MATH 340: ADVANCED LINEAR ALGEBRA

SPRING 2025 SYLLABUS

"The course continues the study of linear algebra from MATH 225 or MATH 230/231. It discusses several aspects of linear algebra that are of crucial importance for the subject and its applications to abstract algebra, geometry and number theory. Topics include generalized eigenspaces and Jordan normal form theorem, dual vector spaces, bilinear and hermitian forms, symmetric and hermitian operators, Hom spaces and tensor products."

INSTRUCTOR	Minh-Tâm Trinh (minh-tam.trinh@yale.edu)
TIME	MW 2:30 PM–3:45 PM
PLACE	WTS (Watson Center Sachem St), Room A74
WEBPAGE	https://mqtrinh.github.io/math/teaching/yale/math-340/

I will mostly rely on my own notes, which may or may not be posted. Some other useful references are Axler, *Linear Algebra Done Right*, 4th Edition, and Treil, *Linear Algebra Done Wrong*. Both are available from the authors' websites.

TOPICS

(1) Vector Spaces and Linear Maps
(2) Eigenvalues and the Jordan Decomposition
(3) Multilinear Forms
(4) Inner Products and the Spectral Theorem

LOGISTICS

Office Hours. By appointment.

Emails. If you need to email me about the course, please put "MATH 340" in the email subject. That helps me keep everything organized. You may address me as "Minh-Tam" or as "Dr. Trinh".

Grades. I will assign nine problem sets (each 4% of the total grade) and a midterm (24%) before the final (40%). The midterm will be during class on **Wednesday, February 26**.

Problem sets will be due by 11:59 pm in Gradescope on their due dates. Access Gradescope through the navigation bar for MATH 340 in Canvas. You can always submit homework **up to four days late** for 50% credit. You also get **two chances** to request no late penalty. *Please try to reserve these for illness and/or family tragedy.* We will not grant any other extensions.

On problem sets, you must cite any collaborators or sources used: Failure to do so is plagiarism. Please write in complete sentences. To discourage you from

relying on large language models, we will adopt a grading scheme that penalizes typos lightly and conceptual mistakes harshly.

There is no attendance grade. If you get sick, please stay at home and take care of yourself.

SCHEDULE

[*] No class on Monday (1/20), Martin Luther King Day. That week, class will be held on Wednesday and Friday.

[**] No class on Monday (4/7).

Week	Axler, 4th Ed. §	
1/13	1B–1C	
1/20 [*]	2A–2C	PS1 due 1/22
1/27	3A–3C	PS2 due 1/29
2/3	3D	PS3 due 2/5
2/10	5A–5C	~~PS4 due 2/12~~
2/17	8A	~~PS5 due 2/19~~
		PS4 due 2/19
2/24	8B–8C	Midterm (**Wed, 2/26**)
3/3	3E–3F, ~~9A~~	PS5 due 3/5
3/10		*Spring Recess*
3/17		*Spring Recess*
3/24	9A–~~9B~~, 9D	PS6 due ~~3/26~~ 3/28
3/31	9B–9C	
4/7 [**]	6A	PS7 due 4/9
4/14	7A–7C	PS8 due 4/16
4/21	7D	PS9 due 4/23