Syllabus, Math 170A, Spring 2020

Numerical Linear Algebra

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Course website: www.math.ucsd.edu/~dumitriu/m170a.html
All information in this syllabus can be found in more detail on the course website.

Office Hours (via Zoom): MW, 3-4:30pm; Thu 5-6:30pm, Fri, 2:30-4pm

Textbook: Fundamentals of Matrix Computations, D. Watkins,
2nd or 3rd edition.

TAs: Yizhe Zhu, Saeed Vahidian, Ryan Schneider (see course website).

About this class. This is an intro course to numerical linear algebra. By the end of this class, you should be able to perform calculations, either by hand or using Matlab (more below); explain concepts, processes, definitions and theorems; and prove some results relating to the material.

The main subjects will be solving linear systems $Ax = b$ (triangular systems, banded systems, LU and Cholesky decompositions, Gaussian elimination with and without pivoting, QR decomposition, iterative methods); perturbation theory (condition numbers and related inequalities); least squares (Gram-Schmidt, orthogonal matrices, QR decomposition); singular values (SVD decomposition); iterative methods for eigenvalues (power method, QR iteration) as well as Jacobi and Gauss-Seidel.

Lectures: There will be pre-recorded “lectures”, which will be made available each week; each “lecture” will be a collection of one or more videos where I will be explaining one topic, and each lecture will roughly cover a relevant chapter from the textbook. The videos will include slides and audio. You should watch these videos and then attend the Zoom office hours to ask questions, clarify concepts, see more examples worked out, discuss homework, etc.

In addition to lectures, I will be posting lecture notes, covering the same material. You are responsible for watching/reading the lectures and lecture notes. Please do this before attending office hours. I will be happy to answer questions, clarify notions, do examples, but I will not repeat the lecture during office hours.

MATLAB: from “matrix laboratory”, it’s a very friendly programming language and numerical computing environment often used in applied mathematics. Many assignments and some test questions will include writing short MATLAB codes. MATLAB is freely available to UCSD students; you have probably used it before if you have taken Math 18. To learn how to access MATLAB, go to the website (see above) and click on the MATLAB tab.

Homework: will be assigned weekly by posting them BOTH on the website and in Canvas. Solutions will be posted ONLY in Canvas.

Homework will be due on Fridays, by 11pm. Late homework will not be accepted, BUT the lowest homework grade will be dropped from the final grade calculation.
All homework will be turned in using Gradescope AND will have to be in .pdf form (one single file for each homework). For more information on Gradescope, please go to the course website and click on the Gradescope tab.

Note: Homework 0, due Friday, 04/03, will be collected and ONLY be graded for completion. It is only meant to familiarize you with Gradescope and MATLAB.

Exams: There will be two midterms, on 4/21, respectively, on 5/19; scheduled from 8pm PST. Each will take one hour.

The final exam is scheduled for 6/10, from 3pm-6pm PST.

Each exam will be uploaded on Canvas, together with an Academic Integrity Pledge that you will have to sign and submit alongside your solutions. Each exam will contain a list of formulas that I will deem necessary for you to solve the problems. For the midterms you will not be allowed to use any other material than what is on the list. For the final, you will also be allowed to use the lecture notes I will provide, and the textbook.

At the end of the exam period, you will have to take pictures or scans of your exam and Integrity Pledge, and you will upload them to Gradescope; you will be given 15 minutes to complete this task.

Among the things you will agree to by signing the Academic Integrity Pledge will be the following: In case the instructor suspects academic misconduct in completing the exam, you will be invited to defend your solutions during a short Zoom session with the instructor and/or the TA. If you decline, or if you accept but fail to defend your solution(s) to the instructor’s or the TA’s satisfaction, the instructor will refer your case to the Academic Integrity Office for an investigation. If you accept and defend your solution(s) satisfactorily, the case will be closed and you will receive a grade for the exam.

There will be NO makeup exams. It is your responsibility to make sure you have no conflicts in final exam scheduling; if you do, do not take this class.

Grading. Due to the coronavirus situation, the Department has decided to allow students to choose the P/NP option during the Spring 2020 quarter, and to make it consistent with all graduation requirements. You can make this choice up until week 10 of the quarter. The default is still to receive a letter grade (so, if that is what you wish, you don’t need to do anything).

Your total grade will be computed as follows.

• 20% Homework, 20% Midterm 1, 20% Midterm 2, 40% Final Exam
• 20% Homework, 30% Best Midterm, 50% Final Exam.

If you become sick or your internet connection fails and you cannot take the final exam, and had up to that point passing grades, you will get an Incomplete (see below).

Piazza. We will be using Piazza for course discussions, the link is provided on the course website; click on the tab Piazza for more details.

Incomplete Grades. The only way to obtain an Incomplete is if a student had been doing satisfactory work up until the final exam, and then misses the final exam because of a good (preferably documented) excuse. If the excuse is undocumented, it will be up to the instructor to decide whether to grant the Incomplete.