MA201 LINEAR ALGEBRA **Spring 2017**
Classes meet: Mo, We, Fr 9:30-10:50am in N 207

Department of Mathematical Sciences
ELIZABETHTOWN COLLEGE

Office hours: Mo, We 3:30 – 5:00pm;
Tu, Th, Fr 2:00 – 3:30pm.

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SYLLABUS

PREREQUISITES: MA122 (Calculus II)

TEXT: H. Anton and C. Rorres *Elementary Linear Algebra: Applications Version*, (11th edition) Wiley (2013), ISBN: 978-1118434413. Alternatively, you may use the binder-ready version of the same edition, ISBN: 978-1118474228.

CALCULATORS and TECHNOLOGY. Absolutely no calculators or electronic devices will be allowed up to and including Test 1. After that, it is advisable to have a calculator capable of matrix operations.

Please keep in mind that, even when calculators are allowed, you must show all steps to receive full credit. I will be more specific about the calculator policy as the course progresses.

COURSE GOALS and COVERAGE. This course has two major goals:

- To give you a working knowledge of the basic concepts and techniques of linear algebra including vectors, vector spaces, matrices, determinants, systems of linear equations, eigenvectors and linear transformations.
- To help you get accustomed to abstract mathematical reasoning, including precise definitions and proofs.

We will cover most of chapters 1 to 8 of the textbook. Chapter 10 will be a resource for the projects. A detailed list of the topics covered can be found in the schedule on the last page of this syllabus.

STUDENT LEARNING OUTCOMES. By the end of this course you will be able to:

- solve systems of linear equations;
- compute determinants, eigenvalues, and eigenvectors;
- deduce consequences of properties of vector spaces;
- perform and explain uses of diagonalization and quadratic forms;
- find matrices for general linear transformations;
- demonstrate the ability to work cooperatively with others;
- demonstrate the ability to write proofs and critically analyze mathematical arguments.

ASSESSMENT. Your final grade for the course will be based on the degree of mastery of the course content and your progress toward the learning outcomes listed above, as measured by your performance in class, on homework assignments, tests, projects, and the final exam.

ATTENDANCE. You are expected to attend all classes. Excessive absences may result in a lower grade. If you do miss a class, it is your responsibility to obtain from a classmate any notes, assignments, handouts, or anything else you may have missed.

HOMEWORK and QUIZZES. Homework is assigned for each section of the book covered and is a required component of the course. Working the exercises is intended to help you learn, and give you some perspective on your progress. Homework will not be collected for grading, but if you do not do it regularly, you will not learn. I suggest that you keep a notebook to write the homework in (this could be the same notebook in which you write your lecture notes).

Approximately once or twice a week, there will be a short mini-quiz on one or two of the homework problems from recent assignments. The dates of the quizzes will *not* be announced in advance. The two lowest quiz grades will be dropped. Quizzes contribute 15% of your final grade.A missed quiz cannot be made up.

The problems on the tests and the final exam will also be similar to (although not exactly the same as) the ones discussed in class or assigned as homework. Discipline yourself to write clear readable notes and solutions; they will be of great value as review.

Of course, the assigned problems should be considered to be a minimum. You should solve more problems, *especially* if you don't feel quite comfortable with any section.

TESTS and EXAMS. There will be three in-class tests on the following dates:
Friday, February 17
Friday, March 31
Wednesday, April 26

Each test is timed and will take 80 minutes. This time limit will be strictly enforced. Make up tests will not be given, except in cases of grave emergency.

There will be a comprehensive final exam on Monday, May 08 at 7:30 to 10:30 am. Note that this date and time have been set by the registrar's office and cannot be changed. Make your travel plans accordingly.

All the tests and exams, as well as the final, are closed-book, in-class exams. No notes, written or electronic, are allowed. All work must be shown to receive full credit.

FINAL GRADE. Your final grade will be calculated in the following way:
55% of the grade come from the three Tests, (15% the lowest one, 20% each the other two),
30% of the grade come from the Final Exam,
15% of the grade come from the short quizzes.

These scores are combined to give a final number of points, between 0 and 100. Point ranges for the final grades are:

A	93-100
A–	90-92.9
B+	87-89.9
B	83-86.9

B–	80-82.9
C+	77-79.9
C	73-76.9
C–	70-72.9

D+	67-69.9
D	63-66.9
D–	60-62.9
F	0-59.9

SCHOOL CLOSURE POLICY. Occasionally, the college is closed and classes are cancelled due to inclement weather or other emergency situations. To minimize the negative impact of such disruptions on your learning, the following School Closure Policy will be in effect for this course. In case of school closure, an alternative form of the lecture will be provided (voice-over slides, instructional video, additional assigned reading, or a combination of these), and you will still need to complete the homework assignment. Concrete details will be communicated to you at the time of the closure announcement. In case the closure falls on an exam day, an alternative date and time for the exam will be announced.

INTEGRITY. All work you submit for grading must be your own and must comply with the Standards of Integrity set forth in the Elizabethtown College Catalog. In particular, no collaboration on quizzes or exams is allowed.

DISABILITIES. Elizabethtown College welcomes otherwise qualified students with disabilities to participate in all of its courses, programs, services, and activities. If you have a documented disability and would like to request accommodations in order to access course material, activities, or requirements, please contact the Director of Disability Services, Lynne Davies, by phone (717-361-1227) or e-mail daviesl@etown.edu.

If your documentation meets the college's documentation guidelines, you will be given a letter from Disability Services for each of your professors. Students experiencing certain documented temporary conditions, such as post-concussive symptoms, may also qualify for temporary academic accommodations and adjustments.

As early as possible in the semester, set up an appointment to meet with me, the instructor, to discuss the academic adjustments specified in your accommodations letter as they pertain to my class.

STATEMENT ON RELIGIOUS OBSERVANCES. The College is willing to accommodate individual religious beliefs and practices. It is your responsibility to meet with the class instructor in advance to request accommodation related to your religious observances that may conflict with this class, and to make appropriate plans to make up any missed work.

MA201, Spring 2017 SCHEDULE

Day	Date	Topic	Sect.	Homework
We	01/18	Systems of linear equations	1.1	2,12,15,19,25
Fr	01/20	Gaussian elimination	1.2	5,9,25,27,32
Mo	01/23	Matrices and matrix operations	1.3	3,4,15,23,35
We	01/25	Inverses. Matrix arithmetic	1.4	5,9,17,19,33
Fr	01/27	Computing matrix inverses.	1.5	11,15
		Properties of inverses	1.6	9,15,19
Mo	01/30	Special matrices	1.7	8,12,14,22,47
We	02/01	Applications of linear systems	1.9	4,11,12,13,15
Fr	02/03	Determinants	2.1	18,22,30
			2.2	11,15–22
Mo	02/06	Properties of determinants. Cramer's rule	2.3	7,11,18,27,33
We	02/08	Vectors in $\mathbb{R}^n$.	3.1	11,15
		Norms of vectors. Dot product	3.2	4,9,11
Fr	02/10	Orthogonal vectors, projections	3.3	11,21,25,28,29
Mo	02/13	Cross product	3.5	7,13,17,22,26
We	02/15	Review		
Fr	02/17	TEST 1		
Mo	02/20	Real vector spaces	4.1	5,7,8,10,12
We	02/22	Subspaces	4.2	2,10,11,13,17
Fr	02/24	Linear independence	4.3	4,5,6,20,22
Mo	02/27	Coordinates and basis	4.4	6,11,15,17,26
We	03/01	Dimension of a vector space	4.5	1,9,10,13,18
Fr	03/03	Change of basis	4.6	1,3,12,16,18
Mo	03/13	Linear Transformations. Matrix Transformations	1.8	28,32
		Properties of matrix transformations	4.10	13,23,25
We	03/15	General linear transformations	8.1	10,14,21,23,25
Fr	03/17	Compositions. Inverse transformations	8.2	3,13,18,26,32
Mo	03/20	Matrices for general linear transformations	8.4	4,7,9,11,13
We	03/22	Matrix subspaces	4.7	3,5,9,12,20
Fr	03/24	Rank and nullity	4.8	1,9,13,14,24
Mo	03/27	Isomorphism	8.3	9,11,12,14,21
We	03/29	Review		
Fr	03/31	TEST 2		
Mo	04/03	Hill cipher	10.14	TBA
We	04/05	Eigenvalues and eigenvectors	5.1	3,5,7,13,24
Fr	04/07	Similarity	8.5	2,15,16,19,30
Mo	04/10	Diagonalization	5.2	9,11,19,27,32
We	04/12	Complex vector spaces	5.3	7,15,16,17,27
Th	04/13	Inner product spaces	6.1	1,7,27,38,45
We	04/19	Orthogonality and angles	6.2	3,11,28,33,34
Fr	04/21	Gramm-Schmidt orthogonalization	6.3	7,27,29,37,43
Mo	04/24	Review		
We	04/26	TEST 3		
Fr	04/28	Orthogonal matrices	7.1	1,2,3,11,12
Mo	05/01	Orthogonal diagonalization.	7.2	10,11
		Bilinear and quadratic forms	7.3	1,7,24
We	05/03	Hermitian, unitary, and normal matrices	7.5	1,9,15,17,39
Fr	05/05	Review		
Mo	05/08	Final Exam, 7:30 – 10:30am, N 207		