Math 324 - Linear Algebra
Fall 2014

Basic Info:

Instructor:	Dr. Nathan Reff
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Phone:	(585) 395-5675
Office Hours:	MW 11:00-12:00, 3:50-4:50,
	or by appointment , or see if I am in!
Course Web Page:	http://www.acs.brockport.edu/~nreff/MTH324/
Course Meetings:	MWF 12:20-1:10 in Holmes 106
Text:	*Elementary Linear Algebra, 10th Ed.*
	by Anton and Rorres (ISBN: 978-0470432051)

INFORMATION ABOUT THIS COURSE:

Prerequisite: Calculus II (MTH 202) and Discrete Mathematics (MTH 281). This course is proof intesive, so please see me immediately if you are concerned about your background on proof writing.

Course Catalog Description: *Covers matrices, determinants, vector spaces and subspaces, dimension, linear transformations and Euclidean vector spaces.*

Course Goals and Objectives:

The central focus of this course is the study of matrix analysis, vector spaces and the vast applications of linear algebra that are essential to modern research and technology.

We will begin by studying systems of linear equations for which matrices will lend a great deal of simplicity. We will then build an algebraic structure with matrices that encapsulates fundamental properties of linear systems. We will use the principle of linear combination to understand how Euclidean space can be generalized to define vector spaces. Structure preserving functions between vector spaces, called linear transformations, will be the next major topic. Linear transformations will lead to beautiful algebraic and geometric implications. In the final part of the course we will study vector spaces with additional structure, called normed and inner product spaces, which extend the notions of length, distance and angle.

Linear algebraic methods are so quick and effective, you can find them in applications you everyday, such as Pandora radio and Google. If time permits we will discuss these in further detail.

After completing this course students should be able to:

- Use Gaussian Elimination to solve linear systems, compute the inverse of a matrix and compute the determinant of a given matrix.
- Do basic computations in Euclidean space and use this as a model for general vector spaces.
- Determine if a given set equipped with addition and scalar multiplication is a vector space.
- Determine if a subset of a vector space is a subspace.
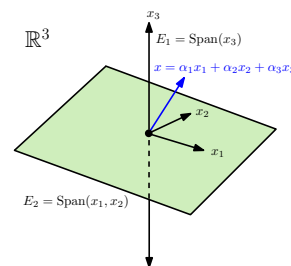
- Determine if a given set of vectors is linearly independent, spans a desired vector space, or is a basis of a vector space.
- Find a basis for the row space, column space and null space of a given matrix. Also, compute the rank and nullity of the same matrix, and understand the connection between all of these constructions.
- Determine if a function between two vector spaces is a linear transformation. Furthermore, whether or not the function is an isomorphism.
- Find the matrix representation of a linear transformation between two finite dimensional vector spaces with respect to a given basis.
- Find eigenvalues, eigenvectors and eigenspaces.
- Determine if a matrix is diagonalizable, and if so, find the appropriate similarity transformation.
- Compute norms, inner products, orthogonal bases, orthogonal complements and other similar constructions in suitable vector spaces.

HOW YOUR GRADE WILL BE DETERMINED:

Grade Distribution: Your final grade will be determined as follows:

Homework and other Coursework	20%
Exam 1	20%
Exam 2	20%
Exam 3	20%
Comprehensive Final Exam	20%

You also have the opportunity to earn additional participation points. Participation points can be earned by answering questions, asking relevant questions, working well with your group, etc. Coming to class is expected and will not get you these participation points alone. I would like everyone to be a part of the classroom discussions.

Borderline cases can be adjusted up or down based on your attendance, class participation, homework, and trends. For example, a pattern of steady improvement is good, but a weak final exam is bad.

If at any time you think there is an error in your computed grade on an assignment please bring this to my attention the day the work is returned to you.

Grade Conversion:

A	93−100	B	83−86	C	73−76	D	63−66
A−	90−92	B−	80−82	C−	70−72	D−	60−62
B+	87−89	C+	77−79	D+	67−69	E	0−59

Please see the Mathematics Department Guidelines for Student Evaluation here: `http://www.brockport.edu/math/MATH_DEPT_GUIDELINES_FOR_STUDENT_EVALUATION.pdf`.

Homework: Homework problems will be posted

on the course website: `http://www.acs.brockport.edu/~nreff/MTH324/`.

Homework problems will come in 2 forms:

1) **Book problems**: These problems will come right out of your text. You must complete these problems and bring your solutions to the next class day. Every week you will turn in these

problems to be graded. The purpose of the book problems is to make sure you are writing out clear step-by-step solutions to prepare you for answering questions on quizzes and tests.

2) **Addition problems**: I will write and assign problems which will generally be more challenging. These problems will be collected with the book problems.

> ## No late homework will be accepted!

Please make sure your homework is *neat* (legible, not torn out of a spiral bound notebook, etc.) and *stapled* when you turn it in. Treat your homework as if it is a professional document that you would submit in a future workplace. It is *very* important that you keep working on problems throughout the course. There is an old saying that "math is not a spectator sport" and there is definitely a lot of truth to this. I recommend working individually and also with other classmates (but make sure you are turning in your own work!). If you are working on a problem and get stuck, make a note of it, bring your work and **ask questions**. I encourage *everyone* to come to office hours!

Other than assigned problems you should be reading the text every day and keeping up with the pace of the course. Keep in mind that it your responsibility to read each section before an exam.

Classwork: Group worksheets and other classwork may be assigned during the lecture.

Tests: There will be 3 exams during the semester. The tentative test dates are as follows:

Exam 1	September 19	(The **course drop deadline** is September 23, 5PM).
Exam 2	October 24	(The **course withdraw deadline** is October 31, 5PM).
Exam 3	November 21.	

Please see the course website for more details. Tests will be more challenging than the quizzes so you need to study accordingly. However doing the homework and reviewing the quizzes is the best way to prepare yourself.

Extra Credit: I will not be giving anyone individual extra credit. This way everyone has the same advantage in the course.

> ## COURSE ETIQUETTE, POLICIES AND ADDITIONAL RESOURCES:

Classroom Etiquette: Please turn off cell phones, laptops and other electronic devices during class.

Quiz/Exam Policy: No calculators, cell phones, computers, mp3 players, slide rules, abaci, Addiators, Napier's bones, Difference/Analytical Engines, Pascalinas, Antikythera mechanisms, etc. may be used. In other words I want you to only use your brain and the hard work you put into this course to earn your grade. You may not talk to each other in the classroom while other students are working, even if you are done. Please keep your eyes on your own paper. Do not look at notes, books, etc. while working. Work through the problem on your own and you will do fine (and save us both a lot of trouble).

Academic Dishonesty: Academic dishonesty of any kind will not be tolerated. It is disrespectful to the College, your classmates and to me. Any form of academic dishonesty will be dealt with severely. The College at Brockport: SUNY Policy on Academic Dishonesty (675 The Policy on Student Academic Dishonesty) can be found at `http://www.brockport.edu/hr/resources/chapters/675policystudentacademicdishonesty.htm`.

Excused Absences: As outlined in The College at Brockport: SUNY Attendance Policy absences will be excused for (a) documented illnesses, (b) official representation of the College, (c) death of a close relative, (d) religious holiday, and (e) other circumstances beyond the control of the student. Excuses for official representation of the College must be obtained from the official supervising that activity or event. Students whose unexcused absences exceed 15 percent of the scheduled classes and laboratories may receive a lowered grade or failure at the instructors discretion. The full policy can be found here: `http://www.brockport.edu/policies/docs/attendance_policy.pdf`

If you cannot attend one of the exams you should submit a written reason for your absence **in advance** of the exam date. I would appreciate knowing at least 3 days in advance if you are going to miss a class. In emergency situations please send me an email as soon as possible. The decision to allow make-up exams will be made on a case by case basis, but proper documentation is always necessary. No make-up exams will be given without advance notice (unless it is an emergency). If you miss a quiz, exam or final with an unexcused absence, you will receive a 0 for that particular assignment.

Attendance Policy: You are expected to attend and be a part of every class meeting. I will keep a record of your attendance, participation and preparation. Excessive absences will noticeably affect your final grade (as mentioned in the excused absences section above). This course will move rather quickly so I suggest you only miss class for a good reason (meaning an excused absence).

Disability Statement: Students with documented disabilities may be entitled to specific accommodations. The College at Brockport's Office for Student with Disabilities (OSD) makes this determination. Please contact the Office for Students with Disabilities at (585) 395-5409 or `osdoffic@brockport.edu` to inquire about obtaining an official letter to the course instructors detailing any approved accommodations.

The student is responsible for providing the course instructors with this official letter. Faculty work as a team with the Office for Students with Disabilities to meet the needs of students with disabilities.

Tutor Services/Requests: Please take advantage of office hours or email me if you have any questions. I am more than happy to help out!

The Student Learning Center (SLC) also provides a large number of free services for all students, including tutoring in all content areas. The SLC is located in Cooper Hall Room B-10 and their website can be found here: `http://www.brockport.edu/~slc/`.

Disclaimer: I reserve the right to make changes to this syllabus without prior notice.