

Carnegie Mellon University
Department of Mathematical Sciences

21-241 Lec 3 Matrices and Linear Transformations

Instructor: Dr. Joshua Ballew Session: Spring 2017
E-mail: jballew AT andrew.cmu.edu WWW: www.math.cmu.edu/~jballew/21241Spring2017.html
Office: Office: WEH 7124 Office Phone: N/A
Office Hours: TW 11:00 AM–12:00 PM, R 3:00 PM–4:00 PM

Lecture Times: MWF 3:30 PM–4:20 PM

Room: DH 2302

Teaching Assistant: Arda Antikacioglu E-mail: aantikac AT andrew.cmu.edu
Office: WEH 6213 Office Phone: N/A
Office Hours: TBA

Tutorial Times:	Room
(G) T 8:30 AM–9:20 AM	WEH 5310
(H) T 9:30 AM–10:20 AM	WEH 5310

Textbooks

Poole, David. *Linear Algebra: A Modern Introduction*. Cengage Learning, Stamford, CT, fourth edition, 2015. ISBN: 978-1285463247

Course Description

This is a first course in linear algebra intended for scientists, engineers, mathematicians and computer scientists. Students will be required to write some straightforward proofs. Topics to be covered include complex numbers, real and complex vectors and matrices, row space and column space of a matrix, rank and nullity, solving linear systems by row reduction of a matrix, inverse matrices and determinants, change of basis, linear transformations, inner product of vectors, orthonormal bases and the Gram-Schmidt process, eigenvectors and eigenvalues, diagonalization of a matrix,

symmetric and orthogonal matrices. Prior completion of the course 21-127, Concepts of Mathematics, is strongly recommended.

Evaluation

Evaluation will be based upon three in-class exams, homework, groupwork from recitation, and a final exam with the following weights.

- Each in-class exam: 15%
- Final Exam: 25%
- Homework: 15%
- Groupwork: 15%

The lowest homework grade and the lowest groupwork grade will be dropped. Any curving of grades will be based upon the final course grade; individual assignments and exams will not be curved.

Assignment Details

Homework will be assigned roughly weekly, and each assignment will be worth fifty points. Each assignment will contain problems from the book and possibly my own problems. I expect to post the coversheet as a PDF file on the course website and Blackboard by 5:00 PM each Friday. Homework will be due at the BEGINNING OF CLASS on the due date, typically on Fridays. You must staple the coversheet to the top of your homework assignment or three points will be deducted. Late assignments will not be accepted for a grade without a documented excuse (illness, death in the family, religious observance, university-sponsored activity, etc.). Late homework assignments must be turned into Dr. Ballew, not your TA. A selection of problems will be graded for correctness. Students may collaborate on homework assignments, but each student must submit his or her *own* work.

Exams will be given on the dates given in the course schedule. The material covered on each exam will be confirmed at least a week before each exam. Make-up exams will be granted only for excused absences with documentation. Please inform me as soon as possible if you will miss an exam day so that alternate arrangements can be made. Each of the three in-class exams will be graded out of one hundred points.

Recitation/Discussion

Students are expected to attend their assigned recitation section each Tuesday. Each recitation section will have some time for questions on lecture material and homework problems, but the main focus will be on the groupwork assignment each week. You will work in groups, but each student shall turn in his or her own assignment. There will be space on the worksheet to indicate the names of the students in your group. Groupwork assignments cannot be made up, but may be excused for appropriate circumstances.

Miscellaneous

Students are expected to abide by policies of academic integrity available at the web address <http://www.cmu.edu/academic-integrity/>. In particular, no assistance will be allowed on any of the exams: no crib sheets, copying, calculators (for the first exam), computers, phones, etc.

Students are also encouraged to get help from other classmates, from their TA, or from me when necessary. You are welcome at any time during office hours or you may make an appointment. Please place “21-241” in the subject line of any emails to me and allow 24 hours for a response. In addition, the university runs an EXCEL program for this course. More information about this program will come in the first couple of weeks of class.

It is expected that students will have read the section(s) for each lecture BEFORE class. Please follow the attached course schedule. Since the schedule is tentative, any changes will be announced in class. It is not expected that you completely understand the material in each section before class, however. Please come with any questions you may have in case I do not address them during the lecture.

The university has also asked instructors to remind students of the following.

Take care of yourself. Do your best to maintain a healthy lifestyle this semester by eating well, exercising, avoiding drugs and alcohol, getting enough sleep and taking some time to relax. This will help you achieve your goals and cope with stress. All of us benefit from support during times of struggle. You are not alone. There are many helpful resources available on campus and an important part of the college experience is learning how to ask for help. Asking for support sooner rather than later is often helpful. If you or anyone you know experiences any academic stress, difficult life events, or feelings like anxiety or depression, we strongly encourage you to seek support. Counseling and Psychological Services (CaPS) is here to help: call 412-268-2922 and visit their website at <http://www.cmu.edu/counseling/>. Consider reaching out to a friend, faculty or family member you trust for help getting connected to the support that can help.

If you or someone you know is feeling suicidal or in danger of self-harm, call someone immediately, day or night:

CaPS: 412-268-2922

Resolve Crisis Network: 888-796-8226

If the situation is life-threatening, call the police:

On campus: CMU Police: 412-268-2323

Off campus: 911

If you have questions about this or your coursework, please let me know.

Lecture Schedule

MONDAY	WEDNESDAY	FRIDAY
Jan 16th No class–Martin Luther King, Jr. Day	18th 1 Course Overview, 1.1	20th 2 1.2
23rd 3 1.3, 1.4	25th 4 2.1, 2.2	27th 5 2.2
30th 6 2.3	Feb 1st 7 2.4	3rd 8 2.5
6th 9 3.1, 3.2	8th 10 3.3	10th 11 Exam 1 (1.1-3.2)
13th 12 3.3, 3.4	15th 13 3.5	17th 14 3.5
20th 15 3.5, 3.6	22nd 16 3.6, 4.1	24th 17 4.2
27th 18 4.2, 4.3	Mar 1st 19 4.3, 4.4	3rd 20 4.4
6th 21 4.6	8th 22 Exam 2 (3.3-4.3)	10th No class–Mid-Semester Break
13th No class–Spring Break	15th No class–Spring Break	17th No class–Spring Break
20th 23 5.1, 5.2	22nd 24 5.2	24th 25 5.3
27th 26 5.4	29th 27 5.4, 6.1	31st 28 6.1
Apr 3rd 29 6.2	5th 30 6.2	7th 31 6.3
10th 32 6.4	12th 33 6.5	14th 34 Exam 3 (4.4-6.3)
17th 35 6.6	19th 36 7.1	21st No class–Spring Carnival
24th 37 7.2	26th 38 5.5	28th 39 7.4
May 1st 40 7.4, 7.3	3rd 41 7.3, Review	5th 42 Review