Math 121A − Syllabus

Linear fun

Monday, April 1, 2019

Welcome to Math 121A, an awesome linear adventure awaits you! This is the survival manual for this course, where you can find all the administrative info you need to know, such as office hours, grading, and other goodies. Feel free to e-mail me if you have any other questions.

- **Instructor:** Peyam (Pie-Am) Ryan Tabrizian
- **E-mail:** drpeyam at gmail dot com or ptabrizi at uci dot edu
- **Office:** 410N Rowland Hall
- **Class meeting times:** This course meets on MWF 11−11:50 AM in PSCB 140. I do not take attendance, so whether you show up to class is entirely up to you.
- **Office Hours:** Tu 2 − 3 PM and W 1 − 2 PM. I do not take office hours by appointment.
- **TA:** TBA
- **Discussion Section:** MW 5−5:50 PM in HH 143. Attendance is optional, but remember that homework and quizzes are due on Wednesdays during discussion section. I have no control over the quizzes, so any complaints about those should be directed to the TA.
- **Enrollment and Waitlists: I have no control over the waitlist.** For any administrative issues such as class enrollment, please contact Mike Vo. His office is in 340B Rowland and his e-mail is myv@uci.edu. **If you're on the waitlist, make sure to do the homework and take the quizzes, just in case you end up getting in the class**.

- **Important Dates:**
  - Friday, April 12: Last day to add/drop a course and to change the grading option.
  - **Friday, May 3, 11−11:50 AM: Midterm Exam** (during lecture)
  - Monday, May 27: No lecture/discussion (Memorial Day)
  - **Tuesday, June 11, 1:30 − 3:30 PM: Final Exam** (most likely in our usual classroom)

- **Online resources you can use:**

  - Course website: This is the main course website, where you can find the lecture notes, the homework, and information about the exams.
  - Canvas: Mainly use this to check your grades.
  - Dr Peyam: My YouTube channel; for linear algebra and other fun math videos. Make sure to subscribe if you want to.
  - Linear Algebra Playlist: This playlist contains lots of fun linear algebra videos.

- **Textbooks:**

  Required: *Linear Algebra, 4th edition* by Friedberg, Insel, and Spence, Pearson, ISBN 978-0130084514. My favorite math book of all time! This is the main textbook of the course, and I am expecting you to thoroughly read it.

  NOT recommended: *Linear Algebra Done Right, 3rd edition* by Axler, Springer, ISBN 3319110799. My least favorite math book of all time. You can look at it if you want a different treatment of linear algebra, but I really don't like this book.

  Sort of recommended: Linear Algebra Done Wrong. Isn't the title adorable?

- **Prerequisites:** Math 3A and Math 13. This is a very proof-heavy course, and although you don't need to be a proof-ninja to take this course, I do expect you to be familiar with proof techniques like induction or contradiction. Technically no linear algebra required, because we'll learn it from scratch, but the techniques from 3A (in particular row-reduction) will prove to be useful.

- **What people make you believe this course is about:** The official description includes "Introduction to modern abstract linear algebra. Special emphasis on students doing proofs. Vector spaces, linear independence, bases, dimension. Linear transformations and their matrix representations. Theory of determinants." This course is the adult version of 3A, in the sense that we'll relearn the concepts in that class, but with a more mathematical point of view. Since there isn't much new material to learn, you can really focus on fine-tuning your proof skills. We will cover the following chapters in the book:

  - Vector Spaces (Chapter 1)
  - Linear Transformations and Matrices (Chapter 2)
  - Systems of Equations (Chapter 3)
  - Determinants (Chapter 4)
  - Diagonalization (Chapter 5)

  Note: In Math 121B (Linear Algbra − THE SEQUEL), you'll finish chapter 5, and move on with Inner Product Spaces (Chapter 6) and the Jordan Canonical Form (Chapter 7)

- **What this course is *really* about:** I highly doubt that you'll forget the techniques you'll learn in this course because they are essential to human surival. That said, as Steve Krantz puts it in his book *"How to teach Mathematics,"* there is another goal of teaching this course. Namely, *real* purpose of this course is to teach you about *mathematical discourse* and critical thought. Just like in rhetoric, philosophy or politics, mathematics has its own language and way of thinking. How do mathematicians deal with an unknown problem? What methods do they use? What do they do when a given method doesn't work? Getting acquainted with all those different types of discourses is what your college education is really about.

- **Grading:**
  - ▶ 20 % Homework, due on Wednesdays during discussion section, two lowest homeworks dropped.
  - ▶ 10 % Quizzes, on Wednesdays during discussion section, two lowest quizzes dropped.
  - ▶ 25 % Midterm, Friday, May 3, 11−11:50 AM in PSCB 140
  - ▶ 45 % Final Exam, Tuesday, June 11, 1:30−3:30 PM (probably) in PSCB 140

I will follow the standard curve suggested by the math department, which is 20 % A, 25 % B, 30 % C, 15 % D, and 10 % F, but I will try to be as generous as I can. The class will very likely going to be curved; the way I'll curve is that I'll take all your raw scores and add them up to get a raw total score, and *then* I'll curve that total score.

- **Homework:** Homework is due every **Wednesday during discussion**. There will be lots of homework, but remember that it's also worth 20 percent of your grade. It's very important to take homework seriously, because this is the key way to absorb the concepts in the course and to do well on the exams. On every homework, 2 or 3 problems will be thoroughly graded, and the rest will be graded on completeness, so make sure to attempt all the problems. **NO** late homework is accepted, but your lowest two homeworks are dropped.

- **Homework/Exam etiquette:** Please write your answers in **complete** sentences. You are **NOT** allowed to use the symbol $\therefore$ write 'therefore' instead. If your answer only involves math symbols and no English sentences at all, it won't get full credit. And please staple your homework, and write your name on it. If you forget to write your name once, we'll forgive you, but if it happens twice, you'll lose points.

- **Quizzes:** Quizzes are given on **Wednesdays during discussion section**, and roughly cover the material from the homework that is due on that day. They are written by your TA, who has complete control over them, and who can give you more information about them. **No make-up quizzes will be given, but your two lowest quizzes will be dropped**. I highly recommend you to save that lowest quiz for the time when you'll get sick or have a personal emergency.

- **Midterm:** The midterm exam will be given on Friday, May 3, 11-11:50 PM in PSCB 140 (our usual lecture room), and will cover Chapters 1 and 2 (*tentatively* up to and including 2.4). **No make-up midterm will be given,** so if you cannot make it for the midterm, please switch to another Math 121A-lecture.

- **Final Exam:** The final exam is cumulative and will cover Chapters $1-5$. It will take place on Tuesday, June 11, 1:30 - 3:30 PM in PSCB 140. **No make-up final will be given,** so if you cannot make it for the final, please switch to another Math 121A-lecture.

- **Cheating: DO NOT CHEAT!** Any form of cheating, no matter how small (e.g. even looking at your neighbor's quiz) will result in an automatic F in the course, and will be pursuant to further disciplinary sanctions. In particular, by taking this course, you agree to abide by the following academic integrity policy:

  Academic Integrity Policy: All students are expected to complete a course in compliance with the Instructor's standards. No student shall engage in any activity involving any Academic Integrity Policy Violations. No student shall engage in any activity that involves attempting to receive a grade by means other than honest effort, and shall not aid another student who is attempting to do so.

- **Accommodations:** Students who may need disability-related accommodations are encouraged to talk to me as soon as possible.

- **Warning:** This is not an easy course, and you shouldn't take this too lightly. Do **NOT** take this course if you need a 'filler' course. I will make you work very hard in this course, and there will be lots of homework. In lecture, I'll cover the important aspects of each section the book, but you will have to do a lot of reading on your own. That said, I *promise* you that your work will pay off, because the material in this course is essential to whatever math (or non-math) courses you'll be taking. You'll see, linear algebra is literally everywhere!

- **Finally:** Sit back, relax, and enjoy the show! Remember that this course is fun and enlightening! I'm really looking forward to an exciting quarter together! :) On the next page, you can find a *very tentative* schedule of the lectures. Unfortunately, due to the amount of material to be covered, there won't be a review session before the exams.

#		Date	Section	Lecture Title	
1	M	Apr 1	1.2	Vector Spaces	
2	W	Apr 3	1.3	Subspaces	HW 1 / Quiz 1
3	F	Apr 5	1.4	Linear combinations and systems of equations	
4	M	Apr 8	1.5	Linear dependence and independence	
5	W	Apr 10	1.6	Basis and Dimension (I)	HW 2 / Quiz 2
6	F	Apr 12	1.6	Basis and Dimension (II)	
7	M	Apr 15	2.1	Linear Transformations, Nullspaces, and Ranges (I)	
8	W	Apr 17	2.1	Linear Transformations, Nullspaces, and Ranges (II)	HW 3 / Quiz 3
9	F	Apr 19	2.2	The Matrix Representation of a Linear Transformation	
10	M	Apr 22	2.3	Composition and Matrix Multiplication (I)	
11	W	Apr 24	2.3	Composition and Matrix Multiplication (II)	HW 4 / Quiz 4
12	F	Apr 26	2.4	Invertibility and Isomorphisms (I)	
13	M	Apr 29	2.4	Invertibility and Isomorphisms (II)	
14	W	May 1	2.5	The Change of Coordinates Matrix	HW 5 / Quiz 5
15	**F**	**May 3**		**Midterm Exam**	
16	M	May 6	2.6	Dual Spaces (I)	
17	W	May 8	2.6	Dual Spaces (II)	HW 6 / Quiz 6
18	F	May 10	3.1, 3.2	Elementary Matrix Operations; The Rank of a Matrix (I)	
19	M	May 13	3.2	The Rank of a Matrix (II)	
20	W	May 15	3.3, 3.4	Systems of Linear Equations (I)	HW 7 / Quiz 7
21	F	May 17	3.3, 3.4	Systems of Linear Equations (II)	
22	M	May 20	3.3, 3.4	Systems of Linear Equations (III)	
23	W	May 22	4.1	Determinants of order 2	HW 8 / Quiz 8
24	F	May 24	4.2	Determinants of order n	
	M	May 27		No lecture/discussion (Memorial Day)	
25	W	May 29	4.3	Properties of determinants	HW 9 / Quiz 9
26	F	May 31	5.1	Eigenvalues and Eigenvectors (I)	
27	M	Jun 3	5.1	Eigenvalues and Eigenvectors (II)	
28	W	Jun 5	5.2	Diagonalizability (I)	HW 10 / Quiz 10
29	F	Jun 7	5.2	Diagonalizability (II)	
	Tu	**Jun 11**		**Final Exam**	