

LECTURE: MWF 8 – 8:50 in BLB 225

INSTRUCTOR: William Cherry

OFFICE: GAB 405

PHONE: 565-4303

E-MAIL: wcherry@unt.edu

WEB PAGE: <http://wcherry.math.unt.edu/math2700>

OFFICE HOURS: M 10–Noon, T 1–2, W 1–3, Th 3:30–4:30, and by appointment

PREREQUISITE(S): Math 1720

TEXT: David Lay, *Linear Algebra and Its Applications* Fifth Edition, Addison Wesley, 2015.

Note: No MyMathLab access code is necessary.

GRADES: There will be five components to your final grade, weighted as follows:

Homework: 10%

Quizzes: 10%

In Class Tests: 45% (15% each)

Final Exam: 35%

Students are also expected to complete the SPOT evaluation of teaching.

IMPORTANT DATES:

FINAL EXAM: Monday, May 7, 8 a.m. – 10 a.m.

IN CLASS TESTS: Feb. 14, Mar. 21, and Apr. 25

ATTENDANCE: Experience shows that students who do not regularly attend class tend not to get good grades. Attendance on the dates of the in class tests is mandatory. **Makeup tests** will be given only in very exceptional cases and must be **arranged in advance**. **No late homework** will be accepted, and students will not be allowed to make up missed quizzes. To account for an occasional absence or illness, a student's three lowest homework scores and two lowest quiz scores will be dropped before final grades are computed. Although students should generally plan to submit homework in class on its due date, if class must be missed, homework may be turned in early or on-time via e-mail. If you come late to class on a day homework is due, please be sure to turn in your homework as you enter the room.

ACADEMIC DISHONESTY: Cheating on exams is a serious breach of academic standards and will be punished severely. UNT's full policy on academic integrity can be found at:

<http://facultysuccess.unt.edu/academic-integrity>.

The University of North Texas makes reasonable academic accommodation for students with disabilities. Students seeking accommodation must first register with the Office of Disability Accommodation (ODA) to verify their eligibility. If a disability is verified, the ODA will provide you with an accommodation letter to be delivered to faculty to begin a private discussion regarding your specific needs in a course. You may request accommodations at any time, however, ODA notices of accommodation should be provided as early as possible in the semester to avoid any delay in implementation. Note that students must obtain a new letter of accommodation for every semester and must meet with each faculty member prior to implementation in each class. For additional information see the Office of Disability Accommodation website at <http://disability.unt.edu>. You may also contact them by phone at 940-565-4323.

Course Description

Linear algebra is the study of systematic methods for solving systems of linear equations, often in many variables. Linear equations are the simplest forms of equations, and they are also the most commonly occurring across business, science and engineering. Although it will not be the emphasis of this course, the methods we will discuss are easily programmed on a computer, and the methods of linear algebra can be used to automate the process of solving linear systems. The structure of these methods is often most clearly seen using the algebra of matrices, so matrix algebra will also be a significant portion of the course. Finally, linear algebra is often the first course where a mathematics student experiences “abstraction” and working through more theoretical aspects of the subject helps students develop logical thinking skills and good proof technique.

Learning Objectives

Math 2700 contributes to the following mathematics undergraduate program objectives:

Mathematical Reasoning

- MR 1. Read, understand, formulate, explain, and apply mathematical statements.
- MR 2. Formulate conjectures by considering examples that move from the specific to the general.
- MR 3. Distinguish between valid and fallacious arguments.
- MR 4. State and apply important results in key mathematical areas, with the ability to provide proof-based arguments of these and related results.
- MR 5. Use a variety of techniques – such as, mathematical induction, proof by contradiction, or direct application of axioms and previously proven theorems – to prove propositions.

Applying Mathematics

- AM 1. Demonstrate knowledge of problem-formulation, problem solving, and modeling techniques central to applications of mathematics.
- AM 3. Represent functional relationships using numerical, graphical, and/or analytic/symbolic means.

General skills

- GS 1. Solve mathematical problems individually and cooperatively.
- GS 2. Formulate strategies for solving novel analytical – both theoretical and applied – problems.
- GS 3. Communicate, both verbally and in writing, mathematical ideas at a variety of levels from technical to intuitive.

Detailed Description of Course Requirements

Final Exam: The final exam will be **Monday, May 7**, 8 a.m. – 10 a.m. You must plan to take the exam on this date. Under no circumstances will early final exams be given. Travel plans are not valid excuses for not taking the final at its scheduled time.

In Class Tests: There will be three in class tests. The tests will be: Wednesday, **February 14**, Wednesday, **March 21**, and Wednesday, **April 25**. Attendance at these tests is mandatory.

Makeup tests will be allowed only in very exceptional circumstances, and **must be arranged in advance**.

Homework: Homework is meant to help you learn and will be assigned frequently. Students are allowed to work on assignments together, but you should be sure you understand the solutions you are submitting and be able to solve similar problems on your own when it comes time to take a quiz or an exam. Assignments will be collected *at the start of class*. *If you are late to class on a day that homework is due, please turn in your homework as you enter the room before taking your seat*. A few homework problems will be especially challenging.

Quizzes: Quizzes will be given approximately every two weeks and will be announced in advance.

Where to Get Help

Instructors' Office Hours: Your professor is here to help you learn. You are encouraged to take full advantage of his office hours. No appointment is necessary to see your instructor during his regularly scheduled office hours. If you cannot make the regularly scheduled office hours, ask for an appointment for another time.

Math Lab: The Math Lab located in GAB 440 offers free tutoring. The Math Lab is open from 7:00 a.m. until 8:00 p.m. Mondays–Thursdays, from 7–4 on Fridays, and from 12–5 p.m. on Saturdays. The Math Lab is NOT open during the first week of class nor during finals week.

Note: Try not to get addicted to math lab help. It is important that you learn to do problems on your own, or you will not do well on tests. Never ask for help in the math lab unless you have thought about a problem for at least 20 minutes on your own first.

Private Tutors: If you decide to hire a private tutor, remember you cannot bring your tutor to exams with you. If you do not start your homework until you meet with your tutor, you will start to rely on your tutor like a crutch and will not do well on exams. To work effectively with a tutor, you need to continually try to do as much as possible by yourself BEFORE you meet your tutor, and only use your tutor for those things you could not do by yourself.

Websites: There are some helpful websites for learning linear algebra. Prof. Cherry will point some of these out in class and link to some of them from his website.

Tentative Course Outline (subject to change)

The following is intended to provide a rough outline of what will be covered when in class. Depending on how quickly students master certain concepts, more or less time may be devoted to particular topics than indicated here.

| Monday | Wednesday | Friday |
|--|---|-------------------------------------|
| 1/15: MLK Day No Class | 1/17: Systems & Row operations §1.1–1.2 | 1/19: Row operations §1.2 |
| 1/22: Vector Equations §1.3 | 1/24: Matrix Equations §1.4 | 1/26: Solution Sets §1.5 |
| 1/29: Applications §1.6 | 1/31: Applications §1.6 | 2/2: Applications §1.6 |
| 2/5: Independence §1.7 | 2/7: Transformations §1.8 | 2/9: Transformations §1.8–1.9 |
| 2/12: Matrix Algebra §2.1 | 2/14: TEST | 2/16: Matrix Inversion §2.2 |
| 2/19: Matrix Inversion §2.2–2.3 | 2/21: Matrix Factorization & Leontief §2.5–2.6 | 2/23: Subspace §2.8 |
| 2/26: Subspace §2.8 | 2/28: Rank §2.9 | 3/2: Determinants §3.1 |
| 3/5: Determinants §3.1–3.2 | 3/7: Determinants §3.3 | 3/9: Null & Column Spaces §4.2 |
| SPRING BREAK | | |
| 3/19: Null & Column Spaces §4.2 | 3/21: TEST | 2/23: Bases & Coordinates §4.3 |
| 3/26: Bases & Coordinates §4.4 | 3/28: Rank §4.5–4.6 | 3/30: Change of Basis §4.6–4.7 |
| 4/2: Eigenvectors §5.1 | 4/4: Eigenvectors §5.2 | 4/6: Diagonalization §5.3 |
| 4/9: Eigenvectors §5.5 & 5.6 | 4/11: Diff Eqns §5.7 | 4/13: Diff Eqns §5.7 |
| 4/16: Diff Eqns §5.7 | 4/18: Dot Products §6.1–6.2 | 4/20: Projection §6.2–6.3 |
| 4/23: Orthogonalization §6.4 | 4/25: TEST | 4/27: Least Squares §6.5 |
| 4/30: Spectral Theorem & SVD §7.1 & 7.4 | 5/2: Review | 5/4: Reading Day No Class |

Homework will be due frequently.

We will have **quizzes** about once every two weeks. Quizzes will be announced in advance.