

MA2330: Introduction to Linear Algebra

(<http://www.math.mtu.edu/kreher/ABOUTME/syllabus/MA2330.html>)

Course description

An introduction to linear algebra and how it can be used, including basic mathematical proofs. Topics include systems of equations, vectors, matrices, orthogonality, subspaces, and the eigenvalue problem. Not open to students with credit in MA2320 or MA2321. Course prerequisite is any math class numbered MA1090 or higher.

Credits: 3.0

Lec-Rec-Lab: (0-3-0)

Semesters Offered: Fall, Spring

Pre-Requisite(s): MA 1160 or MA 1161

Text

David C. Lay *Linear Algebra and its applications*, (Fourth Edition)

Tentative Schedule.

Linear equations in Linear Algebra

	Date	Topic	Homework exercises	Due
			HW 1	Due
M	Jan 13	1.1 Systems of Linear Equations	6, 10, 14, 20, 24, 26	Jan 22
W	Jan 15	1.2 Row Reduction and Echelon Form	4, 8, 12, 14, 20, 22, 24, 26	Jan 22
F	Jan 17	1.3 Vector Equations	10, 12, 14, 16, 18, 22, 24, 28	Jan 22
			HW 2	Due
M	Jan 20	MLK DAY — No class		
W	Jan 22	1.4 The Matrix Equation $Ax = b$	4, 8, 10, 12, 16, 18, 22, 26, 38	Jan 29
F	Jan 24	1.5 Solutions Sets of Linear Equations	2, 6, 8, 12, 14, 18, 34, 38	Jan 29
			HW 3	Due
M	Jan 27	1.7 Linear Independence	6, 8, 10, 12, 18, 24, 28, 30, 32, 38	Feb 3
W	Jan 29	1.8 Introduction to Linear Transformations	4, 6, 12, 20, 24, 30, 32	Feb 3
F	Jan 31	1.9 The Matrix of a Linear Transformation	2, 16, 20, 24, 26	Feb 3
M	Feb 3	Review		
T	Feb 4	Chapter 1 Evening Exam 1		
W	Feb 5	No class — Makeup for Exam 1		
F	Feb 7	Winter carnival recess		

Matrix Algebra

			HW 4	Due
M	Feb 10	2.1 Matrix Operations	2, 8, 12, 16, 20, 22, 26, 28	Feb 19
W	Feb 12	2.2 The inverse of a matrix	8, 11, 16, 20, 23, 24, 30, 32	Feb 19
F	Feb 14	2.3 Characterizations of Invertible matrices	2, 6, 14, 20, 22	Feb 19

			HW 5	Due
M	Feb 17	2.5 Matrix Factorization	2, 4, 8, 10, 12	Feb 26
W	Feb 19	$PA = LU$ decomposition	Read LU.pdf and do exercises 1, 2	Feb 26

Determinants

F	Feb 21	3.1 Introduction to Determinants 3.2 Properties of Determinants	(3.1) 4, 6, 10, 16, 20, 22, 44 (3.2) 6, 12, 16, 18, 26, 28, 31, 34	Feb 26
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Recommended exercises

M	Feb 24	3.3 Cramer's rule, Vol. and Linear Trans.	4, 6, 8, 12, 18, 22	
W	Feb 26	Review for Chapter 2 and 3 evening Exam 2		
R	Feb 27	Chapter 2 and 3 evening Exam 2		

Vector Spaces

			HW 6	Due
F	Mar 28	4.1 Vector Spaces and Subspaces	2, 6, 8, 12, 14, 16, 18, 22	Mar 18
M	Mar 2	4.2 Null Spaces, Col. Space and Lin. Trans. 4.3 Linear independent sets ; Bases	(4.2) 2, 4, 8, 10, 12, 14, 18, 22, 24 (4.3) 2, 6, 10, 12, 14, 16, 20, 22, 24, 25	Mar 18
W	Mar 4	4.4 Coordinate Systems	2, 6, 10, 14, 23, 34	Mar 18
F	Mar 6	No class — makeup for Exam 2		

M	Mar 9	Spring break		
W	Mar 11	Spring break		
F	Mar 13	Spring break		

			HW 7	Due
M	Mar 16	4.5 The Dimension of a vector space	2, 6, 8, 12, 16, 22, 24, 26, 30	Mar 25
W	Mar 18	4.6 Rank	4, 6, 8, 12, 16, 19, 22, 28, 29	Mar 25
F	Mar 20	4.7 Change of Bases	2, 4, 6, 8, 10, 14	Mar 25

M	Mar 23	Review for Chapter 4 evening Exam 3		
T	Mar 24	Chapter 4 evening Exam 3		

			HW 8	Due
W	Mar 25	5.1 Eigenvectors and eigenvalues	2,4,6,8,10,12,14,20	Apr 1
F	Mar 27	5.2 The Characteristic equation	2,4,8,10,14,20,22	Apr 1

Eigenvalues and Eigenvectors

			HW 9	Due
M	Mar 30	5.2 The Characteristic equation	2,4,8,10,14,20,22	Apr 8
W	Apr 1	5.3 Diagonalization	2,4,6,8,20,22,26	Apr 8

Orthogonality and Least Squares

F	Apr 2	6.1 Inner Product Length and Orthogonality	2,4,6,8,14,18	Apr 8
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			HW 10	Due
M	Apr 6	6.2 Orthogonal sets	2,6,8,16,20,22,24	Apr 15
W	Apr 8	6.3 orthogonal projection	2,4,6,10,12,14,20	Apr 15
F	Apr 10	6.5 Least-squares problems	2,4,6,10,12,14	Apr 15

<i>Recommended exercises</i>				
M	Apr 13	6.6 Applications to linear models	2,4,8,10	
W	Apr 15	T.B.A.		
F	Apr 22	T.B.A.		

M	Apr 20	Review		
W	Apr 22	Chapter 5 and 6 Take home Exam due		
F	Apr 24	No class Make up for Exam 4.)		

M	Apr 27	Exam Week		
W	Apr 29	Exam Week		
F	Apr 27	Exam Week		

You are responsible for all of the material in these sections even if it is not presented in class.

Homework

You may work together on homework, but be sure you understand the exercises yourself. Although all assigned exercises must be turned in on there due date, we will in fact only grade a portion of them.

Grading

Your grade will be based on

- Homework (25%)
- Four examinations lowest score dropped (45%)

The first 3 of these exams will be 1-hour exams given in a 2 hour evening time slot.
The fourth exam will be a take home exam.

- A 2-hour comprehensive final (30%).

(From the assigned home work a smaller number of problems will be graded. Recommended exercises are not to be handed in.)

Some advice

This course in Linear Algebra will likely be your first introduction to abstract axiomatic mathematics. This approach may seem very unfamiliar at first and your performance will depend heavily on how much effort you put into understanding the concepts. At a minimum you should

- Attend all lectures.
- Review each lecture afterwards - aiming for understanding.
- Attempt all exercises by yourself.
- Work through odd numbered exercises with other students in the class. Solutions to odd numbered exercises are at the end of the textbook.
- Read any course related material.