MATH 300: Linear Algebra

Spring 2012 Section 001 3 Credit Hours

Instructor:	Tom Polaski	**Course Time and Location:**
Office:	Bancroft 158	MWF 11:00-11:50 a.m., Kinard 305
Office Phone:	803-323-4604	**Office Hours:**
Math Department Phone:	803-323-2175	MW 10:00-10:50 a.m. and 2:00-3:00 p.m. TR 1:00-2:00 p.m. F 10:00-10:50 a.m.
Campus Email:	polaskit@winthrop.edu	Other times may be arranged by appointment.

The instructor reserves the right to make modifications to this syllabus. Students will be notified in class and by email.

Student Learning Objectives – Mathematics Department

1. Students apply fundamental mathematical concepts and techniques to solve problems and evaluate results.
2. Students demonstrate the ability to apply appropriate technologies to the study of mathematics and effectively use such technologies to investigate and develop an understanding of mathematical ideas.

Student Learning Objectives – Linear Algebra

1. Students demonstrate an understanding of and competence with the basic ideas of linear algebra including concepts of linearity, theory of matrices, linear transformations, eigenvalues, eigenvectors and diagonalization.
2. Students will investigate applications of linear algebra, develop the ability to work with advanced technology tools within the study of course concepts, and apply reasoning and communication skills to elementary proofs.

For purposes of departmental assessment of student learning in this course, sections of the final exam will be tabulated for all students and cover the objectives listed above. In addition, the common technology rubric will be implemented to evaluate students' ability to implement the use of *Mathematica* and other technology as appropriate for course assignments.

Text, Materials and Learning Aids

- Required Text: *Linear Algebra and its Applications* by David C. Lay. Fourth Edition. Boston: Addison-Wesley, 2012.
- A Study Guide which comes bundled with this text is suggested, but is not required for the course.
- The ability to use *Mathematica* is a prerequisite skill for this course.

Homework Assignments
At the end of each class session, a homework assignment will be made. You are expected to complete the assignment by computing and recording your answers in the *Mathematica* notebook for the appropriate section of the text; these notebooks are available at the course website, and contain the data for each exercise. You will then e-mail the completed *Mathematica* notebook to your instructor before 3:00 p.m. on the date of the next class session. Late work will not be graded unless prior arrangements have been made with the instructor. Each homework assignment will be given a grade out of a possible 20 points. At the close of the semester, these homework grades will be averaged and converted to a 100-point scale.

Tests and Grading
There will be three 100-point tests given along with a 200-point cumulative final examination. No make-up tests will be given unless prior arrangements have been made with the instructor. A point system will determine your final grade. There are 600 points possible; 300 from the tests, 100 from the homework assignments, and 200 from the final. An approximate grading scale for each test and the homework assignments will be determined after they are graded. The semester grading scale will be based upon these grading scales and on the scale for the final examination. Plusses and minuses are awarded at the discretion of the instructor.

Attendance Policy
Attendance at all scheduled class meetings is strongly encouraged. Your number of absences will not be counted, and will not be used directly to determine your grade. However, attendance is mandatory for those class sessions which include a test. If no prior arrangements are made with the instructor, a zero will be recorded for a test not taken due to absence.

Equal Access to Education
Winthrop University is dedicated to providing access to education. If you have a disability and need specific accommodations to complete this course, please contact the Office of Disability Services (ODS) at 323-3290 as early as possible in the semester. Once you have your official notice of accommodations from the Office of Disability Services, please inform your instructor.

Academic Integrity
Review the student code of conduct for university polices on academic misconduct. Academic misconduct will not be tolerated and will result in a failing grade on the assignment and/or in the course. The full handbook is available online at http://www2.winthrop.edu/studentaffairs/handbook/StudentHandbook.pdf.

Electronic Devices
All electronic devices (including cell phones) other than a calculator should be on silent and kept in your book bag or purse throughout class time unless otherwise instructed. NOTE: if you have some educational, health, or physical reason for an electronic device you must notify your instructor of this accommodation.

Tentative Course Schedule

Date		Section	Topic
M	1/9	1.1	Systems of Linear Equations
W	1/11	1.1,1.2	Systems of Linear Equations ; Row Reduction and Echelon Forms
F	1/13	1.2	Row Reduction and Echelon Forms
W	1/18	1.3	Vector Equations
F	1/20	1.4	The Matrix Equation A$\mathbf{x}$=$\mathbf{b}$
M	1/23	1.5	Solution Sets of Linear Systems
W	1/25	1.6	Applications of Linear Systems
F	1/27	1.7	Linear Independence
M	1/30	1.8	Introduction to Linear Transformations
W	2/1	1.9	The Matrix of a Linear Transformation
F	2/3	1.10	Linear Models in Business, Science and Engineering
M	2/6	2.1	Matrix Operations
W	2/8		**Test 1**
F	2/10	2.2	The Inverse of a Matrix
M	2/13	2.3	Characterizations of Invertible Matrices
W	2/15	2.4	Partitioned Matrices
F	2/17	2.5	Matrix Factorizations
M	2/20	2.6	The Leontief Input-Output Model
W	2/22	2.7	Applications to Computer Graphics
F	2/24	2.8	Subspaces of $\mathbf{R}^n$
M	2/27	2.8,2.9	Subspaces of $\mathbf{R}^n$; Dimension and Rank
W	2/29	2.9	Dimension and Rank
F	3/2	3.1	Introduction to Determinants
M	3/5	3.1,3.2	Introduction to Determinants; Properties of Determinants
W	3/7	3.2,3.3	Properties of Determinants; Volume and Linear Transformations
F	3/9	4.9	Applications to Markov Chains
M	3/19	4.9	Applications to Markov Chains; PageRank
W	3/21		**Test 2**
F	3/23	5.1	Eigenvalues and Eigenvectors
M	3/26	5.2	The Characteristic Equation
W	3/28	5.3	Diagonalization
F	3/30	5.4	Eigenvectors and Linear Transformations
M	4/2	5.5	Complex Eigenvalues
W	4/4	5.6	Discrete Dynamical Systems
F	4/6	6.1	Inner Product, Length, and Orthogonality
M	4/9	6.2	Orthogonal Sets
W	4/11	6.3	Orthogonal Projections
F	4/13	6.4	The Gram-Schmidt Process
M	4/16	6.5	Least-Squares Problems
W	4/18	6.6	Applications to Linear Models
F	4/20		**Test 3**
M	4/23		Review and Evaluation

SU Deadline: T 1/24 **Course Withdraw Date:** W 3/7

Spring Break: M 3/12 to F 3/16 **Final Exam:** M 4/30 8:00 a.m. (Sims 114)

MATH 300: Linear Algebra
Assigned Homework Exercises

Text: *Linear Algebra and its Applications* by David C. Lay. Fourth Edition. Boston: Addison-Wesley, 2012.

Section	Exercises
1.1	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 29, 31
1.2	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27
1.3	1, 3, 5, 7, 9, 11, 13, 15, 17, 21, 23, 25, 27, 29
1.4	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 29, 31, 33, 37, 39
1.5	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 27, 29, 31, 33, 35
1.6	1, 3, 5, 7, 9, 11, 13, 15
1.7	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 27, 29, 31, 33, 35, 37, 39
1.8	1, 3, 5, 7, 9, 11, 17, 19, 21, 37, 39
1.9	1, 3, 5, 7, 9, 11, 15, 17, 19, 23, 25, 27, 31, 35, 37, 39
1.10	1, 3, 9, 11, 13
2.1	1, 3, 5, 7, 9, 15, 17, 19, 21, 23, 25, 27, 37, 39
2.2	1, 3, 5, 7, 9, 13, 17, 21, 23, 29, 31
2.3	1, 3, 5, 7, 9, 11, 17, 19, 21, 23, 25, 27, 29, 31
2.4	1, 3, 5, 7, 11, 13, 15, 21
2.5	1, 3, 5, 7, 9, 11, 13, 15, 17
2.6	1, 3, 5, 7, 9, 13
2.7	1, 3, 5, 7, 15, 17, 19
2.8	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37
2.9	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29
3.1	1, 3, 5, 7, 9, 11, 13, 19, 21, 23, 25, 27, 29, 31, 33, 35, 37, 39
3.2	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 31, 33, 35, 37, 39
3.3	19, 21, 23, 25, 27, 29
4.9	1, 3, 5, 7, 9, 11, 13, 15
5.1	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 37, 39
5.2	1, 3, 5, 7, 9, 11, 13, 15, 17, 21
5.3	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 25, 27, 29, 31, 33, 35
5.4	11, 13, 15, 17, 19, 21, 25, 31
5.5	1, 5, 7, 11, 13, 15, 17, 19, 21, 23
5.6	1, 3, 5, 7, 9, 11, 13, 15, 17
6.1	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 23, 27, 29
6.2	1, 3, 5, 7, 9, 11, 13, 15, 17, 19, 21, 23, 27, 29
6.3	1, 3, 5, 7, 9, 11, 13, 15, 17, 21
6.4	1, 3, 5, 7, 9, 11, 13, 15, 17, 25
6.5	1, 3, 5, 7, 9, 11, 17
6.6	1, 3, 7, 9, 11, 13