

Applied Math 352

Applied Linear Algebra and Numerical Analysis

Winter Quarter, 2008

Time: MWF, 12:30-1:20

Place: Loew Hall 113

Instructor: Nicholas Cain

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Office hours at AS Lab, CMU B022/B027: M, 5:00-6:00 and Th, 2:30-3:30

T.A.: Lisa Bishop

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Office hours at AS Lab, CMU B022/B027: M, 2:00-3:00 and Tu, 10:30-11:30

AS Lab Assistant: Edwin Ding

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Office hours at AS Lab, CMU B022/B027: M, 4:00-6:00 and Tu, 11:30-3:30

Course webpage: <http://www.amath.washington.edu/courses/352-winter-2008/>

Check the webpage regularly for important announcements, homework corrections, etc.

Some things on the course webpage (such as homework assignments) are available from off-campus computers only if you enter the proper account name (amath352) and password (linear).

Textbook / course notes:

There is no textbook. Course notes will be available to download or read online from the course webpage.

I recommend that you read these in advance of lectures.

Some other recommended books are listed on the website, including the book *Numerical Computing with MATLAB* by Cleve Moler, which is available on-line.

Homework:

There will be 9 weekly homework assignments. Each homework will be worth 25 points and the lowest homework score will be dropped, so 200 points are possible on homework.

Homework will usually be due on Wednesdays **in class**. (If you cannot get it in during class but can find the TA to turn it in Wednesday afternoon, it may still be accepted, but no guarantees!) In general late homeworks will not be accepted, but **one time** you are allowed to turn it in the following class period with a 5 point deduction if you must miss a class.

Feel free to email me if you run into difficulties with the homework, but first please check the "Announcements and Corrections" link on the webpage for corrections or clarifications.

Exams:

There will be one midterm, worth 75 points, and a final exam worth 100 points.

The dates for the midterm and final will be decided later in the course.

Objectives and outline:

The main goal of the course is to introduce approximate numerical methods for solving mathematical equations that cannot be solved exactly by hand. Such problems arise constantly in science, engineering, finance, computer graphics, and elsewhere.

We will also study basic concepts in linear algebra, including matrix-vector manipulations, solving linear systems, least squares problems, and eigenvalue problems. The emphasis will be on practical aspects of linear algebra and numerical methods for solving these problems. Math 308 (Linear Algebra) is not a prerequisite for this class. This class and that one should complement one another and can be taken in either order.

You should also become adept at using the MATLAB language for numerical problem solving. MATLAB has many built-in functions for solving particular problems and you will learn how to use these. You should also gain an understanding of how they work, why they sometimes don't work, and how to use them intelligently.

The mathematical analysis of these algorithms and how well they work is called *numerical analysis*. The course will introduce this type of analysis for many of the algorithms we study, but will only scratch the surface. The year-long sequence Math 464-5-6 goes much further in this direction, and 352 should be good background for that course.

We will focus on a few basic types of problems: root finding, linear algebra, interpolation and data fitting, numerical integration, and the solution of differential equations. See the syllabus on the webpage for more details.

Computer usage:

The College of Arts and Sciences Instructional Computing Lab (AS Lab, previously known as MSCC), is located in Communications B022. The Windows PC's in this lab all have Matlab and other mathematical software. Use the generic `lab` account, which requires no password. You can store files in the `C:\temp` directory temporary while working on the PC. There is no permanent file storage on these machines. You should transfer your programs to your account on another machine or use a flash drive to store your work.

Consultants are usually available in the Lab to help with basic questions on the computers. See the AS webpage for lab hours, <http://depts.washington.edu/aslab/>.

Office Hours at the AS Lab:

Some of my office hours will be held in the AS lab, in Communications B022. It is easier to help you with programming difficulties in the lab than in my office, but you can also come to the lab with other questions.