

Syllabus for MATH 4242 (Applied Linear Algebra) Spring 2025

Instructor: Scot Adams **Office:** Vincent Hall 354 **Phone:** 612-625-5507

email address: adams@math.umn.edu

Office Hours:

Mondays: 11:15am–12:05pm, Vincent 354

Wednesdays: 2:30pm–3:20pm, Vincent 354

Fridays: 1:25pm–2:15pm, Vincent 354

NOTE: I do not hold office hours on University Holidays. I do not hold office hours before the first day of classes. I do not hold office hours after the final exam.

Text: Olver and Shakiban

Grading:

Quizzes 20%

Midterms 50%

Final Exam 30%

1st Midterm: Thursday 27 February

2nd Midterm: Thursday 27 March

Final exam: Monday 05 May

Course summary and prerequisites

The course will cover the basics of linear algebra, see the list of topics below. Generally students will be expected to know calculus. It is helpful to have had two years of calculus and a course in differential equations.

Required University Policies

Please point to <https://policy.umn.edu/education/syllabusrequirements-appa>

Miscellaneous:

I either do “curve” or do not “curve” depending on how you define it. I do not preassign the number of students who will receive a specific grade. On the other hand, neither do I preassign the gradelines before seeing the distribution of grades.

Incompletes will be given only in cases where the student has completed all but a small fraction of the course with a grade of C or better and a severe unexpected event prevents completion of the course. In particular, if you get behind, you cannot “bail out” by taking an incomplete.

No extra credit work will be accepted.

As students in a university community, you are expected to do your own academic work. Generally, a student caught cheating (on any quiz or exam) is given an “F” for the course, and a report is filed with the Office for Student Conduct and Academic Integrity.

Course Schedule

- 01/21-01/24 Gauss elimination, pivoting 1.1-1.4
- 01/27-01/31 Inverses, linear systems, determinants, 1.5, 1.6, 1.8, 1.9
- 02/03-02/07 Vector spaces, span, bases, dimension 2.1-2.3
- 02/10-02/14 Kernel, range, adjoints, solvability 2.4-2.5
- 02/17-02/21 Inner products, norms 3.1-3.3
- 02/24-02/28 Positive definite, Cholesky 3.4-3.6

- 02/27 Midterm 1 (covering Chapters 1, 2)

- 03/03-03/07 Orthogonal bases and matrices, Gram-Schmidt 4.1-4.3
- 03/10-03/14 SPRING BREAK
- 03/17-03/21 Projection, minimization, least squares, interpolation 4.4-5.5
- 03/24-03/28 Linear transformations 7.1-7.2

- 03/27 Midterm 2 (covering Chapters 3, 4, 5)

- 03/31-04/04 Isometries, linear systems, 7.3-7.5
- 04/07-04/11 Eigenvalues, diagonalization 8.2-8.4
- 04/14-04/18 Symmetric matrices 8.5
- 04/21-04/25 Jordan canonical form 8.6
- 04/28-05/02 Singular values 8.7

- 05/05 Final Exam (entire course – cumulative)

Details of course grading

Homework will be assigned but not collected. Instead there will be weekly quizzes, except for the first week and the two midterm weeks. These quizzes will consist of problems very similar to the homework problems. The two lowest quiz scores will be dropped. No makeup quizzes. The quizzes will count for 20% of your grade. There will be two midterms and a final exam. Each midterm will count for 25% of your grade. The final exam is cumulative and will count for 30% of your grade. No materials allowed on the midterms and final, except writing utensils and water. For the quizzes, speak with the TA.

Suggested homework problems

page 3: 1.1.1(e)
page 8: 1.2.7(a)(b)(c), 1.2.13, 1.2.23, 1.2.32
page 15: 1.3.4(c)(d), 1.3.7
page 21: 1.3.33(e)
page 24: 1.4.4
page 30: 1.4.21(b)
page 34: 1.5.4, 1.5.15
page 39: 1.5.25(h), 1.5.28(c)
page 44: 1.6.2, 1.6.3
page 47: 1.6.25(d)
page 65: 1.8.4, 1.8.7 (i)
page 69: 1.8.22(e)
page 73: 1.9.1(f), 1.9.7
page 80: 2.1.2, 2.1.12
page 85: 2.2.1, 2.2.4, 2.2.12, 2.2.22
page 91: 2.3.2, 2.3.19
page 97: 2.3.22(a)(c), 2.3.32
page 103: 2.4.3, 2.4.8(a), 2.4.11, 2.4.15, 2.4.21
page 109: 2.5.4
page 111: 2.5.17
page 118: 2.5.26(c), 2.5.28, 2.5.40
page 132: 3.1.1, 3.1.15, 3.1.17
page 135: 3.1.23(b)(c)
page 139: 3.2.9, 3.2.13
page 141: 3.2.19
page 143: 3.2.39
page 147: 3.3.11(b)(e)
page 149: 3.3.20(a)(b)
page 152: 3.3.35(i)
page 155: 3.3.50
page 159: 3.4.4, 3.4.8, 3.4.10

page 165: 3.4.23(iii)(iv), 3.4.25
page 170: 3.5.2(c)(f), 3.5.4, 3.5.10
page 172: 3.5.21(g)
page 180: 3.6.45
page 186: 4.1.4, 4.1.10, 4.1.15
page 191: 4.1.22, 4.1.28
page 196: 4.2.1(c), 4.2.9(a)
page 200: 4.2.17(c)
page 203: 4.3.4, 4.3.17, 4.3.20
page 211: 4.3.27(f)
page 215: 4.4.2(c), 4.4.3(c), 4.4.6
page 220: 4.4.15(b), 4.4.19
page 225: 4.4.34(f), 4.4.35
page 239: 5.1.7
page 244: 5.2.1, 5.2.8
page 249: 5.3.8, 5.3.14
page 252: 5.4.4(a), 5.4.6(b)
page 258: 5.5.1(b)
page 268: 5.5.19(a)(b)
page 346: 7.1.5, 7.1.15
page 351: 7.1.30
page 353: 7.1.40
page 357: 7.1.54
page 363: 7.2.4
page 369: 7.2.24(d), 7.2.25(b)
page 371: 7.3.2, 7.3.5, 7.3.9
page 374: 7.3.11(c)(e)
page 382: 7.4.7
page 389: 7.4.35
page 397: 7.5.6
page 399: 7.5.11(d), 7.5.12
page 402: 7.5.29(a)(b)
page 414: 8.2.1(e)(f)
page 417: 8.2.14, 8.2.20, 8.2.32, 8.2.42
page 425: 8.3.3(d)(g)
page 427: 8.3.13(d)(e), 8.3.21
page 431: 8.4.12
page 438: 8.5.13(c), 8.5.17(e), 8.5.26
page 452: 8.6.7(c)(d), 8.6.8, 8.6.19
page 464: 8.7.1(e)(f), 8.7.3