Brown University MA 0540 - Honors linear Algebra S02

Spring Term 2015

Class time/place: MWF 2:00-2:50pm, Barus & Holley 161

Instructor: Dr. Francesco Di Plinio - `www.math.brown.edu/~fradipli` - `fradipli@brown.edu`
Office and Office Hours: Kassar 313 / to be determined

Prerequisites: Third semester calculus as in MA 0180, MA 0200, or MA 0350, or consent of the instructor.

Course textbook and topics covered: Linear Algebra done Wrong, by Sergei Treil, available at

`http://www.math.brown.edu/\%7Etreil/papers/LADW/LADW.html`

We will cover most sections in Chapters 1 to 7 and some extra topics from Chapters 8 and 9 according to interest and time availability. Other books of interest include "Linear Algebra done Right" by Sheldon Axler (Springer) and "Linear Algebra" by Friedberg, Insel, Spence (Pearson). Some applications will be drawn from "Discrete dynamical Models" by E. Salinelli and F. Tomarelli (Springer).

A detailed but tentative week-by-week breakdown of the sections covered can be found on the course web page below.

Course web page: `https://canvas.brown.edu/courses/959201`. Used to gain access to syllabus, detailed course outline, assignments, homework and exam grades, lecture notes, and course announcements.

Learning objectives and teaching style: this class consists of an introduction to linear algebra, from a rigorous and deep viewpoint, but with a concrete flavor. Topics include vector spaces, linear transformations, matrices, linear equations, determinants, eigenvalues and eigenvectors; inner product spaces; Hermitian, orthogonal, and unitary matrices; bilinear forms; generalized eigenvectors and Jordan normal forms (if time permits). Some applications to other branches of Mathematics (linear optimization, discrete dynamical systems) will be briefly presented.

In the instructor's opinion, the central object of study of linear algebra are linear transformations (maps) between vector spaces with their dynamical behavior (zeros, fixed points, orbits, etc.). The dynamical viewpoint, in contrast to the more abstract-algebraic one, will be emphasized throughout the course, also by means of non-standard applications. An important objective of the course is to get students accustomed to reading, understanding and possibly reproducing formal mathematical definitions, theorems and proofs–in short, to the style of modern theoretical (abstract) Mathematics. The flavor of the course textbook is quite operational, while some students might prefer a more abstract presentation. Therefore, as often as possible, alternative definitions (for instance, for determinants) and proofs (of more abstract flavor versus of operational type) will be presented and contrasted. To this aim, we will take brief glimpses to other presentations of the subject (e.g. Axler's textbook).

Grading:

MIDTERMS	40%	2 in class midterms, dates tbd
HOMEWORK/QUIZZES	15%	lowest hw score dropped
FINAL	45%	May 8, 2015, 2pm, room TBD

A score above 90% is usually enough for an A. A score below 50% usually means failing. Other factors such as in-class participation and improvement over time may impact positively your final grade. A single exam grade that is out of line with the other grades might also be assigned a lesser weight, to the instructor's discretion.

Homework: Homework will be assigned after each lecture and discussed at the beginning of the next lecture. It will be collected weekly (usually on Fridays) for grading purposes. The detailed list of problems

for each assignment will be made available on the course webpage. You will also be able to see a summary of your homework grades on the course page. Although not all problems will be graded, it is extremely important to do all the homework. Tests' problems will be often modeled after the homework problems or problems discussed in the class. Note that you are not done with a problem just because you got the right answer. You are only done when you understand why the methods you used had to have worked. If all you are doing is blindly applying formulas and mimicking examples, get extra help. The problems should make sense to you. You should be able to solve the problem and similar ones with closed book and notes.

Submission guidelines: the following rules will be strictly enforced.

(1) Write your name clearly at the top of every page.
(2) Put the problems in order, indicating clearly what you have skipped.
(3) **STAPLE** your homework. Paperclips, folded corners, etc. are not acceptable.
(4) Turn in assignments in time, in class on in the course mailbox **ON DUE DATE** (Kassar Mail Room, closes at 5pm). No late homework will be accepted.
(5) Write neatly. If your homework is too messy, a grader might decide, with the instructor's consent, not to grade it.

You can talk to each other about any of homework problems, but when you write up the problems to be handed in, you must work alone.

Quizzes: In-class Pop Quizzes may be given if necessary. The quizzes will be closed book, closed notes, and will consist of problems modeled after the homework assigned since the previous quiz. Each quiz will be worth 10 points (the same as a homework assignment).

Midterm Exams: There will be two in-class exams during the semester, the dates will be announced later. Exams are closed book and closed notes. Grades will be posted on the course page.

Make-ups will not be permitted except for a severe medical problem or dire family emergency. A written note from an appropriate person (doctor, parent, etc.) is required. If at all possible, you should notify the instructor before the missed exam.

Final: Friday, May 8, 2-5 pm. The location will be announced later. The exam is closed book and closed notes.

Calculators: You can use computers/calculators when doing homework. However they are not permitted (and not needed) on the tests and quizzes.

Questions and office hours: Mathematical questions are appreciated and encouraged any time during the class. Please use the office hours as much as possible for additional clarifications, occasional homework help. I will also be answering email questions, 9am-10am daily on weekdays.

Notes: Taking good notes is essential for advanced mathematical classes, in particular for this class. While we will be following our textbook, my presentation will differ at a number of times. Lectures and the textbook augment each other, so it is essential to get good notes. To encourage you to learn basics of mathematical note-taking as well, for each lecture one or two students will be chosen to be responsible for note-taking. They should take notes, check them after the lecture, and present a neatly written (or typed) version before the beginning of next class. I'll check the notes, correct if necessary, and post them on the web page. This way we will have a detailed picture of what was done in class each day, and at the end of the course, you will have a complete collection of notes in addition to your own. Everyone will be note-taking at least once.

Attendance: Many college students treat class attendance as optional. This may be fine for some classes. However, in math classes you can get way behind very fast. I would not penalize you for non-attendance, but you should come to class every time unless you are seriously ill. And remember: office hours are not replacements for missing classes!