MATH 15A: APPLIED LINEAR ALGEBRA
SPRING 2015

Instructor: Dr. Arunima Ray
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Course website: http://people.brandeis.edu/~aruray/teaching/15aS15
Lecture Time: TF 12:30p-1:50p (Block J)
Office: Goldsmith 205
Aru's Office Hours: M 5-630p (and onwards), Th 11a-12:30p, and by appointment.
TA Office Hours: W 5-6p, Goldsmith 311.

Welcome to MATH 15a! As you can see from the title, our object of study will be linear algebra. Why do we call it 'Applied' linear algebra? Well, one can look at linear algebra in two different ways; in one sense, it is a springboard into theoretical ("pure") mathematics, If you are (or considering becoming) a math major, you should see the material as an introduction to the vast field of algebra, which can roughly be described as the 'study of abstract structures'. This will *not* be the primary focus of our class (although I would be delighted to talk about this more to any interested parties). Instead we will take a different tack; linear algebra is also, outside of possibly calculus, the subfield of mathematics with the most applications to the real world - starting from physics and chemistry to genetics, population/disease modeling, error-correcting codes, Google's page rank algorithm, image compression (e.g. see the JPEG file format), and just gobs and gobs of other such exciting and cool things. Overall, the goal of this class is to understand the basics and mechanics of linear algebra and see some of the many unexpected and varied places where it is applied.

Textbook:
Linear Algebra, by Jim Hefferon (freely available at:

http://joshua.smcvt.edu/linearalgebra/book.pdf)

It is also possible to purchase a printed copy, in the bookstore or online.

Additional References:
The following are *not* required. They are simply for you to look up if you are seeking additional resources. Since the content for our course is fairly standard, many good and relevant resources can be found online or in the library.

Elementary linear algebra, by Howard Anton
Linear Algebra and its Applications by David C. Lay
Applied Linear Algebra, by Ben Noble and James Daniel

Feedback:
Occasionally during the semester I will pass out notecards asking for (anonymous) feedback. Please use them to share any thoughts or concerns regarding the course. Remember, the sooner you tell me your concerns, the more I can do about them. In addition, you can send me anonymous feedback through the google form available at http://goo.gl/forms/oCc5dChfUE (this link can also be found on the course website). To make sure only members of this class

use this form, we have a codeword, which will be announced on the first day of class; **our code word is** _____.

You are of course always welcome to talk to me directly about any concerns you might have about the course in general, or your own performance in particular.

Prerequisites:
MATH 5a and permission of the instructor, placement by examination, or any mathematics course numbered 10 or above. Students may take MATH 15a or 22a for credit, but not both.

Learning outcomes:
After completing this course, students will be able to

- solve systems of linear equations,
- describe the geometry and algebra of vectors in $\mathbb{R}^n$,
- understand and apply the concepts of span, linear independence, basis, dimension, and orthogonality
- use matrix algebra and apply matrices to analyzing linear transformations,
- compute and use determinants, eigenvectors and eigenvalues,
- apply concepts of linear algebra to solving theoretical/applied problems

Grading:
There are four grading options for this course. For *each* student, I will select the option leading to the highest grade.

	Option 1	Option 2	Option 3	Option 4
Homework	40%	25%	20%	20%
Quizzes	10%	10%	10%	10%
Midterm #1	15%	20%	15%	20%
Midterm #2	15%	20%	20%	15%
Final	20%	25%	35%	35%
Total	100%	100%	100%	100%

If there are any concerns about grading, please see me within one week of getting the assignment/quiz/exam back, and before the final.

Graders:
Tarakaram Gollamudi, `gtr@brandeis.edu`
McKee Krumpak, `mkrumpak@brandeis.edu`

LATTE:
Course materials and grades will be available on LATTE. Log in at `http://latte.brandeis.edu` using your Unet username and password.

Homework:
Homework will be assigned regularly throughout the semester. See the schedule at the end of this syllabus for exact dates. Homework is due at the end of the class period (1:50p) on the

due date - late work will not be accepted for any reason, instead your two lowest homework scores will be dropped.

You are welcome to (and encouraged to!) work with your classmates on homework assignments, however you must write down your solutions independently. If you have worked with someone on a homework assignment, please clearly write down their names on the top of the first page of your submission.

Quizzes:
There will be three 20-minute quizzes, in class, on January 27 *(rescheduled to January 30 due to blizzard)*, March 6, and April 17. These will consist of short pencil-and-paper computations. *There will be no makeup quizzes.*

Exams:
There will be three exams in this course: two midterms and a final. The midterms will be in-class. The final will be comprehensive. Further details will be given in class.

The midterm exams will take place in class on February 10 and March 20. If you must miss an exam, you have to let me know before the exam starts. If you do not do so, there will be no makeup exam.

The registrar has our final exam (tentatively) scheduled for Wednesday May 6, 1:30 pm - 4:30 pm *(This has been confirmed to be our final exam time.)*

Technology:
Calculators are **not** allowed on exams or quizzes. They are not allowed on homeworks unless you are specifically directed otherwise.

Expectations:
Most of our work will be computational. As a result, a large portion of our time in class will consist of working through computations. This will sometimes consist of me writing on the board with input from the class; at other times, you will be asked to work on your own for some time and then discuss your work with your neighbor(s). You are expected to attend classes in a timely manner, ask questions if you have them in class or in office hour, and work in good faith with your classmates when called upon to do so.

In return you should expect me to be on time for lectures, be available in my office for scheduled office hours, and respond to emails in a timely manner. You should also expect me to answer your questions to the best of my ability, and to direct you towards appropriate resources when necessary. You should expect my goal to be for everyone in this class to do well.

Disability support:
If you are a student with a documented disability on record at Brandeis University and wish to have a reasonable accommodation made for you in this class, please see me immediately.

Academic Integrity:
You are expected to be familiar with, and to follow, the University?s policies on academic integrity. Please consult Brandeis University Rights and Responsibilities for all policies

and procedures. All policies related to academic integrity apply to in-class and take home projects, assignments, exams, and quizzes. Students may only collaborate on assignments with permission from the instructor. Allegations of alleged academic dishonesty will be forwarded to the Director of Academic Integrity. Sanctions for academic dishonesty can include failing grades and/or suspension from the university.

Disclaimer:
I reserve the right to make changes to this syllabus and to course policies during the semester. Such changes will be announced in lecture and/or by email when they are made. A copy of this syllabus will be available on my website and will be kept up to date.

Important dates:

Jan 23	HW #1 *(rescheduled to Jan 30 due to blizzard)*
Jan 27	Quiz #1 *(rescheduled to Jan 30 due to blizzard)*
Feb 3	HW #2
Feb 10	**Midterm # 1**
Feb 24	HW #3
Mar 3	HW #4
Mar 6	Quiz #2
Mar 13	HW # 5
Mar 20	**Midterm # 2**
Mar 27	HW # 6
Apr 14	HW # 7
Apr 17	Quiz # 3
Apr 24	HW # 8

Last updated: February 25, 2015