MATH 231
syllabus
Spring, 2013

Professor:	Matthew Neal (`nealm@denison.edu`)
Office and phone:	Olin 202 (6288)
Office Hours:	MTWRF 1:30-3:30 or by appointment
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Course

This is a course on linear systems. These might be systems of vectors acted on by matrices, systems of functions acted on by differential operators, or any systems that behave well with respect to sums and scalar multiplication. Linear systems have a common structure and a wide variety of applications in the social and physical sciences.

Audience

This course is intended for students who have successfully completed Math 124 or the equivalent.

Book

Differential equations and Linear Algebra by Goode and Annin. We will certainly cover Chapters 4-7 and we will try to cover the first few sections of Chapter 9

Topics

Week 1: Vector Spaces, Subspaces, and Spanning Sets
Week 2: Spanning sets, Linear Independence, Bases and Dimension
Week 3: Change of Basis, Row Space, Column Space, Rank Nullity Theorem
Week 4: **Test #1**, Invertible Matrix Theorem, Inner Product Spaces
Week 5: Orthogonal Sets of Vectors, Linear Transformations
Week 6: Kernel and Range of a Linear Transformation, Additional properties of Linear Transformations, The Matrix of a Linear Transformation
Week 7: Eigenvectors/Eigenvalues, Diagonalization
Week 8: **Test #2** Orthogonal Diagonalization, Jordan Canonical Forms
Week 9: General Theory of Linear Differential Equations, Constant Coefficient Linear Differential Equations, Undetermined Coefficients
Week 10: Mechanical Oscillations, Curcuits
Week 11: Variation of Parameters, First Order Linear Systems, Non-defective Coefficient Matrix
Week 12: **Test #3** Variation of Parameters, Applications
Week 13: Applications, The Matrix Exponential Method, Phase Plane
Week 14: Power Series Solutions of Differential Equations
Week 15: Review

Grades and Expectations

The grade will be calculated with the following weights:

- 25 % for each of three tests (but homework is factored into this grade)
- 25 % Final exam

Grade Scale: 90-100 A 80-89 B 66-79 C 50-65 D 0-49 F
The final takes place in our classroom on Tuesday, May 7th, 2-4 p.m.

Tests

Tests will occur from 7-9 p.m. on the following Tuesdays: February 5th, March 5th, April 2nd.

You are responsible to understand everything said in class or written in the text for the sections covered as well as every problem assigned. Note that "understand" does not mean "memorize" and problems on the test will not always be identical to homework problems.

Homework

There are three stages of homework each week. Each type of homework is either worth a percentage of your grade on the next test or gives bonus points.

- *Pre-homework* Before teaching new topic each Monday, Tuesday, and Wednesday, I will assign a reading on that topic and a basic problem for you to attempt before class. You will discuss the problem at the start of class in groups while I check that you attempted it. We will then discuss the problem and begin an interactive lecture. These attempted problems are worth 5 % of the next test or the final.
- *Basic homework* Each Monday, Tuesday, and Wednesday, you will be given intermediate level odd problems for which you have answers. You must complete these by Friday. There will be a two problem quiz each Friday on these problems. These quiz problems give a bonus point on the next test or the final.
- *Challenge homework* Each weekend you will be given a few challenging problems to complete that are due each Monday and graded. These problems are worth 10 % of the next test or the final.

Regrading

On tests, you will have an opportunity to redo problems for a few points back.

Late Work

Late tests and homework will receive a 20 % point penalty per day late unless there is a written note (such as a note from Whistler) that verifies a VERY strong excuse (such as illness or important sports team events). Late quizzes are not accepted at all without a serious excuse as described above.

Office Hours

Please come to office hours so I can get to know you better!

Disabilities

Any student who feels he or she may need an accommodation based on the impact of a disability should contact me privately as soon as possible to discuss his or her specific needs. I rely on the Academic Support and Enrichment Center in 104 Doane to verify the need for reasonable accommodations based on documentation on file in their office.

Academic Integrity

The students and faculty of Denison University and the Department of Mathematics and Computer Science are committed to academic integrity and will not tolerate any violation of this principle. Academic honesty, the cornerstone of teaching and learning, lays the foundation for lifelong integrity.

Academic dishonesty is, in most cases, intellectual theft. It includes, but is not limited to, providing or receiving assistance in a manner not authorized by the instructor in the creation of work to be submitted for evaluation. This standard applies to all work ranging from daily homework assignments to major exams. Students must clearly cite any sources consulted, not only for quoted phrases but also for ideas and information that are not common knowledge. Neither ignorance nor carelessness is an acceptable defense in cases of plagiarism. It is the students responsibility to follow the appropriate format for citations.

Proposed and developed by Denison students, passed unanimously by DCGA and Denisons faculty, the Code of Academic Integrity requires that instructors notify the Associate Provost of cases of academic

dishonesty, and it requires that cases be heard by the Academic Integrity Board. Further, the code makes students responsible for promoting a culture of integrity on campus and acting in instances in which integrity is violated.

For further information about the Code of Academic Integrity see http://www.denison.edu/about/integrity.html