

Numerical Linear Algebra

CSC 352/652 and MTH 326/626

Course Syllabus

Spring 2019

Professor: Dr. Grey Ballard

Email: ballard@wfu.edu

Office: Manchester 234

Office Hours: Mon and Thurs 3-5pm, or by drop-in or appointment

Class: 10–11 MWF, Manchester 241

Text: *Numerical Linear Algebra* by Trefethen and Bau (SIAM 1997); see <https://people.maths.ox.ac.uk/trefethen/text.html>

1 Course Description

Numerical methods for solving matrix and related problems in science and engineering. Topics will include systems of linear equations, least squares methods, and eigenvalue and singular value computations.

2 Learning Outcomes

By the end of this course, students should be able to:

1. write scripts and functions in Matlab,
2. use Matlab built-in functions to solve standard matrix problems including solving linear systems and least squares problems, and computing eigenvalue and singular value decompositions,
3. identify where matrix computations arise in scientific applications,
4. reason about the accuracy and stability of numerical algorithms,
5. evaluate the efficiency of numerical algorithms, and
6. identify efficient software (LAPACK subroutines) for solving standard matrix problems.

This class is both a math and computer science class; thus, there will be both proofs as well as programming in Matlab. Familiarity with elementary linear algebra and Matlab is helpful but not required for this course. The graduate version of this class will be more demanding than the undergraduate version, and it will include a project.

3 Assessment

There will be at least four quizzes, at least four problem sets, a midterm, a final exam, and a project. The project is optional for undergraduates and required for graduate students.

Problem sets can be done collaboratively, but all code and proofs must be written by each individual (see Academic Integrity below). Include the names of those with whom you've worked on each completed problem set. Problem sets will be turned in electronically through the class Sakai site.

Quizzes will be in-class and last 10 minutes. They will be announced about a week in advance. The lowest quiz score will be dropped.

The midterm and final exam are both cumulative. Make-up tests and quizzes will be administered only if excused in advance.

Projects can be done individually or by partners.

4 Academic Integrity

All tests and quizzes are to be done independently. Problem sets may be discussed with other students, however the work submitted must be your own work and reflect your understanding of the material. Copying of work from other students or from Internet-based resources is not acceptable and will be dealt with through the Honor System. I recommend that you retain drafts of your homework assignments and programs until the end of the semester in case a question arises as to authorship.

5 Grading

Course grades are determined using the following weightings. Undergraduates who choose to do a project can use the better of the two weightings.

With project:	No project:
10% quizzes	11% quizzes
30% problems sets	33% problem sets
20% midterm	22% midterm
30% final	34% final
10% project	

Letter grades are assigned based on the following categorization:

A	93 or above	C	73–76.99
A⁻	90–92.99	C⁻	70–72.99
B⁺	87–89.99	D⁺	67–69.99
B	83–86.99	D	63–66.99
B⁻	80–82.99	D⁻	60–62.99
C⁺	77–79.99	F	below 60

6 Contacting Me

In general, email is the best way to reach me, and I'm happy to take questions over email. The easiest way to find me in person is to stop by my office during office hours, though please feel free to drop by any time. If you want to be sure to find me then you can also email ahead to schedule a time; it helps to propose a few times that work for you so that I can choose one that works for me too.

7 Learning Assistance Center

If you have a disability that may require an accommodation for taking this course, then please contact the Learning Assistance Center (758-5929) within the first two weeks of the semester and bring it to my attention as appropriate.

8 Supporting Fellow Students in Distress

As members of the Wake Forest community, we have a personal responsibility to ensure that this classroom and the campus as a whole remains a healthy and safe environment for learning. Occasionally, you may come across a fellow classmate whose personal behavior concerns or worries you, either for the classmate's wellbeing or yours. If this should occur, you are encouraged to send your concern to the Wake Forest CARE Team at <http://careteam.wfu.edu/how-to-make-a-report/>. By utilizing your insights and observations, we can work together to help individuals get connected to appropriate resources and keep our community safe.

9 Emergency Preparedness Policy

In the unlikely event of a major disruption of normal university activities (such as might result from a health emergency or other disaster), a course continuation contingency plan will be enacted in order to allow completion of the course. During this time, students should continue with the reading and other assignments listed on the syllabus and monitor email, Sakai, and the WFU website for information. If students have questions or are in doubt about how to proceed, they should contact the instructor by email if available, otherwise they should contact by phone.