

Elements of Linear Algebra

MATH 346, Section 1XC, Summer 2018

T, W, Th 1:20pm – 3:00pm in NAC 7/219

Instructor: Jhevon Smith. (“Jhevon” is fine.)

Email: JhevonTeaches@gmail.com

Office Hours: By appointment only.

Website: http://math.sci.ccny.cuny.edu/people?name=Jhevon_Smith

Text: Anton, Howard; *Elementary Linear Algebra, 11th Edition.*

Math Dept.: NAC 8/133 **Math Dept. website:** <http://math.sci.ccny.cuny.edu>

Math 346 website: http://math.sci.ccny.cuny.edu/courses?name=Math_34600

Websites: I gave you my website since I will be posting documents and instructions for the class there, such as: review topics, announcements, solutions to tests, etc. I gave you the math 346 website so you can access resources like past finals. I gave you the math. dept. website because, well, you should have it.

Supplements:

- (1) A self-guided aid to learning proofs for Anton:
http://higheredsbc.wiley.com/legacy/college/anton/1118473507/pvg/solow_proofs.html
- (2) Larson, Ron; *Elementary Linear Algebra, 6th edition or higher.*
- (3) Coursera’s Linear Algebra course; *Coding the Matrix: Linear Algebra through Computer Science Applications.* <https://www.coursera.org/course/matrix>
- (4) Axler, Sheldon; *Linear Algebra Done Right, 2nd Edition.* (This is an advanced text)
- (5) Treil, Sergei; *Linear Algebra Done Wrong.*
<http://www.math.brown.edu/~treil/papers/LADW/LADW.html>
- (6) Interesting article: <http://www.ams.org/samplings/feature-column/fcarc-pagerank>

Calculators/Technology: While you may use these to do your homework or explore some topic in depth, you will not be allowed to use them on any exam.

Grading: Grades will be assigned according to the following chart.

Letter Grade	G.P.A.	Grade	Letter Grade	G.P.A.	Grade	Letter Grade	G.P.A.	Grade
A ⁺	4.00	96-100	B ⁺	3.33	77-79	C+	2.33	67 - 69
A	4.00	91-95	B	3.00	74-76	C	2.00	60-66
A ⁻	3.66	80-90	B-	2.66	70-73	D	1.00	50-59
			F	0	< 50			

As department policy demands, the final exam is worth 40% of your grade in this course. The remaining 60% will come from your in-class grade as follows:

Online HW: 15% (I will drop the worse two)

Participation: 5% (Based mostly on attendance).

In-class tests: 40% (I will give two exams; none will be dropped).

Final Exam: 40% (This will be a cumulative exam given at the end of the course).

Extra Credit: I could easily be convinced to offer generous extra credit for completing, with full participation, the Coursera course listed in the supplements (if it's still offered). Other than that, nope! You may have noticed that there is already a curve built into the grading chart. No more free lunches.

Make-up Exams: None will be given. Please don't miss any exams.

Attendance: Attendance will be taken at the beginning of class. You are *late* if you arrive after your name is called. You will be assigned a WU (failing) grade if you accumulate 5 unexcused absences.

To be excused for an absence (or lateness) you must email me no later than one day after that particular absence (or lateness) with the reason. Of course, proof is required where applicable. For example, if your absence or lateness was due to a medical emergency, I expect to see a doctor's note. If you miss a class, it is your responsibility to catch up. You can see me during my office hour to discuss what was done in class, or catch up on your own. It's up to you.

My Expectations:

Work ethic: You are not to slack off! You are to read ahead! Very Important! Read each section before coming to class. It's better if you have your mind working on the concepts before coming to class—it will be easier for you to keep up and ask intelligent questions. Make note of definitions and notation especially. You will find that knowing the definitions and knowing how to write something down clearly and with the right notation is half the battle. Read (intelligently) and do the homework. It is highly unlikely that you will do well by just coming to class, even if you pay attention. Hopefully by now you've realized, watching someone do math on the board is different from doing it yourself.

Responsibility: This is a non-trivial math class, and as such, I do expect a certain level of responsibility, maturity, and integrity from you. You've made it this far, which means you know what it takes to get through a college math class. This class may be a little different for you if you've never seen proofs before, but I expect you to apply diligence to bridge the gap between your comfort zone and what's required here. We all have to do this at some point. No excuses, and no begging for grades at the end of the semester. And no sob stories. Understand, that while I want to see every one do well and have no ill will towards anyone, it is **not** my responsibility to keep your GPA up, or to help you keep that scholarship, or whatever reason it is important that you do well here. These are your responsibilities. My responsibility is to facilitate you learning linear algebra. I shall keep that responsibility. Please keep yours.

Homework: Online homework will be assigned through the WebWork system. Due dates for online homeworks will be listed in the online system. Online, the dates are dynamic, so as the course goes on, I may extend or shorten due dates depending on how slowly we're moving through a topic. So pay attention and set up email alerts to make sure you don't miss anything. **Late homework will NOT be accepted.** The excuse does not matter.

The topics to be covered in the class are listed towards the end of this document, along with some suggested problems from the textbook. These are for your own study, you do not need to hand in any written homework. **However, you will NOT do well in this course if all you do is the online HW. It is highly recommended that you do the suggested problems from the text, especially since the online HW will only test you on the computational aspects of this course, and not the proof writing aspects.**

The instructions to access the online HW can be found on the next page.

To access the online homework system:

1. Go to <https://webwork.ccny.cuny.edu/webwork2>
2. Click on **18_Su346_1XC** from the Courses list.
3. The username is your CCNY email address username, one word all lowercase.¹
For example, my CCNY email address is `jsmith@ccny.cuny.edu`², my username would be `jsmith`
4. The password is the same password you would use to access your CCNY email.³
5. You will be logged in to the page that has the list of assignments that are currently active.

More expectations: I also expect you to remember all the math that you have done before this course. We usually won't specifically use things that you've done in, say, calculus, but I expect a level of mathematical maturity befitting those who are experts at the lower level math courses. I'd like the freedom to use examples from anywhere, including calculus, without losing the class. I think highly of you and will treat you accordingly. I will heavily punish any elementary/fundamental mathematical mistakes. Such things are now beneath you.

In my lower-level classes, I have a list of blasphemies—mistakes that you must never make, lest you get zero for the problem in which you make them. In this class, we will only have one such thing: Not knowing a definition! **If you misquote a definition or otherwise write down a statement that makes it clear you do not know the precise statement of a relevant definition, you will get a zero for that problem—regardless of what you write otherwise.**

Contact:

I will be emailing important information from time to time; including progress reports, announcements and advice as needed (to the email address listed for you on BlackBoard. If this is not a good email address, notify me). Please read the emails. If I email you, it means it is important.

Feedback: I encourage you to give me feedback about my teaching or the class, whether positive or negative (just make it constructive please). You can email me or talk to me, or if you don't want to reveal your identity, there is an anonymous feedback page on my website.

Help: FREE tutoring is available in the Marshak Building, room 403. The hours for this semester are: Mondays through Thursdays 12pm – 5pm. Tutoring begins June 11th. There are also online resources available. A great place to get math help, even at odd hours, is www.mathhelpforum.com. Mathhelpboards.com is also nice, as is math.stackexchange.com. There are a significant number of brilliant people from varying time zones who decide to spend their free time helping others with math at sites like those. Take advantage of these great services. Of course, there are other online contenders like various YouTubers, Khan Academy, etc. Check them out. And don't forget your classmates. You should get the contact information of at least one person that you can study with or get missed notes from if you are absent, etc. You're all in this together, help each other out. And, of course, there is always me! Don't be afraid to come to me if you have questions or concerns. You can contact me via email or see me after class or during my office hour.

Some class rules: Please silence your cell phones and don't use them when in class. Eating in class is NOT allowed. Drinking is permitted, as long as you remove your garbage afterwards.

¹ See: <https://www.youtube.com/watch?v=bLE7zsJk4AI>

² Follow instructions and do NOT email me at my CCNY email address, but rather the Gmail address on the first page. I like to keep my students' emails separate.

³ The password will remain precisely the same. If you change your CCNY email password, the WebWork password will automatically change to your new email password as well. The accounts are linked.

Academic Integrity: Any act of academic dishonesty will be dealt with by applying the most stringent penalties permitted. Cheating includes, but is not limited to, receiving help during exams and submitting homework without properly acknowledging persons who assisted you.

Please read carefully the Policy on Academic Integrity posted on the CUNY website with URL http://www1.cuny.edu/portal_ur/content/2004/policies/image/policy.pdf

Important Dates:

You can view the full academic calendar at: <https://www.ccny.cuny.edu/registrar/summer-2018-academic-calendar-extended-session>

June 4	First day of summer classes. Yay!
June 8	Last day to add a course or apply for an audit; last day for 50% tuition refund.
June 13	Last day to drop without earning a “W”; last day for 25% tuition refund; last day for “WD” grades.
June 14	“W” grades begin; no refund
July 3	Deadline to file for Summer 2018 graduation
July 4	Independence Day – College closed.
July 5	Last Day to withdraw from a course; last day for pass/fail option.
July 23	Last day of classes
July 24-25	Final Exams

Course description: Vector spaces, basis and dimension, matrices, linear transformations, determinants, solution of systems of linear equations, eigenvalues, and eigenvectors.

Topics	Section - Topic	Problems
Systems of linear equations, Matrices, Determinants, and Inverses		
0	Into to Linear Algebra	N/A
0	A discussion of proofs	N/A
1	1.3 - Matrices and Matrix Operations	1 - 35 odd
2	1.1 - Intro to systems of linear equations	1 - 27 odd
3	1.2 - Gaussian Elimination a.k.a Gauss-Jordan Elimination	1 - 17 odd, 23 - 31 odd, 35, 37, 39, 43
4	2.1 - The determinant; cofactor expansion a.k.a. Laplacian expansion	1, 3(d), 9, 13, 15, 21, 23, 27, 29, 31
5	2.2 - Determinants by row reduction: triangular matrices and pivotal condensation	1, 5, 9, 31
6	2.3 - Properties of determinants and Cramer's rule	1, 7, 9, 15, 21, 25, 29, 33, 39
7	1.4 - Inverses and algebraic properties of matrices	1 - 11 odd, 21, 35, 37, 39, 43, 45(a), 51 - 57 odd
8	1.5 - Elementary matrices and a method of finding A^{-1}	1, 3, 5(a), 9 - 15 odd, 19(a), 21, 33
9	1.6 - More on linear systems and finding invertible matrices	1, 3, 9, 13, 15, 19, 21, 23
10	1.7 - Diagonal, Triangular, Symmetric Matrices	7, 13, 14, 15(a), 17 - 29 odd, 45 (see defn above 41), 47
Vector Spaces		
11	4.1 - Real Vector Spaces	1 - 27 odd
12	4.2 - Subspaces	1 - 11odd, 13, 14, 17, 19, 24
13	4.3 - Linear Independence	1, 2, 4, 5, 24, 25, 26, 28, 29, 31, 32
14	4.4 - Coordinates and bases	1, 3, 7(a), 11, 17, 20, 30, 31
15	4.5 - Dimension	1, 3, 5, 7(a), 22, 23, 25
*	Exam 1 on topics 1 through 15	Date TBA
16	4.6 - Change of basis	1 (Important topic, but we'll just gloss over it.)
17	4.7 - Row space, Column space, Null space	1(a), 3 - 15 odd
18	4.8 - Rank and Nullity	1, 7, 13, 19, 29
19	4.9 - Basic Matrix Transformations in \mathbb{R}^2 and \mathbb{R}^3	1, 5, 9, 13, 23
20	4.10 - Properties of matrix transformations	7, 19, 21, 23
Linear Transformations		
21	8.1 - General linear transformations	1, 3, 5, 7, 11, 13, 19, 21, 23, 25, 31
22	8.2 - Composition and Inverse Transformations	1 - 11 odd, 15 - 23 odd, 29 - 37 odd
23	8.3 - Isomorphisms	1, 3, 5, 11, 17, 19, 23
24	8.4 – Matrices for General Linear Transformations	1, 3, 4, 5, 6, 7, 11, 17, 19
Intro to Spectral Theory: Eigenvalues, Eigenvectors, Diagonalization		
25	5.1 - Eigenvalues and Eigenvectors	1, 5, 7, 13, 15, 25, 28,
26	5.2 - Diagonalization	1, 5, 9, 11, 15, 19, 23, 25, 27, 37
27	5.4 - Systems of linear differential equations	1
*	Exam 2 on topics 16 through 27	Date TBA
Final Exam: Tue July 24, 1:20pm – 3:35 pm in regular classroom		

Anonymous Questionnaire

What is your major? _____

Are you sure you need this class? _____ Are you sure? _____

Will you need to do more math after this? _____

What is the highest math class you've taken? _____

If you don't *need* this class, why are you taking it? _____

Have you ever taken a mathematical proofs class before? _____

Rate your interest: 5 = math is my life and I'm so excited to be here, down to 1 = I don't really like math, but I'm just here to get a minor or satisfy some requirement. _____

How good are you at Algebra? ____ Precalc? ____ Calc 1? ____ Calc 2? ____ Calc 3? ____
(Enter 5 for "I can do it in my sleep!", 4 for "I'm not the best at it, but pretty awesome.", 3 for "I'm just OK; I'm good at the basics.", 2 for "I'm not the worst, but far from the best.", 1 for "The class was a blur that got more obscure over time!")

Are there any dates during the semester for which you will not be able to take an exam/quiz due to religious reasons? If so, please state the date(s) and "occasion(s)" below.

Any general feelings or concerns towards this course? (For example, are you: Scared? Excited? Curious? Indifferent? Based on your perceived ability in math, what grade are you expecting? etc)

Are there any other relevant comments that you wish to add?
