Welcome to the Summer '23 (second session) manifestation of MATH 117 at UC Santa Cruz! This syllabus contains important information about the course. If you are a student, I highly recommend you read the document in it's entirety. Additional information about the course can be found on my webpage.

Basic Course Information

Instructor: Jadyn V. Breland[1] (Pronouns: he/him/his.)   **Office Hours:** Tu/Th 4:00PM - 5:00PM

Email: jbreland@ucsc.edu (§Guidelines)   **Personal Webpage:** http://jadynbreland.com

Prerequisites: MATH 21 or AMS 10 and either MATH 100 or CMPS 101. Prerequisites waived for non-UCSC students.

Credits/Workload: This is a five-week course worth 5 credits towards your degree. According to UCSC, an ordinary ten-week course has a workload of approximately 3 hours per credit. Since this is a compressed version of a ten-week course, you should expect a workload of (at most) 30 hours per week, including time spent in lectures. **I highly recommend that you spend an average of least 20 hours per week on this course.**

Textbook: The lectures will not follow any particular textbook. Therefore, there is no required textbook for the course.

Zoom Meetings: We will have synchronous Zoom meetings every Monday, Wednesday, & Friday from 1:00PM - 3:30PM. **The Zoom room information will be posted on Canvas**. The first meeting is on July 31st, 2023 and the last meeting is on September 1st, 2023. **Lectures will not be recorded**. Detailed handwritten lecture notes from each meeting will be posted promptly on the course webpage.

Course Webpage: The course web page is located at https://people.ucsc.edu/~jbreland/teaching/SM23_MATH117.html. All course information will be posted there, including lecture notes, assignments, and exams.

TA: Unfortunately, we no longer have a TA.[2]

LSS Small Group Tutoring: Our class is supported by LSS via small-group tutoring. Our tutor is Morea Lee. All sessions are held via Zoom. Morea's tutoring schedule is as follows:

- Sunday 2:00pm - 3:00pm

- Wednesday 4:30pm - 5:30pm

- Thursday 4:30pm - 5:30pm

You can sign-up online at lss.ucsc.edu by scrolling down to the LSS Tutor Hub or hitting the "Sign Up for Tutoring!" drop-down at the top. If you have any questions or if these times don't work for you, please don't hesitate to reach out to Morea via email at moalee@ucsc.edu.

Canvas: The Canvas webpage will be used for hosting grades, Zoom links, and administering the exams.

Zulip: We will be using Zulip as a discussion forum for the course. Our forum is located at the following url: https://math117.zulipchat.com. You will receive an invitation to join via your .edu email. Zulip is similar to Discord, except it has far better LaTeX integration which makes it easy to type mathematics. The purpose of the forum is to facilitate class discussion.   (§Zulip Guidelines)

Accessibility: I am strongly committed to making my course as accessible as possible. If you encounter materials that are not accessible to you, or experience a barrier to your participation, please bring this to my attention and I will gladly work with you to ensure accessibility. I am also happy to honor any accommodations letters from the Disability Resource Center (DRC) that you would like to confidentially bring to my attention.

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[1] Please address me by my first name.
[2] Updated: 8/11/23

Course Content: This is a proof-based course in advanced linear algebra. Our ambitious goal is to cover the following topics:

1. Vector spaces: groups; fields; vector spaces; subspaces, linear combinations; linear independence, bases, dimension; coordinates; axiom of choice, existence of bases; free vector spaces.

2. Linear Maps: linear maps; image and kernel; isomorphisms; behavior of linear maps on bases; spaces of linear maps, algebras of linear operators; matrix representations of linear maps, change of basis, similarity; direct sums; quotients; first isomorphism theorem, rank-nullity theorem; systems of linear equations.

3. Duality and multilinear algebra: linear functionals, dual space, dual bases, naturality of the double dual, dual transformation; multilinear forms, tensor products; alternating multilinear forms, determinants.

4. Canonical forms: eigenvalues and eigenvectors; the characteristic polynomial; the minimal polynomial; diagonalizable operators; invariant subspaces; the Jordan canonical form.

5. Orthogonality: inner product spaces; orthogonality; linear functionals on inner product spaces; the adjoint; self-adjoint operators; unitary and orthogonal operators; projections; the spectral theorem for self-adjoint operators.

Learning Outcomes: Upon successful completion of the course, students will be able to do the following within the topic of linear algebra:

1. Recall the basic definitions, theorems, and techniques.

2. Distinguish truth from falsehood and create examples and counterexamples.

3. Competently and confidently solve a variety of problems.

4. Communicate mathematical ideas and arguments in clear, convincing, and concise language.

5. Construct concise and correct proofs.

Additionally, successful students will be able to typeset mathematics using the LaTeX mark-up language.

Assessment

Assessment Distribution: Your *score* is a nonnegative real number calculated as the weighted average of the following assessments.

- DAILY ASSIGNMENTS (20%)

    There will be approximately 13 (low-stakes) daily homework assignments. Daily assignments will be assigned shortly after each class meeting and will be due by 11:59PM the next day. Daily assignments will generally be short, consisting of a few exercises related to the days topics. In general, the exercises will be computational in nature. Daily assignments are graded on a Pass/No-Pass basis. You will either receive 1 point (a "Pass") or 0 points (a "No Pass"). You will receive 1 point if you:

    1. submit your daily assignment on time;
    2. follow the submission guidelines (see Submitting Assignments below); and
    3. demonstrate a good-faith effort to solve all parts of the assignment correctly.

    Otherwise, you will receive 0 points. Your lowest two scores will be dropped when calculating your final grade.

- WEEKLY ASSIGNMENTS (40%)

  There will be 5 weekly homework assignments. Weekly assignments will be released at the beginning of each week and will be due the following Sunday at 11:59PM. Weekly assignments will consist of several problems that require you to synthesize ideas we encountered in class. In general, the problems will be proof-based. These assignments will require more time and deeper thought compared to the Daily Assignments. Each problem on each assignment will be worth 4 points. Your score for each problem is determined by the grader using the weekly assignment rubric posted on the course webpage. You are required to typeset your weekly assignments using LaTeX.   (§Weekly Assignment Guidelines)

- MIDTERM (20%)

  There will be 1 non-proctored, timed midterm exam. The exam will be administered via the Canvas "Quiz" tool on August 18th at 1:00PM. You will have 120 minutes to take the exam and 30 minutes to scan and submit your work. Students who have a legitimate conflict with the exam time-slot must contact me by Friday August 7th to make alternative arrangements. **Read the detailed exam protocol before the exam begins.**   (§Exam Protocol)

- FINAL EXAM (20%)

  There will be 1 non-proctored, timed final exam. The final exam is not cumulative - it will primarily focus on topics not covered on the midterm. The exam will be administered via the Canvas "Quiz" tool on September 1st at 1:00PM. You will have 120 minutes to complete the exam, and 30 minutes to scan and submit your work. Students who have a legitimate conflict with the exam time-slot must contact me by Friday August 7th to make alternative arrangements. **Read the detailed exam protocol before the exam begins.**   (§Exam Protocol)

LaTeX: You are required to typeset your weekly assignments using the LaTeX markup language. I have posted a quick LaTeX guide on my website to get you started. It is not difficult to learn LaTeX, although there will be a small learning curve in the beginning. The easiest way to get started is on overleaf.com. I will always provide templates for the assignments that you can compile with Overleaf.

Submitting Assignments: All daily and weekly assignments must be submitted via gradescope. When you submit your files, you will be prompted to select, for each specified problem or activity, the pages on which the associated work/solution are located. You are required to accurately identify the pages associated to each problem. If you fail to do so, you may receive a "No Pass" (if it is a daily assignment) or you may lose credit for each problem for which the pages are not correctly identified (if it is a weekly assignment).

Weekly assignments must be written using LaTeX. Handwritten weekly assignments will receive a 20% deduction, unless you have received prior authorization from me. All other assignments can be handwritten, including exams. It is your responsibility to make sure your handwritten submissions are legible and easy to read. If you submit work that is difficult or impossible to read, you will not receive credit for it, and you will not be allowed to resubmit. There are numerous free smart phone apps that allow you scan your work and save it as a `.pdf`.

Exam Protocol: Exams are timed tests. They will be administered using the Canvas quiz tool. Please carefully read the following BEFORE the exam begins:

- **Midterm:** The exam will become available at 1:00PM on 8/18/23 via the Canvas quiz tool. You will have 120 minutes to complete the exam and 30 minutes to scan and submit your work. The exam will become unavailable and submissions will no longer be accepted at 3:30PM on 8/18, regardless of what time you begin.

- **Final:** The exam will become available at 1:00PM on 9/1/23 via the Canvas quiz tool. You will have 120 minutes to complete the exam and 30 minutes to scan and submit your work. The exam will become unavailable and submissions will no longer be accepted at 3:30PM on 9/1, regardless of what time you begin.

- **Submitting Exams:** Accurately label each problem with the number from the exam. Scan your work and save it as a .pdf. You will only be allowed to submit **one** .pdf file. You can use CombinePDF to combine files into one .pdf. Ensure that your files are easy to read.

- If you fail to take an exam, you will receive a zero. Once you have started an exam, I will only accept work submitted through the Canvas quiz, during the allotted time. Therefore, you should allow yourself adequate time (30 minutes) to scan and submit your files.

- Do not discuss the exam with anyone, including your peers, until after the due date. **Any student suspected of violating this guideline will, at a minimum, receive a zero on the exam.**

- You may freely consult my lecture notes during the exam. However, **you are forbidden from consulting any other resources, including, but not limited to, other textbooks, the internet, Chegg, and math.stackexchange. Any student suspected of violating this guideline will, at a minimum, receive a zero on the exam.**

Late Work Policy: I will not, under any circumstance, accept late submissions for daily assignments. Late submissions of weekly assignments and exams are only accepted, at my sole discretion, in extreme circumstances, such as in the case of a medical emergency. Extreme circumstances must be brought to my attention as soon as possible and must be adequately documented.

Letter Grades: Your final letter grade depends on your score. Final letter grades are assigned according to the following score ranges:

A+	96-100	B+	86-89	C+	76-79	D+	66-69	F	0-59
A	93-95	B	83-85	C	73-75	D	63-65		
A-	90-92	B-	80-82	C-	70-72	D-	60-62		

Score ranges may be adjusted (to your advantage) according to class performance. Scores falling in between two ranges will be rounded up. For example, according to the ranges above a final score of 75.1 will earn the letter grade C+ (rounded up), whereas a final score of 74.9 will earn the letter grade C (no rounding).

P/NP Grading: A passing grade (P) will be awarded if your score would earn a letter grade of C or higher. Otherwise, you will not receive a passing grade (NP). **Warning**: a score earning the letter grade of C- is NOT passing, contrary to popular belief.

Guidelines

Weekly Assignments (See also: Weekly Assignment Webpage)

- ▷ Collaboration is allowed and *encouraged*.
- ▷ You are **NOT** allowed to copy someone else's work.
- ▷ You are **NOT** allowed to let someone else copy your work.
- ▷ This is a writing assignment. I expect your submissions to be well-written, neat, and organized. Do not turn in rough drafts or scratch work. What you turn in should be the "polished" version of potentially several drafts. Your assignment must be written using LaTeX.
- ▷ Pay close attention to the presentation and clarity of your reasoning in your answers. The ability to communicate effectively is just as important as solving a problem correctly.
- ▷ You may freely consult my leture notes. However, you are forbidden from consulting any other resources, including, but not limited to, other textbooks, the internet, Chegg, and math.stackexchange.

Communication

▷ Course announcements will be made primarily via Zulip and NOT canvas. (§Zulip Guidelines)

▷ If you have a question that is math-related, please post it on Zulip.

▷ If you have a question that is of a sensitive or personal nature, please send me an email: `jbreland@ucsc.edu`. Include "MATH 117" in the subject line.

▷ Please make sure you give me as much information as you possibly can about the subject you intend to discuss when you contact me.

▷ **Never hesitate to reach out, I always want to hear from you.**

Zulip

▷ You will receive an invitation via email to join Zulip. Please sign up with your first and last name as your username.

▷ The Zulip forum is organized into streams. Posts in each stream can be organized by topic, e.g. "Naturality of the double dual?" or "How the heck do I compute the Jordan canonical form of this matrix????".

▷ Zulip has basic in-line LaTeX built in, which makes it easy to typeset mathematical formulas. Whenever typing mathematical expressions, please use LaTeX by surrounding your code with the symbol "$$" on each side.

▷ Use Zulip to discuss anything and everything course related, especially: homework problems.

▷ Always be kind, courteous, and respectful.

> I RESERVE THE RIGHT TO CHANGE ANY PARTICULAR PART OF THE SYLLABUS ABOVE.

> YOU WILL BE PROMPTLY NOTIFIED OF ANY CHANGES VIA ZULIP AND THE COURSE WEB PAGE.

Other Important Information

Summer Session Calendar:
https://summer.ucsc.edu/studentlife/index.html

Mathematics Department's Enrollment Info:
https://www.math.ucsc.edu/courses/enrollment-info.html

DRC Remote Accommodations: 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 appointment, preferably within the first two weeks of the quarter. At this time, I would also like us to 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`.

CAPS (Counseling and Psychological Services): This is a stressful time, so if you are in distress, managing heightened stress and anxiety, or want to get more support and a counselor's perspective on something you're going through, CAPS provides a variety of services for your needs, please visit their website for more information `https://caps.ucsc.edu`.

Academic Integrity: Academic integrity is the cornerstone of a university education. Academic dishonesty diminishes the university as an institution and all members of the university community. It tarnishes the value of a UCSC degree. All members of the UCSC community have an explicit responsibility to foster an environment of trust, honesty, fairness, respect, and responsibility. All members of the university community are expected to present as their original work only that which is truly their own. All members of the community are expected to report observed instances of cheating, plagiarism, and other forms of academic dishonesty in order to ensure that the integrity of scholarship is valued and preserved at UCSC. For the full policy and disciplinary procedures on academic dishonesty, students and instructors should refer to the Academic Integrity page at the Division of Undergraduate Education.

Title IX: 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.