Math 425 Applied & Comput. Lin. Algebra Fall 2024 Handout

Course Information

Instructor: Serkan Hoşten

- **Lecture:** TuTh 9:30-10:45, TH 211
- **Office:** TH 931
- **E-mail:** serkan@sfsu.edu

Prerequisite: Math 225 or Math 325 with C or better, and Math 309 or CS 210 with C or better.

Course Objectives: The main objective of Applied and Computational Linear Algebra is to introduce efficient computational methods for solving applied problems that can be mathematically modeled as linear algebra problems. We will deepen the theory that is learned in a typical first linear algebra course, develop efficient and numerically stable algorithms for main tasks such as Gaussian elimination, Gram-Schmidt orthogonalization process, and least squares methods, and introduce new topics that are parts of the modern toolkit such as discrete Fourier transform and singular value decomposition. We will draw applications from data analysis, signal processing, image processing, computer vision, and optimization.

Text: *Applied Linear Algebra, Second Edition* by Peter J. Olver and Chehrzad Shakiban. The textbook is available free through the SFSU Library. Login to the library using your credentials, search for the book, and download the pdf.

Canvas: The course has an official Canvas webpage. I will post reading notes, handouts, homeworks and other material there. Bookmark this site and visit regularly.

Software: `MATLAB`: We will use `MATLAB` to do computations and develop code for our applications. If you do not have `MATLAB` on your desktop/laptop yet, use this site to install a free version.

Office Hours: Wednesday 1:30-2:30 pm, Thursdays 1:30-3:00 pm, TH 931.

Exams: Exam : in-class; the week of October 14-18.
Final: in-class; Thu, Dec 19, 8:00 am - 10:00 am.

Grading: Your grade will be based on four components:

- Your class participation in discussions and group work (10%)
- The written work in homeworks (40%)
- Exam (15%) and the final (25%)
- Individual project (10%)

A student who develops an understanding of the topics of the course at the most basic level and who can articulate this understanding in verbal and written fashion should collect $60-70\%$ of the total available points and receive a grade of C or C+. A student who shows proficiency both in understanding, and verbal and written articulation is capable of collecting $70-85\%$ of the available points and will receive

a B-/B/B+. Students who developed a deeper understanding and strong mathematical communication skills will collect more than 85% of the available points that correspond to a course grade of A- or A.

Homeworks and Reading Assignments: There will be about 10 weekly homework assignments that will be due 11:59 pm on Fridays. Most homeworks will include `MATLAB` code. Homework need to be submitted on Canvas. I will not accept late homeworks.

I highly recommend that you use LaTeX to typeset your homeworks. An easy way of using this tool is via Overleaf. You can find further resources on LaTeX on the course Canvas page.

You are welcome to discuss the homework problems with your classmates. However, you need to write the solutions to them *on your own*. If I decide that an answer is plagerised/copied from your friend's work or some other source, then both the plagerizer and the person who let this happen will be punished with a zero credit in that entire homework. I will strictly enforce this policy.

Course Conduct:

(1) Come to lecture by 9:30 am. If you are going to be late for an important reason let me know ahead of time (talk to me at the end of the earlier lecture or send me an e-mail prior to the lecture). If you arrive after 9:30 am, *do not enter the classroom*. Wait outside until I find a good break during lecture and come and get you (this might take 5-10 minutes).
(2) Turn off your cell phone, put your laptop or iPad in your backpack.
(3) No eating during lecture.
(4) Please use the bathroom *before* the lecture.
(5) If you need to leave the lecture for a particular well-established reason let me know about it at the beginning of the lecture. If a need arises that you have to leave the lecture, please ask for permission to leave.

Important Dates: Last day to add/drop/audit is Monday, September 16. After this day, in order to withdraw you need my permission. Withdrawal is not permitted except for serious and compelling reasons that could not have been predicted at the beginning of the semester. Not doing well in the course does *not* count as a reason. A serious and prolonged illness or injury is a valid reason if medical documentation is provided. A serious change in your personal life that negatively affects your schoolwork (for instance, all of a sudden you have to work full-time, you cannot afford childcare, you need to be away for a prolonged time etc) is a valid reason to withdraw.

Last day to opt for CR/NC grade is Friday, December 6. You can choose this option without asking my permission. If you do, you will receive CR if your work based on the grading scheme above corresponds to a C or better. You will receive NC otherwise.

The withdrawal deadline is Monday, November 11. After this day, only under extreme circumstances and by my, department chair's, and college dean's written permission you can withdraw. Usually, withdrawals after November 11 are due to circumstances that require the student to withdraw from all of his/her courses. The deadline is Friday, December 13.

Policy on WU grades and international students: WU (Withdrawal Unauthorized) indicates that an enrolled student did not withdraw from the course and also failed to complete course requirements. It is used when, in the opinion of the instructor, completed assignments or course activities or both were insufficient to make normal evaluation of academic performance possible. For purposes of grade point

average and progress point computation, this symbol is equivalent to an F.

International students who have enrollment unit requirements for their stay in the US need to be aware that a course with a WU grade is not viewed as a course attempted whereas a course with an F grade is considered to be a course attempted. The Mathematics Department will not approve petitions to retroactively change a grade of WU to a grade of F.

Disability access: Students with disabilities who need reasonable accommodations are encouraged to contact the instructor. The Disability Programs and Resource Center (DPRC) is available to facilitate the reasonable accommodations process. The DPRC is located in the Student Service Building and can be reached by telephone (voice/415-338-2472, video phone/415-335-7210) or by email (dprc@sfsu.edu).

Student disclosures of sexual violence: SF State fosters a campus free of sexual violence including sexual harassment, domestic violence, dating violence, stalking, and/or any form of sex or gender discrimination. If you disclose a personal experience as an SF State student, the course instructor is required to notify the Title IX Coordinator by completing the report form available at http://titleix.sfsu.edu, emailing vpsaem@sfsu.edu or calling 338-2032.

To disclose any such violence confidentially, contact:

- The SAFE Place - (415) 338-2208; http://www.sfsu.edu/~safe_plc/
- Counseling and Psychological Services Center - (415) 338-2208; http://psyservs.sfsu.edu/
- For more information on your rights and available resources: http://titleix.sfsu.edu

Religious holidays: Reasonable accommodations will be made for you to observe religious holidays when such observances require you to be absent from class activities. It is your responsibility to inform me during the first two weeks of class, in writing, about such holidays.

Changes to the syllabus: If I believe it will improve students' learning, I will make changes to any parts of the course such as structure of lectures, frequency and length of homework assignments and exams, grading policies etc. I will announce any such changes in class and via email.