Carnegie Mellon University

Department of Mathematical Sciences

21-241 Lec5 Matrices and Linear Transformations

Instructor: Dr. Joshua Ballew
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Office: Office: WEH 7124
Office Hours:

Session: Fall 2015
WWW: `www.math.cmu.edu/~jballew/21241Fall2015.html`
Office Phone: N/A
T 10:00 AM–11:00 AM, WR 3:00 PM–4:00 PM

Lecture Times: MWF 9:30 AM–10:20 AM

Room: BH A53

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, rowspace and columnspace 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 four in-class exams, homework, groupwork from recitation, and a final exam. Specifically, each in-class exam will be worth ten percent of the overall grade, the final

exam will be worth twenty-five percent of the overall grade, all the homework together will be worth twenty percent of the overall grade, and all the groupwork from recitation will be worth ten percent of the final grade. Class participation (coming and contributing to lectures and discussion) will count for five percent of the final grade 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 ten 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 one point 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. 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 four in-class exams will be graded out of one hundred points.

Recitation/Discussion

Students are expected to attend their assigned recitation section each Thursday. 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.

Section I–11:30 AM–12:20 PM: TA: Sameer Dhavalikar, sdhavali AT andrew.cmu.edu
Office: Wean Hall 7215
Meets in DH 1117

Section J–1:30 PM–2:20 PM: TA: Timothy Li, tkli AT andrew.cmu.edu
Office: Wean Hall 7215
Meets in DH 1217

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, 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.

It is expected that students will have read the section(s) for each lecture BEFORE 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.

Lecture Schedule

Monday	Wednesday	Friday
Aug 31st **1** Course Overview, 1.1	Sep 2nd **2** 1.2	4th **3** 1.3, 1.4
7th No class–Labor Day	9th **4** 2.1, 2.2	11th **5** 2.2
14th **6** 2.3	16th **7** 2.4	18th **8** 2.5
21st **9** 3.1, 3.2	23rd **10** 3.3	25th **11** Exam 1 (1.1-3.3)
28th **12** 3.4	30th **13** 3.5	Oct 2nd **14** 3.5
5th **15** 3.6	7th **16** 4.1	9th **17** 4.2
12th **18** 4.2, 4.3	14th **19** 4.4	16th **20** 4.5
19th **21** 4.6	21st **22** Exam 2 (3.4-4.5)	23rd No class–Mid-Semester Break
26th **23** 5.1, 5.2 Mid-Semester Grades Due	28th **24** 5.2	30th **25** 5.3
Nov 2nd **26** 5.4	4th **27** 6.1	6th **28** 6.1
9th **29** 6.2	11th **30** 6.2	13th **31** 6.3
16th **32** Exam 3 (4.6-6.2)	18th **33** 6.4	20th **34** 6.5
23rd **35** 6.5	25th No class–Thanksgiving	27th No class–Thanksgiving
30th **36** 7.1	Dec 2nd **37** 7.2	4th **38** Exam 4 (6.3-7.1)
7th **39** 7.3	9th **40** 7.4	11th **41** Review

Final Exam: TBA