

SYLLABUS

MATH 4378 / MATH 6309 ADVANCED LINEAR ALGEBRA II SPRING 2024

Instructor: Alexander Mamonov
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Class web page: <https://www.math.uh.edu/~mamonov/MATH4378-S2024/index.html>
Classroom: CBB 106
Class hours: TuTh 11:30AM - 1:00PM
Class numbers: 11141 (for 4378), 11643 (for 6309)

The information contained in this class syllabus is subject to change without notice. Students are expected to be aware of any additional course policies presented by the instructor during the course.

All class policies, announcements, reviews, homework assignments, solutions, and grades are posted on Canvas: <https://canvas.uh.edu/>

Prerequisite: MATH 4377 or MATH 6308.

Textbook: S.H. Friedberg, A.J. Insel, L.E. Spence, *Linear Algebra*, 5th Edition, Pearson.

Objectives: Upon completion of this course, the students are expected to gain the understanding of the fundamental concepts of linear algebra including eigenvalues, eigenvectors and diagonalizability, inner products and orthogonalization, linear operator adjoints, unitary operators and orthogonal projections, Singular Value Decomposition and the pseudoinverse.

Assignments, Bi-weekly homework, two in-class midterm exams and a final exam will be given.
Exams and The course grade is determined by the homework, midterm exams and the final exam
Grading: with each having the following weights:

Homework	1/5
Midterm 1	1/5
Midterm 2	1/5
Final Exam	2/5

Specifically, at the end of the semester, the following (percentage) Weighted Class Total (WCT) quantity is computed

$$\text{WCT} = 0.2 \cdot \text{HW} + 0.2 \cdot \text{ME1} + 0.2 \cdot \text{ME2} + 0.4 \cdot \text{FE},$$

where HW is the average of all homework grades excluding the lowest grade, ME1 and ME2 are the first and second midterm exam grades, respectively, and FE is the final exam grade. Any missing assignment or exam grades are set to zero.

WCT is converted to a Letter Grade on a sliding scale that is determined at the very end of the semester after the Final Exam is graded. The sliding scale is typically (but not necessarily) set so that the average value of WCT taken over the whole class corresponds to a Letter Grade between B- and C+.

Topics: The following topics are covered (section numbering as in the textbook, the list is subject to change)

- 5.1 Eigenvalues and Eigenvectors
- 5.2 Diagonalizability
- 5.4 Invariant Subspaces and the Cayley-Hamilton Theorem
- 6.1 Inner Products and Norms
- 6.2 The Gram-Schmidt Orthogonalization Process and Orthogonal Complements
- 6.3 The Adjoint of a Linear Operator
- 6.4 Normal and Self-Adjoint Operators
- 6.5 Unitary and Orthogonal Operators and Their Matrices
- 6.6 Orthogonal Projections and the Spectral Theorem
- 6.7 The Singular Value Decomposition and the Pseudoinverse

Academic Honesty Policy

High ethical standards are critical to the integrity of any institution, and bear directly on the ultimate value of conferred degrees. All UH community members are expected to contribute to an atmosphere of the highest possible ethical standards. Maintaining such an atmosphere requires that any instances of academic dishonesty be recognized and addressed. The [UH Academic Honesty Policy](#) is designed to handle those instances with fairness to all parties involved: the students, the instructors, and the University itself. All students and faculty of the University of Houston are responsible for being familiar with this policy.

Reasonable Academic Adjustments/Auxiliary Aids

The University of Houston is committed to providing an academic environment and educational programs that are accessible for its students. Any student with a disability who is experiencing barriers to learning, assessment or participation is encouraged to contact the Justin Dart, Jr. Student Accessibility Center (Dart Center) to learn more about academic accommodations and support that may be available to them. Students seeking academic accommodations will need to register with the Dart Center as soon as possible to ensure timely implementation of approved accommodations. Please contact the Dart Center by visiting the website: <https://uh.edu/accessibility/> calling (713) 743-5400, or emailing jdcenter@Central.UH.EDU.

Excused Absence Policy

Regular class attendance, participation, and engagement in coursework are important contributors to student success. Absences may be excused as provided in the University of Houston [Undergraduate Excused Absence Policy](#) or [Graduate Excused Absence Policy](#) for reasons including: medical illness of

student or close relative, death of a close family member, legal or government proceeding that a student is obligated to attend, recognized professional and educational activities where the student is presenting, and University-sponsored activity or athletic competition. Under these policies, students with excused absences will be provided with an opportunity to make up any quiz, exam or other work that contributes to the course grade or a satisfactory alternative. Please read the full policy for details regarding reasons for excused absences, the approval process, and extended absences. Additional policies address absences related to [military service](#), [religious holy days](#), [pregnancy and related conditions](#), and [disability](#).

Mental Health and Wellness Resources

The University of Houston has a number of resources to support students' mental health and overall wellness, including [CoogsCARE](#) and the [UH Go App](#). UH [Counseling and Psychological Services \(CAPS\)](#) offers 24/7 mental health support for all students, addressing various concerns like stress, college adjustment and sadness. CAPS provides individual and couples counseling, group therapy, workshops and connections to other support services on and off-campus. For assistance visit uh.edu/caps, call 713-743-5454, or visit a [Let's Talk](#) location in-person or virtually. [Let's Talk](#) are daily, informal confidential consultations with CAPS therapists where no appointment or paperwork is needed.

The [Student Health Center](#) offers a Psychiatry Clinic for enrolled UH students. Call 713-743-5149 during clinic hours, Monday through Friday 8 a.m. - 4:30 p.m. to schedule an appointment.

The [A.D. Bruce Religion Center](#) offers spiritual support and a variety of programs centered on well-being.

Need support now?

If you or someone you know is struggling or in crisis, help is available. Call CAPS crisis support 24/7 at 713-743-5454, or the National Suicide and Crisis Lifeline: call or text [988](tel:988), or chat 988lifeline.org.

Title IX/Sexual Misconduct

Per the UHS Sexual Misconduct Policy, your instructor is a "responsible employee" for reporting purposes under Title IX regulations and state law and must report incidents of sexual misconduct (sexual harassment, non-consensual sexual contact, sexual assault, sexual exploitation, sexual intimidation, intimate partner violence, or stalking) about which they become aware to the Title IX office. Please know there are places on campus where you can make a report in confidence. You can find more information about resources on the Title IX website at <https://uh.edu/equal-opportunity/title-ix-sexual-misconduct/resources/>

Recording of Class

Students may not record all or part of class, livestream all or part of class, or make/distribute screen captures, without advanced written consent of the instructor. If you have or think you may have a disability such that you need to record class-related activities, please contact the [Justin Dart, Jr. Student Accessibility Center](#). If you have an accommodation to record class-related activities, those recordings may not be shared with any other student, whether in this course or not, or with any other person or on any other platform. Classes may be recorded by the instructor. Students may use instructor's recordings

for their own studying and notetaking. Instructor's recordings are not authorized to be shared with anyone without the prior written approval of the instructor. Failure to comply with requirements regarding recordings will result in a disciplinary referral to the Dean of Students Office and may result in disciplinary action.

UH Email

Email communications related to this course will be sent to your CougarNet account. To access this email, [login](#) to your Microsoft 365 account with your CougarNet credentials.