Math 117 Syllabus

Summer (Session 1) 2022

Instructor Information

Instructor	*Email*	*Office Location & Hours*
David Rubinstein (he/him/his)	darubins@ucsc.edu	*OH: M 3:45-4:45 PM, Th 11:45-12:45*

General Information

Learning outcomes

This is an Advanced Proof Based Linear Algebra course. Upon completion of this course, students will be able to

1. Define vector spaces and provide examples and non-examples of them
2. Create and write coherent proofs
3. Connect the concepts of Matrices and Linear Transformations
4. Construct quotient vector spaces and apply its universal property to problems
5. Understand the concept of the dual vector space and apply dual basis to prove theorems
6. Connect abstract notions of the dual transformation with concrete phenomena
7. Make connections between bilinear/multilinear maps and tensor products of vector spaces
8. Compute examples of tensor products, and internalize their universal property
9. Understand the content of the Spectral Theorem, and describe applications of it to certain operators
10. Form productive learning groups and collaborate successfully with peers
11. Develop the ability to seek out and apply outside resources (including Office Hours)
12. Develop the belief that they will succeed in a STEM field

Course Logistics

- *I will be teaching via the same zoom link every Monday, Wednesday, Friday at our designated time (1-3:30).* **The password to enter the zoom meeting is LAlecture.**
- *Summer courses are long, so we will be taking a 10ish minute break halfway through every class.*
- *I* **will be recording all my lectures and uploading it onto canvas (will be uploaded onto the 'YuJa' subheading)**, *so if you can't make some classes you can watch the uploads. I* **strongly, strongly, strongly encourage all who can** *attend the lectures live to do so.*

Grading/Assignments

Ok let's discuss the grade breakdown: your grade will consist of "mini" homeworks; "larger" homeworks; a "glossary"; and 1 final problem set

- **6 Mini Homeworks (60 Points)**

- o *The homework will be posted on Canvas under assignments and files, and upload a pdf of your work onto Gradescope.*
- o *There is a guide on how to use Gradescope under "modules" in Canvas that you can look at if you have never used Gradescope before*
- o *These homeworks will consist of smaller problems that will assure you cannot fall behind in such a sped-up class.*
- o *They will typically be due the day after a lecture*

- *4 Larger Homeworks (80 points)*
  - o *These homeworks will be a little more in depth and require a bit more thought and time. Whereas the mini-homeworks are usually about the previous lecture, these homeworks will be more or less cumulative.*
  - o *I will post these usually on the beginning of the week and they will be due the following week (see schedule below)*
  - o *This means you should work on them throughout the week- try to not save them for the weekend*

- *Glossary (20 points)*
  - o *In this class you will make a glossary consisting of definitions, examples, and statements of theorems, along with your commentaries on them (ie, your thoughts about it- put into your own words how you understand the material)*
  - o *More information on this (including how many entries you will need) is listed under the assignments tab of Canvas.*

- *Final Problem Set (20 Points)*
  - o *There will be a final problem set released the last week of class. This will take the place of the final exam and will be due on the last day of class. More information about this will be posted in Canvas under assignments later.*

Academic Integrity

Academic integrity means honesty in academic work. All of your coursework should be a result of your own efforts. You may feel pressured and overwhelmed by the demands of school, work, and personal commitments. But you are expected to approach your work with honesty and integrity. Please read the Academic Integrity page from the Office of the Registrar for more information.

Do

- *Trust your own intellect.*
- *Demonstrate your own achievement and abilities.*
- *Do original work for each course.*
- *Undertake research honestly and credit others for their work.*
- *Ask for help from your instructor, or for more time if you need it!*

Don't

- *Copy ideas or wording without citing your source.*
- *Copy answers from another student.*
- *Ask someone else to do your work for you.*
- *Complete an assignment for another student.*

LATE WORK GRADING POLICY

- *You may turn in one Mini-HW and one Large-HW one day late without penalty.*
- *Each additional assignment submitted late will be accepted up to two days later, with a 10% reduction for each late day.*
- *As you will read directly below, the grading scale takes into account that some work may be missed due to the rapid nature of the course.*

GRADE BREAKDOWN

These assignments add up to 180 points. **We will only require 170 points for a 100%, so EVERYONE GETS 10 FREE POINTS.** *This is to account for any missed assignments that may inevitably occur in such a crammed quarter. The grade breakdown will be as follows.*

A = 158-170	*A- = 153-158*
B+ = 148-152	*B = 141-147*
B- = 136-140	*C+ = 131-135*
C = 124-130	*C- = 119-123*
D+ = 114-118	*D = 107-114*
D- = 102-106	*F = Anything <102*

Course Materials

Required Materials

- *We will not be following any textbook. A few reference texts are included in Canvas as PDF's under Files.*
- *There is no homework service that will be used,* **but you will need to submit PDF's of your homework and submit it on Gradescope.**
- *If you handwrite your homework, it is your responsibility to make sure it is legible and neat. If we cannot read what you wrote, you will get a zero for that part.*
- *I highly recommend taking this time to learn Latex and typing up your HW. With this in mind, I will post some source code each week related to that week's assignments.*
- *If you have never written any math in Latex before, I suggest creating a free account at overleaf.com*

Course Schedule / Due Dates

Week	Topic	Due Dates
Week 1	*Monday 6/20:*	*Mini HW 1 due Thursday 6/23*
	Holiday no class!!	
	Wednesday 6/22:	
	Fields and Vector spaces	

	Friday 6/24	
	Subspaces, LI and spanning	
Week 2	*Monday 6/27:*	*HW 1 due Tuesday 6/28*
	Linear transformations	*Mini HW 2 due Tuesday 6/28*
	Wednesday 6/29:	*Mini HW 3 due Thursday 6/30*
	Direct Sum and Quotient Space	
	Friday 7/1:	
	Dual Space and Double Dual	
Week 3	*Monday 7/4:*	*HW 2 due Tuesday 7/5*
	No class! Holiday	*Glossary Check Wednesday 7/6*
	Wednesday 7/6:	*Mini HW 4 due Thursday 7/7*
	Tensor Products	
	Friday 7/8:	
	Tensor Products (cont)	
Week 4	*Monday 7/11:*	*HW 3 due Tuesday 7/12*
	Complexification	*Mini HW 5 due Tuesday 7/12*
	Wednesday 7/13:	*Mini HW 6 due Thursday 7/14*
	Alternating Products	
	Friday 7/15:	
	Determinant and Wedge Product	
Week 5	*Monday 7/18:*	*HW 4 due Monday 7/18*
	Inner Product Spaces and Adjoint	*Final Problem Set released on Monday 7/18 and due on Friday 7/22*
	Wednesday 7/20:	
	Normal, Unitary and Self Adjoint Operators	*Submit Glossary Friday 7/22*
	Friday 7/22:	
	tbd	

Additional Information and Resources

ACCESSIBILITY:

UC Santa Cruz is committed to creating an academic environment that supports its diverse student body. If you are a student with a disability who requires accommodations to achieve equal access in this course, please submit your Accommodation Authorization Letter from the Disability Resource Center (DRC) to me privately during my office hours or by email, as soon as possible so I can assure you have the support you deserve/are entitled to. We can discuss ways we can ensure your full participation in the course. I encourage all students who may benefit from learning more about DRC services to contact the DRC by phone at 831-459-2089 or by email at drc@ucsc.edu.

Operations continue via remote appointments. If you have questions or concerns about exam accommodations or any other disability-related matter, email the DRC Schedulers at drc@ucsc.edu for an appointment.

RELIGIOUS ACCOMMODATION:

UC Santa Cruz welcomes diversity of religious beliefs and practices, recognizing the contributions differing experiences and viewpoints can bring to the community. There may be times when an academic requirement conflicts with religious observances and practices. If that happens, students may request the reasonable accommodation for religious practices. The instructor will review the situation in an effort to provide a reasonable accommodation without penalty. You should discuss the conflict and your requested accommodation with your instructor early in the term.

TITLE IX/CARE ADVISORY:

The Title IX Office is committed to fostering a campus climate in which members of our community are protected from all forms of sex discrimination, including sexual harassment, sexual violence, and gender-based harassment and discrimination. Title IX is a neutral office committed to safety, fairness, trauma-informed practices, and due process.

Title IX prohibits gender discrimination, including sexual harassment, domestic and dating violence, sexual assault, and stalking. If you have experienced sexual harassment or sexual violence, you can receive confidential support and advocacy at the Campus Advocacy Resources & Education (CARE) Office by calling (831) 502-2273. In addition, Counseling & Psychological Services (CAPS) can provide confidential, counseling support, (831) 459-2628. You can also report gender discrimination directly to the University's Title IX Office, (831) 459-2462. Reports to law enforcement can be made to UCPD, (831) 459-2231 ext. 1. For emergencies call 911.

Support/Help Options *(with hyperlinks)***:**
[Tutoring and Learning Support](#)
[Sexual Violence Prevention & Response (SAFE) website](#)
[Hate/Bias Report Form](#)
[Counseling and Psychological Services](#)
[On-Campus Emergency Contacts](#)