MATH 253

Spring 2021 Syllabus

Instructor:	Dr. Colin Starr	**Office Hours:**	M 11-12 and 2-3, T 9-10 and 1-2:30
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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. I will return my comments directly in the 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 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 coloquia 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 3 midterm exams and a comprehensive final exam. Each exam will be worth 20% of your grade. Tentative dates are below; these are subject to change.

Exam I	Friday, February 5
Exam II	Friday, March 5
Exam III	Monday, April 5

The final will be from 8-11 AM on Thursday, May 6.

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 nearby), but you may stop by any time during the day. If I am there and have the time, I will help you. Also: Red Vines.

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); at WUTalk, a 24-hour telephone crisis counseling support line (503-375-5353); and via the University Chaplains (503-370-6213). If you are in immediate danger, please call campus safety at 503-370-6911."

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.