

Math 2164: Matrices & Linear Algebra

Section 090, Denny 109, TR 6:30pm – 7:45pm

Instructor Information

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Textbook & Resources

textbook: Linear Algebra and It's Applications by David Lay, 4th Edition
class website: <http://math.uncc.edu/~sbirdso/linalg>
calculator (optional): TI-83 or comparable

General Information & Grading Scale

This course will cover solving linear systems using matrices, matrix properties, vector spaces, and limited applications of these topics (ie: chapters 1 through 5 in Lay's textbook). All assignments and class handouts can be found on the class website in addition to being distributed in class. I expect every student to attend each class and will take attendance.

homework	20%
projects & quizzes	15%
3 exams	40%
final	25%

Tests & Make-up Work

There will be 4 exams: three in-class tests and a final exam. A review for each test will be held during the class prior to the test. You must contact me ahead of time to arrange for make-up work.

Questions & Extra Credit Work

Bring any questions to class. If we do not have time to go over all the questions at the beginning of class, you can ask me after class, come by my office, email me, or call me.

There will be opportunities for extra credit both on the class tests and on the homework.

Special Accommodations

If you plan to seek special accommodations (ie: extended time through the Office of Disability Services or accommodations for religious observances), be sure to contact the appropriate department and follow their instructions for obtaining accommodations, including dealing with the related paperwork.

Homework, Projects, & Quizzes

Homework sets will be due on Thursdays. Check the syllabus or homework page on the class website for specific due dates. See the assignment guidelines on submission guidelines. The homework sets are for practice and will be graded as follows: 0%, 25%, 50%, 75%, or 100%. Submissions will be accepted any time before their keys are posted to the class website. I do not guarantee to grade late homework.

Projects will be due on Tuesdays. These projects are designed to be used with the computer program Matlab, which can be found on campus computers; however, you may use other mathematical programs such as Mathematica or Maple. The projects can be found on the class website.

There will be quizzes, which may be either in-class or take-home. If the quiz will be take-home, it will either be handed out in the class before it is due, or it will be posted to the class website by midnight the day before it is due. I expect that you work each quiz on your own regardless of whether it is an in-class or take-home quiz.

Guidelines for Submitting Assignments:

- **Your name** and the chapter section or activity name need to be on each assignment submitted.
- Anytime you work problems on your own sheet of paper, the **question needs to be copied out.** Then show your work and give your answer.
- If an assignment has multiple pages, these pages **must** be stapled together. Do not staple multiple assignments together. (Multiple sets handed in on the same piece of paper **will not be graded.**)
- Emailed Homework or Quizzes:
 - This option is for **special circumstances** only, and any emailed submission must adhere to the following:
 - file format: pdf or word (jpeg or gif files will not be accepted)
 - file content: each homework set or quiz needs to be in one file
 - file name: include both your name and section number if applicable
 - email subject line: include the assignment name for each assignment attached
 - scan quality: the file must be able to be read
- Library Resources: the library has a stapler as well as a scanner for student use.
- Projects:
 - Be sure to include both your answers to the project questions as well as your Matlab code and output.
 - Format of the Matlab portion of the submission:
 - Use Matlab's publish option (preferred). This will result in the fewest number of pages to submit as well as looking the nicest. See the class website for examples and a step-by-step way to use this publish option.
 - OR copy your Matlab code into a .txt file and copy your output into a .txt file

- Late Submissions
 - If you get the assignment to me before Midnight, it will not be counted as late.
 - If you have a *really good excuse*, there will be no late penalty.
 - If your work is late and you do not have a good reason:
 - Your grade will be **20% lower** than what you would have gotten
 - I do not guarantee that I will grade late homework
 - If the solutions have already been posted online, the set will not be graded.
 - Note: a late grade is much better than a zero

Cheating* Policy:

While I encourage you to use any and all resources at your disposal to complete homework, I expect that for tests and quizzes your work is entirely your own and that you have not used any unauthorized materials. If I find a student has cheated or has intentionally aided a classmate in cheating, that student will receive a zero on the test or quiz. If I find a student has cheated for a second time, that student will receive a zero for the course. It is your responsibility to know the academic integrity code and our class policy on cheating. If you have questions about a situation or how the policies apply to this class, feel free to ask me. (See the class website for more information.)

Definition of Cheating: Intentionally using or attempting to use unauthorized materials, information, notes, study aids or other devices in any academic exercise. This definition includes unauthorized communication of information during an academic exercise.

Common Examples: Copying from another student's paper or receiving unauthorized assistance during a quiz, test or examination; using books, notes or other devices (e.g., calculators or cell phones) when these are not authorized; procuring without authorization tests or examinations before the scheduled exercise.

Complicity in Academic Dishonesty: Intentionally or knowingly helping or attempting to help another to commit an act of academic dishonesty.

Common Examples: Knowingly allowing another to copy from one's paper during an examination or test; sharing calculators during an exam; knowingly distributing test questions or substantive information about the material to be tested before the scheduled exercise; or signing a false name on an academic exercise.

Changes to the Syllabus

While unlikely, this syllabus may be modified at any time during the semester. Such changes will be announced in class as well as changed on the syllabus posted to the class website.

* These definitions and examples were taken and slightly adopted from University Policy Statement #105: the Code of Student Academic Integrity, section III (<http://www.legal.uncc.edu/policies/ps-105.html#II>)

Course Schedule of Topics

Date	Topics Covered	Assignments Due
Aug 20	1.1: Systems of Linear Equations 1.6: Applications of Linear Systems	
Aug 22	1.2: Row Reduction & Echelon Forms	Homework: 1.1
Aug 27	1.3: Vector Equations 1.4: Matrix Equations $Ax = b$	Project 1
Aug 29	1.5: Solutions of Linear Equations	Homework: 1.2, 1.3, 1.6
Sept 3	1.7: Linear Independence	
Sept 5	Exam 1	Homework: 1.4, 1.5
Sept 10	1.8: Linear Transformations	Project 2
Sept 12	1.9: Matrices of Linear Transformations 1.10: Some Linear Models	Homework: 1.7, 1.8
Sept 17	2.1: Matrix Operations	
Sept 19	2.2: The Inverse Matrix	Homework: 1.9, 1.10, 2.1
Sept 24	2.3: Characterization of Invertible Matrices 2.4: Partitioned Matrices	Project 3
Sept 26	2.5: Matrix Factorization (LU Factorization)	Homework: 2.2, 2.3, 2.4
Oct 1	2.6: Leontief Model 2.7: Computer Graphics	
Oct 3	3.1: Introduction to Determinants 3.2: Properties of Determinants	Homework: 2.5, 2.6, 2.7
Oct 8	<i>Fall Break - no class</i>	
Oct 10	Catch Up and Review for Exam 2	Homework: 3.1
Oct 15	Exam 2	
Oct 17	3.2: Properties of Determinants 3.3: Cramer's Rule	
Oct 22	4.1: Vector Spaces & Subspaces	Project 4
Oct 24	4.2: Null Spaces, Col. Spaces, & Linear Transform.	Homework: 3.2, 3.3
Oct 29	4.3: Linearly Independent Sets & Bases	
Oct 31	4.4: Coordinate Systems	Homework: 4.1, 4.2, 4.3
Nov 5	4.5: Dimension of a Space 4.6: Rank	Project 5
Nov 7	4.7: Change of Basis	Homework: 4.4, 4.5, 4.6
Nov 12	5.1: Eigenvectors & Eigenvalues	
Nov 14	5.2: Characteristic Equation	Homework: 4.7, 5.1
Nov 19	5.3: Diagonalization	Project 6
Nov 21	5.4: Eigenvectors & Linear Transformations	Homework: 5.2, 5.3
Nov 26	Exam 3	
Nov 28	<i>Thanksgiving Break - no class</i>	
Dec 3	Review for Final Exam	Project 7 Homework sect 5.4
Dec 5	<i>Reading Day - no class</i>	
Dec 10	Final Exam 8:00pm – 10:30pm	

Homework Set Assignments

Section	Page	Questions from Textbook	Due Date
1.1	10	4, 7, 10-12, 16-17, 21-26, 29-30, 33-34	8/22
1.6	54	1-2, 3ab, 6-8, 12-14	8/29
1.2	21	1-15, 19-23, 25-26, 29, 31, 33	8/29
1.3	32	3, 5-10, 12-13, 18, 20, 23-24, 26-27	8/29
1.4	40	1-13, 15, 20-21, 23-26, 29-30, 32	9/5
1.5	47	2-3, 5-6, 9-10, 12, 14-15, 20-21, 23-24, 26-32	9/5
1.7	60	1, 3, 5, 8-12, 15-28, 33-34	9/12
1.8	68	1-4, 7-9, 11, 13-19, 21-22, 24-25, 31, 33-34	9/12
1.9	78	1-12, 15-28, 31-32, 35	9/19
1.10	86	1, 6-9, 12, 14	9/19
2.1	100	1-12, 15-21, 27-28	9/19
2.2	126	1-10, 19, 29-33, 35, 41	9/26
2.3	132	1-18, 28, 33-36	9/26
2.4	121	1, 4, 6-7, 10-13, 16, 18, 21	9/26
2.5	129	2-4, 8-10, 13, 15, 18, 24, 26, 29, 31	10/3
2.6	136	1-5, 7, 10	10/3
2.7	144	1-8, 10-11, 17	10/3
3.1	167	3, 9-10, 13-21, 25-28, 36-41	10/10
3.2	175	1-4, 7-8, 11-20, 22, 25, 27-30, 39-42	10/24
3.3	184	1-2, 6-8, 15-18, 21-23, 27-29	10/24
4.1	195	1-3, 5-18, 21, 23-24, 26, 31-36	10/24
4.2	205	1-2, 4-5, 7-8, 11-12, 15-20, 23-27, 31-32	10/31
4.3	213	4-8, 10-11, 13-16, 19-24, 26, 29-30, 33-34	10/31
4.4	222	2-3, 5, 8-10, 13-16, 29-32, 34	11/7
4.5	229	1-10, 13, 19-24, 29-30	11/7
4.6	236	1-4, 6-7, 12-18, 26-27	11/7
4.7	242	1-2, 5-14	11/14
5.1	271	3-10, 13-14, 16-30	11/14
5.2	279	5-8, 13-18, 21-22, 24-25	11/21
5.3	286	1-6, 8-9, 12, 15-16, 18-28, 31-32	11/21
5.4	293	1-17, 19-22, 25, 30-31	12/3

Project Assignments

Project	Topic	Due Date
Project 1	Introduction to Matlab	8/27
Project 2	Interpolating Polynomials	9/10
Project 3	Dominance Matrices	9/24
Project 4	The Leontif Input-Output Model	10/22
Project 5	Hill Substitution Ciphers	11/5
Project 6	Error-Detecting and Error-Correcting Codes	11/19
Project 7	The Fibonacci Sequence and Generalizations	12/3