MA 580 - Numerical Analysis I
North Carolina State University - Fall 2022 Syllabus

Instructor: Dr. Hangjie Ji
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Class Times: MWF 9:35 am - 10:25 am
Class Location: 01218 SAS Hall
Office Hours: SAS 3212, Monday 11:00 am - 12:00 pm, Thursday 10:30 am - 11:30 am and by appointment.
Midterm exam: Friday Oct. 14.
Final exam: Monday Dec. 12, 8:30 am - 11:00 am. Final exam date cannot be changed.

Course Description:
This is a first graduate course in numerical analysis. The topics covered in this course include: (1) vector and matrix norms, conditioning, errors and floating point arithmetic; (2) linear systems of equations (3) linear least-squares; (4) QR and SVD decompositions; (5) iterative methods for linear systems; (6) solution of nonlinear equations; (7) eigenvalue problems; (8) special topics.

Resources:

- Course Schedule: https://hji5.math.ncsu.edu/teaching/Fall2022MA580
- Textbooks:
  - I. C. F. Ipsen, Numerical Matrix Analysis, SIAM, 2009. https://catalog.lib.ncsu.edu/record/NCSU2514760
  - C. T. Kelley, Iterative Methods for Linear and Nonlinear Equations, SIAM, 1995. http://catalog.lib.ncsu.edu/record/NCSU2512957
  - D. Watkins, Fundamentals of Matrix Computations, Wiley-Blackwell, 2002. https://catalog.lib.ncsu.edu/catalog/NCSU4249441

  These books are available (freely) online for NCSU users through NCSU library.

  Other recommended references:

  - L.N. Trefethen and Bau, Numerical Linear Algebra, 1st Edition. 1997.
  - J. Demmel, Applied Numerical Linear Algebra https://catalog.lib.ncsu.edu/catalog/NCSU2482341
  - Desmond J. Higham and Nicholas J. Higham, Matlab Guide: Second Edition, SIAM, 2005 http://catalog.lib.ncsu.edu/record/NCSU3108706
  - Hans Petter Langtangen. Python Scripting for Computational Science
  - Anaconda Python website.

  Additional resources for learning Matlab, Python and LaTeX will be provided.

- Moodle page: https://moodle-courses2223.wolfware.ncsu.edu/course/view.php?id=1196 This website will be where the instructor posts all important documents needed for this course. Homework assignments will also be submitted here.

- Prerequisites: Calculus, background in linear algebra and ODEs, and some programming experience. You may use Matlab or Python for the class assignments.

Grading:
This course will use the standard letter grading cutoffs: 100–97 A+, 96.9–93 A, 92.9–90 A-, and similarly for B/C/D plus/minus/etc. Grades will not be curved; it is theoretically possible for everyone in the class to get an A (or an F). Your grade depends only on your performance, not on how everyone else in the class performs. Therefore, it is in your best interests to help your classmates, while keeping the academic integrity policy in mind.
Your final grade will be determined as follows:

Homework	60%
Midterm	15%
Final Exam	25%

Homework:
There will be approximately biweekly (computational and theoretical) homework assignments. The homework assignments will be uploaded to the course Moodle page and the cutoff time is final. You must follow the guidelines for homework submission in order for your file to be accepted. You may not email your homework. Also, do not show your solutions to anyone else; you may discuss the ideas of the homework and explain to each other, but do not copy any solutions from any source for any assignment. If you believe a problem on a homework has been graded incorrectly, or that your score was not correctly recorded in the gradebook, you must bring this to the attention of the instructor within 5 business days of the homework grade release date. Grading requests not initiated within this period of time will not be considered. Please verify in a timely manner that your scores are correctly recorded.
I encourage you to typeset your homework solutions in LaTeX (example LaTeX source files will be provided). To receive full credits, you must show complete work and provide sufficient details such that someone else can reproduce your results.

Attendance Policy/Late Assignments:
You are expected to attend all classes on time. Late assignments and make-up work will only be allowed for excused absences. You should contact me by email or in person before any anticipated excused absence. If you have an unanticipated excused absence (for example, a medical emergency), you should contact me within one week of returning to class.

Academic Honesty:
This will be upheld, and documentation will be submitted to the Office of Student Conduct for students who violate University regulations on academic integrity. Your signature on any test or assignment indicates "I have neither given nor received unauthorized aid on this test or assignment." See `http://policies.ncsu.edu/policy/pol-11-35-01` for a detailed explanation of academic honesty.

Special Needs:
If you qualify as a special needs student, please let me know as soon as possible so that we can make arrangements. We are able to make accommodations but we do need to know well in advance.