MATH 253

Fall 2022 Syllabus

Instructor: Dr. Colin Starr Office Hours: MWF 9:10-10

Office: Ford 213 $T\Theta 9-10, 1:30-2:30 \text{ (Zoom)}$

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Required Text: Undergraduate Matrix Theory and Linear Algebra, by John S. Alin and Colin L. Starr. ISBN-13: 978-1791944131. ISBN-10: 1791944131.

Goals: This is an introduction to matrix algebra and linear algebra. Linear algebra is of fundamental importance in mathematics; it appears in every subject area and has wide-ranging applications outside of mathematics, from business to quantum physics.

- 1. Students will become familiar with the concepts, methods, and terminology of Linear Algebra. Specifically, students will understand the following: (abstract) vector spaces and subspaces, linear independence and span of a set of vectors, basis and dimension, linear transformations and their matrix representations, eigenvalues and eigenvectors, and all of the tools needed to adequately discuss these topics and apply them to understand the PageRank algorithm.
- 2. Students will learn how Linear Algebra can be applied to other branches of mathematics.
- 3. Students will learn how Linear Algebra can be applied outside of mathematics.
- 4. Students will become familiar with the basics of Python for computing with matrices.

Assessment: Your grade will be computed as follows:

WeBWorK: 230 points
Proofs: 170 points
Python: 80 points
Colloquium: 20 points
Midterm Exams: 3 for 100 points each
Final Exam: 200 points
Total: 1000 points

All points are worth the same amount – one homework point equals one exam point, for example.

Homework: I will assign homework from the textbook nearly every class meeting. Answers and solutions for almost all problems appear in the back of the book, so I will not collect these; they are just for your practice. I encourage you to work together on the homework. Also, you are certainly welcome to do more problems than I assign!

WeBWorK: Each section will have associated WeBWorK, collectively worth 23% of your grade; each problem is worth 1 point (0.1%). This is in addition to the homework mentioned above.

Proofs: It is exceptionally difficult to grade proofs in WeBWorK, so I assign and grade those separately. Proofs are to be LaTeXed. There are 34 spread throughout the semester, each worth 5 points. Please use Overleaf. Make an Overleaf project folder for this class, and share that folder with me. Each homework set should have its own file; I will return my comments directly in that file. Please also use my homework template; it includes commands that make it easier to distinguish my comments from your original text.

Python: We will be learning Python for performing basic matrix operations and related computations. There will be several small-scale Python worksheets over the course of the term. We will start them in class, working in groups, and each will be responsible for finishing them by the due date. In addition, there may be one or two small Python projects to be done outside of class.

Colloquium: Per department policy, this 200-level class includes a requirement of attending 2 colloquia this semester. Each is worth 10 points. Be sure to sign in before you get your cookies! We have a standard colloquium time, 4:10 on Thursdays, but most semesters we have colloquia at several other times, as well. If you find that you are unable to attend any, please let me know, and I will arrange for an alternative assignment for you. However, the alternative assignment will not include departmental cookies.

Exams: There will be three midterm exams and a comprehensive final exam. Tentative dates are below; these are subject to change.

Exam I Wednesday, September 21 Exam II Wednesday, October 12 Exam III Monday, November 14

The final will be from 8-11 AM on Monday, December 12.

General Info: Please take advantage of my office hours. I can't help you if you won't come see me! The times above are times I will be in my office or Zoom (or nearby), and you are welcome to try to meet with me by appointment or chance.

Final Thoughts: If you have any intention of continuing with mathematics, learn Linear Algebra as thoroughly as you can. Every math course you take will use ideas from Linear Algebra, so a solid grasp of it will be not only useful, but essential.

General Policies

Academic Integrity

Students of Willamette University are members of a community that values excellence and integrity in every aspect of life. As such, we expect all community members to live up to the highest standards of personal, ethical, and moral conduct. Students are expected not to engage in any type of academic or intellectually dishonest practice and encouraged to display honesty, trust, fairness, respect, and responsibility in all they do. Plagiarism and cheating are especially offensive to the integrity of courses in which they occur and against the College community as a whole. These acts involve intellectual dishonesty, deception, and fraud, which inhibit the honest exchange of ideas. Plagiarism

and cheating may be grounds for failure in the course and/or dismissal from the College. http://willamette.edu/cla/catalog/policies/plagiarism-cheating.php

Commitment to Positive Sexual Ethics

Willamette is a community committed to fostering safe, productive learning environments, and we value ethical sexual behaviors and standards. Title IX and our school policy prohibit discrimination on the basis of sex, which regards sexual misconduct — including discrimination, harassment, domestic and dating violence, sexual assault, and stalking. We understand that sexual violence can undermine students' academic success, and we encourage affected students to talk to someone about their experiences and get the support they need. Please be aware that as a mandatory reporter I am required to report any instances you disclose to Willamette's Title IX Coordinator. If you would rather share information with a confidential employee who does not have this responsibility, please contact our confidential advocate at confidential-advocate@willamette.edu. Confidential support also can be found with SARAs and at the GRAC (503-851-4245); and at WUTalk - a 24-hour telephone crisis counseling support line (503-375-5353). If you are in immediate danger, please call campus safety at 503-370-6911.

DACA/Undocumented Student Advocate

Willamette is committed to supporting our DACA/Undocumented students in a variety of ways. This year, Olivia Muñoz is the contact person for all DACA/undocumented students can provide those students with a number of external and internal resources that are available. Her contact information is email:omunoz@willamette.edu, Office: 3rd Floor UC, Phone: 503-370-6447.

Diversity and Disability Statement

Willamette University values diversity and inclusion; we are committed to a climate of mutual respect and full participation. My goal is to create a learning environment that is usable, equitable, inclusive and welcoming. If there are aspects of the instruction or design of this course that result in barriers to your inclusion or accurate assessment or achievement, please notify me as soon as possible. Students with disabilities are also encouraged to contact the Accessible Education Services office in Smullin 155 at 503-370-6737 or Accessible-info@willamette.edu to discuss a range of options to removing barriers in the course, including accommodations.

Religious Practice

Willamette University recognizes the value of religious practice and strives to accommodate students' commitment to their religious traditions whenever possible. Please let me know within the first two weeks of the semester if a conflict between holy days or other religious practice and full participation in the course is anticipated. I will do my best to work with you to determine a reasonable accommodation.

SOAR Center Offerings: Food, Clothing, and School Materials

The Students Organizing for Access to Resources (SOAR) Center strives to create equitable access to food, professional clothing, commencement regalia, and scholarly resources for WU and Willamette Academy students. The SOAR Center is located on the Putnam University Center's third floor (in the former Women's Resource Center and across from the Harrison Conference Room). The space houses the Bearcat Pantry, Clothing Share, and First-Generation Book Drive and is maintained by committed students and staff and faculty advisers.

Trans-Inclusive Classroom Space

I will gladly honor your request to address you by your affirmed name and gender pro-

nouns. Please advise me of this at any point in the semester so that I may make appropriate changes to my records. If I accidentally use an incorrect gender pronoun when addressing you, please feel free to let me know, in whatever manner makes you comfortable, what pronouns you use so that I can make every effort to correct that error.

Land Acknowledgement

We are gathered on the land of the Kalapuya, who today are represented by the Confederated Tribes of the Grand Ronde and the Confederated Tribes of the Siletz Indians, whose relationship with this land continues to this day. We offer gratitude for the land itself, for those who have stewarded it for generations, and for the opportunity to study, learn, work, and be in community on this land. We acknowledge that our University's history, like many others, is fundamentally tied to the first colonial developments in the Willamette Valley. Finally, we respectfully acknowledge and honor past, present, and future Indigenous students of Willamette.

LinkedIn Learning

Willamette University tracks all log-in information for LinkedIn Learning. This information will be kept in-house and will be used for the purposes of developing LinkedIn Learning on campus. Faculty may keep track of your log-in for the purposes of evaluating your progress for class. Faculty using LinkedIn Learning in for class assignments will not share your log-in information with others as it is protected under FERPA.

Time Commitment

Willamette's Credit Hour Policy holds that for every hour of class time there is an expectation of 2-3 hours' work outside of class. Thus, for this class you should anticipate spending 6-9 hours outside of class engaged in course-related activities. Examples include reading course materials, preparing for discussion, and preparing and writing papers and exams.

Intellectual Property and Privacy

Class materials and discussions including recorded lectures are for the sole purpose of educating the students enrolled in the course. The release of such information (including but not limited to directly sharing, screen capturing, or recording content) is strictly prohibited, unless the instructor states otherwise. Doing so without the permission of the instructor will be considered an Honor Code violation and may also be a violation of other state and federal laws, such as the Copyright Act.