

LECTURE: TTh 2 – 3:20 in LANG 302.

INSTRUCTOR: William Cherry

OFFICE: GAB 405

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

OFFICE HOURS: TTh Noon–1:45, Weds 7–9 p.m., and by appointment.

PREREQUISITE(S): Math 1720

TEXT: David Lay, *Linear Algebra and Its Applications* Fourth Edition, Addison Wesley, 2012.

WEBASSIGN CLASS KEY: unt 1151 3701

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

Web Homework: 15%

Paper Homework: 10%

Daily Quizzes: 5%

In Class Tests: 40% (20% each)

Final Exam: 30%

Students are also expected to complete a student evaluation of teaching.

IMPORTANT DATES:

FINAL EXAM: Thursday, May 9, 1:30 – 3:30 p.m.

IN CLASS TESTS: Thursday, March 7 and Tuesday, April 23.

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 written homework scores and two lowest quiz scores will be dropped before final grades are computed.

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://vpaa.unt.edu/academic-integrity.htm>.

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://www.unt.edu/oda>. 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, but 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 Thursday, **May 9**, 1:30–3:30 p.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 two in class tests. The tests will be: Thursday, **March 7**, and Tuesday, **April 23**. Attendance at these tests is mandatory. Makeup tests will be allowed only in very exceptional circumstances, and **must be arranged in advance**.

**Homework:** You will have two types of homework:

**WEBASSIGN HOMEWORK:** Homework is meant to help you learn. There is often a considerable lag in time from when a written assignment is collected until it gets back to the student. Because of this, students will be asked to submit most homework for this class online. This allows students to get immediate feedback on how they did on the assignment and it allows the instructors to immediately see what concepts are causing students the most difficulties and need to be clarified in class. This also allows a reduction in the amount of written work collected, allowing the instructor to check more carefully all the work that you are asked to turn in and make sure partial credit is awarded.

WebAssign assignments will be due most class days.

For students to submit homework and get feedback via [www.webassign.net](http://www.webassign.net), they must pay a \$19.95 fee. This fee can be paid using a credit card on the WebAssign website. Access to WebAssign is available for free for the first two weeks of the course.

Students are allowed to work on WebAssign assignments together. However, different students may get different versions of the problems asked. Thus, although you can work together, be careful because the answers that are correct on one student's version of the assignment may not be the same answers that are correct on another student's version of the assignment.

**WEEKLY WRITTEN HOMEWORK:** Written assignments will be collected *at the start of class* about once per week. Problems on the written assignments will generally be challenging, and you are both allowed and encouraged to work on these written assignments together with your classmates. Although you will usually not be asked to turn in many problems, you will be asked to write your solutions very carefully with full explanations.

**Quizzes:** Quizzes will be given approximately every other week 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:** The Mathematics Department (GAB 435) can provide you with a list of private tutors if you really feel you need more one-on-one help than the above sources can provide. If you do work with a 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. Students should consult the more detailed schedules that will be distributed weekly during the course for more up-to-date information on what will happen each week.

Tuesday	Thursday
1/15: Systems & Row operations §1.1–1.2	1/17: Row operations & Vector Equations §1.2–1.3
1/22: Matrix Equations & Solutions Sets §1.4–1.5	1/24: Applications §1.6
1/29: Applications §1.6	1/31: Independence §1.7
2/5: Transformations §1.8	2/7: Transformations §1.9
2/12: Matrix Algebra §2.1	2/14: Matrix Inversion §2.2–2.3
2/19: Matrix Factorization & Leontief §2.5–2.6	2/21: Subspace §2.8
2/26: Subspace & Rank §2.8–2.9	2/28: Rank §2.9
3/5: Determinants §3.1–3.2	3/7: <b>TEST</b>
3/19: Determinants §3.3	3/21: Null & Column Space §4.2
3/26: Bases & Coordinats §4.3–4.4	3/28: Rank §4.5–4.6
4/2: Change of Basis §4.7	4/4: Eigenvectors §5.1–5.2
4/9: Diagonalization & Cplx Eigenvalues §5.3 & 5.5	4/11: Diff Eqns §5.7
4/16: Dot Product §6.1–6.3	4/20: Least Squares §6.4–6.5
4/23: <b>TEST</b>	4/25: Spectral Theorem §7.1
4/30: SVD §7.4	5/2: Review
	5/9: <b>Final Exam</b> 1:30–3:30 p.m.

**Homework** (either web, paper, or both) will be due most every class day.

We will have **quizzes** about once every other week. Quizzes will be announced in advance.