Numerical Linear Algebra, Fall 2017
Math 326/626
Dr. John Gemmer, gemmerj@wfu.edu
Office: 360 Manchester Hall **Phone:** (336) 758-5386
Course Website: http://users.wfu.edu/gemmerj/Math383-683.html
Office Hours: Tuesday 3-5, Wednesday 1-2, Tursday 2-4
Class Meeting Times: MWF 10:00-10:50
Class Location: Carswell 101

Textbook: *Numerical Linear Algebra,* Trefethan and Bau (1997).

Prerequisites: Linear algebra. Students should be comfortable with fundamental concepts from linear algebra: linearity, basis, linear independence, orthogonality, rank nullity theorem. No familiarity with Matlab is required.

Course Description: An introduction to numerical linear algebra. Topics covered will include: singular value decomposition, QR factorization and least squares, conditioning and stability, systems of equations, eigenvalues, and time permitting iterative methods. Along the way students will learn how to use Matlab as a tool of numerical linear algebra.

Course Rationale: The purpose of this course is to introduce the student to the field of numerical analysis through linear algebra. The central goal of numerical analysis is to compute the uncomputable! While all linear systems can be solved exactly by Gaussian elimination, this is a horribly inefficient method and in fact it is unstable! The trick is that Gaussian elimination — as well as many other algorithms you have learned from linear algebra — are completely useless for large matrices. This course will blend mathematical theory with modern computing to develop and analyze computationally efficient algorithms for handling large matrices.

Class Delivery: The course material will be delivered through a combination of lectures and in class group assignments. Evaluation of the students understanding of the material will be assessed through written homework assignments, in-class exams, in-class quizzes, classworks, and a final exam. Graduate students in the mathematics and statistics program will receive additional problems on homework and exams.

Course Policies:

✦ **Grading:**

Your grade will be based on:

- Weekly Homework: 30%
- Class works: 5%
- Quizzes: 5%
- Two in-class exams: 30% (15% each)
- Final Exam: 30%

You are guaranteed the following grades if your final percentage lies within the following ranges:

90-92.9: A-	**93-100: A**	
80-82.9: B-	**83-86.9: B**	**87-89.9: B+**
70-72.9: C-	**73-76.9: C**	**77-79.9: C+**
60-62.9: D-	**63-66.9: D**	**67-69.9: D+**

✦ **Homework:**
Homework will be assigned most weeks on Wednesday and will be due Friday of the following week. The assigned homework problems will be posted on my website.

✦ **Class Works:**
Throughout the course there will be several "class works". These consist of structured group assignments that should be completed during class time. These assignments will generally be exploratory allowing students to learn a new concept through a "hands on" approach.

✦ **Exams:**
There will be two exams and a comprehensive final in the course. All exams will be in-class.

✦ **Quizzes:** On most Fridays there will be a short 10 minute in-class quiz. These quizzes will consist of a very short problem that will test your knowledge of the prior lectures. These quizzes are to help both the students *and* the instructor understand concepts that students may be struggling with. All quizzes will be announced in class. *There will be no "pop" quizzes*. There are no retakes for missed quizzes, however I will drop the lowest quiz score from your final grade. Quizzes are often indicative of how the instructor grades and what concepts will be emphasized on exams.

Important Dates:

1. September 29: Exam 1.
2. November 3: Exam 2.
3. Final Exam: TBD

The Honor Code: At Wake Forest, we expect you to behave as honorable citizens of the class, the university, and the world as a whole. When you complete an assignment with your name on it, you are representing that everything you are turning in is your own work. That means that you do not copy from other students, textbooks, or websites. If at any time I become aware of cheating or plagiarism in this course, I will submit the information to the honor council.