



**COURSE TITLE/SECTION: MATH 2318-01 (13558) Linear Algebra (in-person)**

**TIME: MoWe 1:00PM - 2:30PM**

**LOCATION: GAR G201**

**FACULTY: ALEXANDER MAMONOV**

**OFFICE HOURS: PGH 690 MoWe 5:30PM-6:30PM**

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**I. Course: MATH 2318-01 (13558) Linear Algebra**

**A. Catalog Description:** Solutions of systems of linear equations, matrices, vector spaces, linear transformations, similarity, eigenvalues and eigenvectors.

**B. Prerequisites:** Credit for or concurrent enrollment in MATH 2414.

**II. Course Objectives:** Upon completion of this course, the students are expected to gain the understanding of the fundamental concepts of linear algebra including systems of linear equations and their solution, linear dependence and independence, linear transformations, matrices and matrix operations, matrix inverses, subspaces, dimension and rank, determinants, vector spaces, subspaces, bases, eigenvectors and eigenvalues, matrix diagonalization, inner products and orthogonality, projections, Gram-Schmidt process, least squares, etc.

**III. Course Content:** The following topics are covered (section numbering as in the textbook, see Section V). The list below is subject to change.

Chapter 1: Linear Equations in Linear Algebra

- 1.1 Systems of Linear Equations
- 1.2 Row Reduction and Echelon Forms
- 1.3 Vector Equations
- 1.4 The Matrix Equation  $Ax=b$
- 1.5 Solutions Sets of Linear Systems
- 1.7 Linear Independence
- 1.8 Introduction to Linear Transformations
- 1.9 The Matrix of a Linear Transformation

Chapter 2: Matrix Algebra

- 2.1 Matrix Operations
- 2.2 The Inverse of a Matrix
- 2.3 Characterizations of Invertible Matrices
- 2.4 Partitioned Matrices
- 2.8 Subspaces of  $\mathbb{R}^n$
- 2.9 Dimension and Rank

Chapter 3: Determinants  
3.2 Properties of Determinants  
3.3 Cramer's Rule, Volume, and Linear Transformations

Chapter 4: Vector Spaces  
4.1 Vector Spaces and Subspaces  
4.2 Null Spaces, Column Spaces, and Linear Transformations  
4.3 Linearly Independent Sets; Bases  
4.5 The Dimension of a Vector Space  
4.6 Rank

Chapter 5: Eigenvalues and Eigenvectors  
5.1 Eigenvectors and Eigenvalues  
5.2 The Characteristic Equation  
5.3 Diagonalization  
5.4 Eigenvectors and Linear Transformations

Chapter 6: Orthogonality and Symmetric Matrices  
6.1 Inner Product, Length, and Orthogonality  
6.3 Orthogonality and Projections  
6.4 The Gram-Schmidt Process  
6.5 Least-Squares Problems

**IV. Course Structure:**  
**All class policies, announcements, reviews, homework assignments, solutions, and grades** are posted on **Canvas**: <https://canvas.uh.edu/>  
Web page: <https://www.math.uh.edu/~mamonov/MATH2318-F2024/index.html>

**V. Textbook:**  
David C. Lay, Steven R. Lay and Judi J. McDonald,  
*Linear Algebra and Its Applications*, 5th Edition, Pearson.

**VI. Course Requirements**

- A. Homework:** Weekly homework is assigned on Canvas. Detailed homework policies and instructions are posted on Canvas.
- B. Exams:** Two in-class midterm exams and a final exam are given. Exam policies, instructions and schedules are posted on Canvas.

**VII. Evaluation and Grading:** The course grade is determined by the homework, midterm exams and the final exam with each having the following weights:

**20% Homework**

**20% Midterm Exam 1**

**20% Midterm Exam 2**

**40% Final Exam**

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 two lowest grades, 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.

**Policy on grades of I (Incomplete):** The grade of "I" (Incomplete) is a conditional and temporary grade given when a student, for reasons beyond his or her control, has not completed a relatively small portion of all requirements. Sufficiently serious, documented situations include illness, death in the family, etc.

**VIII. Tutoring**

Students can take advantage of tutoring through the following:

➤ [LAUNCH](#)

At LAUNCH, students can:

- Drop in for individual **Peer Tutoring** on over 100 different courses—no appointment necessary! LAUNCH is located in Cougar Village 1, room N109.
- Attend a [Success Workshop](#)
- Set up an individual appointment with an [Academic Coaching](#): 713-743-5411
- [Scholar Enrichment Program](#) (SEP) provides in person and online/remote tutoring services
- [KNACK Tutoring](#) is online peer tutoring for various courses.

- The Mathematics Department runs the **Mathematics Undergraduate Student Lounge (MUSL)** at **Fleming Rm 11** where tutoring is available for certain courses. Visit MUSL web page for more details and tutoring schedule: <https://www.uh.edu/nsm/math/undergraduate/academic-assistance/Support-and-Tutoring/Departmental%20Tutoring/>

### **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](mailto:jdcenter@Central.UH.EDU).

### **NSM Code of Honor** (<https://uh.edu/nsm/students/undergraduate/code-of-honor/>)

The College of Natural Sciences and Mathematics (NSM) expects its students and faculty to work together to promote a culture and environment for honorable completion of academic work. As members of NSM, we must all demonstrate personal and academic integrity, honesty and mutual respect for one another. This requires that we all uphold the [University of Houston Academic Honesty Policy](#) and [Codes of Conduct](#), which apply in all academic settings, including the online environment.

As members of this science and math community, we aim to strengthen and improve the quality of life for our local communities and society as a whole, so it is important that we all demonstrate the highest ethical standards, which are critical to the integrity of the institution.

### **Academic Honesty**

It is each student's responsibility to read and understand the [Academic Honesty Policy](#). There will be no tolerance towards academic dishonesty, and cheating can lead to report of a violation of the Academic Honesty policy to the UH Office of Undergraduate Academic Affairs. 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 Process](#) 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.

### **UH Honor Code**

Students may be asked to sign an honor code statement as part of their submission of any graded work including but not limited to projects, quizzes, and exams: *"I understand and agree to abide by the provisions in the [University of Houston Undergraduate Academic Honesty Policy](#). I understand that academic honesty is taken very seriously and, in the cases of violations, penalties may include suspension or expulsion from the University of Houston."*

**NOTE:** The materials provided by the instructor in this course are for the use of the students enrolled in the course only. Copyrighted course materials may not be further disseminated without instructor permission. This includes sharing content to commercial course material suppliers such as Course Hero or Chegg. Students are also prohibited from sharing materials derived from the instructor's content (e.g., a student's lecture notes).

### **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](#) and [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](http://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.

### **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](#), or chat [988lifeline.org](http://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/>.

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.

The [Center for Student Advocacy and Community \(CSAC\)](#) is where you can go if you need help but don't know where to start. CSAC is a “home away from home” and serves as a [resource hub](#) to help you get the resources needed to support academic and personal success. Through our [Cougar Cupboard](#), all students can get up to 30 lbs of FREE groceries a week. Additionally, we provide 1:1 appointments to get you connected to on- and off-campus resources related to essential needs, safety and advocacy, and more. The [Cougar Closet](#) is a registered student organization advised by our office and offers free clothes to students so that all Coogs can feel good in their fit. We also host a series of cultural and community-based events that fosters social connection and helps the cougar community come closer together. Visit the CSAC homepage or follow us on Instagram: @uh\_CSAC and @uhcupbrd. YOU belong here.

### **Women and Gender Resource Center**

The mission of the [WGRC](#) is to advance the University of Houston and promote the success of all students, faculty, and staff through educating, empowering, and supporting the UH community. The WGRC suite is open to you. Stop by the office for a study space, to take a break, grab a snack, or check out one of the WGRC programs or resources. Stop by Student Center South room B12 (Basement floor near Starbucks and down the hall from Creation Station) from 9 am to 5 pm Monday through Friday.

**Disclaimer:** This syllabus is subject to change at any time at the discretion of the instructor. Notice of such changes will be announced as quickly as possible in class and on Canvas.