will be going through the following topics- Note that they are not all in the order given in the textbook, so be sure to follow the calendar closely.

- Intro and Equations of One Variable [about 2 weeks: Sept 3-12]
- Applied Linear Algebra [about 3 weeks: Sept 16-Oct 3]
EXAM 1 after the Linear Algebra section, early October
- Interpolation and Curve fitting [about 3 weeks: Oct 7-24]
- Differentiation and Integration [about 2 weeks: Oct 28-Nov 7]
EXAM 2 after the section on derivatives and integrals, early to mid November

¹You may write in other languages, but see me first.

- Differential Equations and Solvers [about 3 weeks: Nov 7-Dec 12]

There are 14 weeks in the semester, so we have a few days open to take catch up if needed.

5. **Grading:** Grading is based on the standard scale: 90 – 100% is generally an A (A- for borderline grades), 80 – 89% is generally a B (with B+/- for borderline cases), 70 – 79% is generally a C (again, with C+/- for borderlines). The components of your grade are:
 - (a) Homework (30% overall) Homework will be assigned daily and collected weekly. This is a 400-level course, so your homework should be written carefully and you will use complete sentences! Late homework will **not** be accepted. If you need to miss class, you will need to turn it in ahead of time, or give it to someone to turn in for you. Do not wait until the evening before it is due to work on it!
 - (b) Exams (20% each for a total of 40%) There will be two exams. See the calendar for the dates of each.
 - (c) Final Exam (20%) There will be an in-class final exam during the time announced by the Registrar.
6. Academic Honesty: Standards of academic honesty will be strictly adhered to. Violations of the standards may result in an automatic failing of the course in addition to administrative action.

You may help each other on homework problems, but each of you will do your own write ups, and do your own coding.