

Math 3330-004

Introduction to Matrices and Linear Algebra

Spring 2018

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Office Hours: Monday and Friday 1:00—2:00 and 3:00—4:00 pm or by appointment
Section Information: Math 3330-004
Time and Place of Class Meetings: Mo/We 4:00PM - 5:20PM in PKH 102

Description of Course Content: Solving systems of linear equations, matrix operations, determinants, vector spaces, linear transformation, orthogonality, Gram-Schmidt process, projections, and eigenvalues and eigenvector.

- 1.1 Introduction to Linear Systems
- 1.2 Matrices, Vectors, and Gauss–Jordan Elimination
- 1.3 On the Solutions of Linear Systems; Matrix Algebra
- 2.1 Introduction to Linear Transformations and Their Inverses
- 2.2 Linear Transformations in Geometry
- 2.3 Matrix Products
- 2.4 The Inverse of a Linear Transformation
- 3.1 Image and Kernel of a Linear Transformation
- 3.2 Subspaces of \mathbb{R}^n ; Bases and Linear Independence
- 3.3 The Dimension of a Subspace of \mathbb{R}^n
- 3.4 Coordinates
- 4.1 Introduction to Linear Spaces
- 5.1 Orthogonal Projections and Orthonormal Bases
- 5.2 Gram–Schmidt Process and QR Factorization
- 5.3 Orthogonal Transformations and Orthogonal Matrices
- 5.4 Least Squares and Data Fitting
- 6.1 Introduction to Determinants
- 6.2 Properties of the Determinant
- 6.3 Geometrical Interpretations of the Determinant; Cramer’s Rule
- 7.1 Diagonalization
- 7.2 Finding the Eigenvalues of a Matrix
- 7.3 Finding the Eigenvectors of a Matrix
- 8.1 Symmetric Matrices 385

Student Learning Outcomes: Solve systems of linear equations without the aid of a calculator and interpret the results geometrically; give the geometric meaning of linear transformations and express them in different coordinate systems; calculate the kernel, range, determinant, eigenvectors and eigenvalues of a linear map; identify a basis of a vector space, and solve problems involving orthogonal projection and orthonormal bases. Additionally, students should be able to justify and explain their steps in problem solving, students should be able to construct correct and detailed mathematical arguments to justify their claimed solutions to problems.

Required Textbooks and Other Course Materials: Linear Algebra with Applications, 5th Ed, O. Bretscher, Prentice Hall.

Descriptions of major assignments and examinations:

- **3 Unit Exams (60%):** Each exam will be 20% given during a class period and you will have 1 hour and 20 minutes to take it. Exams will be made up of questions like the assigned homework problems. Make-ups for the exam will be given only for the university approved absences, and should be discussed prior to the exam.

- One comprehensive **Final Examination (40%)**
- The homework will not be collected; it is assigned to help you learn the material and prepare for the tests. The tests will be designed to determine whether you have mastered the ideas in the homework and in the lectures. Indeed, at least half of each test will be based on homework problems. Some reading will also be assigned, due to the amount of material that we need to cover.

Attendance: To succeed in this class it is strongly recommended that you attend every class. A missed exam cannot be made up.

Grading: A = 90+; B = 80-89; C = 70-79; D = 60-69; F = 59-

Drop Policy: Students may drop or swap (adding and dropping a class concurrently) classes through self-service in MyMav from the beginning of the registration period through the late registration period. After the late registration period, students must see their academic advisor to drop a class or withdraw. Undeclared students must see an advisor in the University Advising Center. Drops can continue through a point two-thirds of the way through the term or session. It is the student's responsibility to officially withdraw if they do not plan to attend after registering. **Students will not be automatically dropped for non-attendance.** Repayment of certain types of financial aid administered through the University may be required as the result of dropping classes or withdrawing. For more information, contact the Office of Financial Aid and Scholarships (<http://www.uta.edu/aao/fao/>).

Americans with Disabilities Act: The University of Texas at Arlington is on record as being committed to both the spirit and letter of all federal equal opportunity legislation, including the *Americans with Disabilities Act (ADA)*. All instructors at UT Arlington are required by law to provide "reasonable accommodations" to students with disabilities, so as not to discriminate on the basis of that disability. Any student requiring an accommodation for this course must provide the instructor with official documentation in the form of a letter certified by the staff in the Office for Students with Disabilities, University Hall 102. Only those students who have officially documented a need for an accommodation will have their request honored. Information regarding diagnostic criteria and policies for obtaining disability-based academic accommodations can be found at www.uta.edu/disability or by calling the Office for Students with Disabilities at (817) 272-3364.

Title IX: The University of Texas at Arlington is committed to upholding U.S. Federal Law "Title IX" such that no member of the UT Arlington community shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity. For more information, visit www.uta.edu/titleIX.

Academic Integrity: Students enrolled all UT Arlington courses are expected to adhere to the UT Arlington Honor Code: *I pledge, on my honor, to uphold UT Arlington's tradition of academic integrity, a tradition that values hard work and honest effort in the pursuit of academic excellence. I promise that I will submit only work that I personally create or contribute to group collaborations, and I will appropriately reference any work from other sources. I will follow the highest standards of integrity and uphold the spirit of the Honor Code.*

UT Arlington faculty members may employ the Honor Code as they see fit in their courses, including (but not limited to) having students acknowledge the honor code as part of an examination or requiring students to incorporate the honor code into any work submitted. Per UT System *Regents' Rule* 50101, §2.2, suspected violations of university's standards for academic integrity (including the Honor Code) will be referred to the Office of Student Conduct. Violators will be disciplined in accordance with University policy, which may result in the student's suspension or expulsion from the University.

Electronic Communication: UT Arlington has adopted MavMail as its official means to communicate with students about important deadlines and events, as well as to transact university-related business regarding financial aid, tuition, grades, graduation, etc. All students are assigned a MavMail account and are responsible for checking the inbox regularly. There is no additional charge to students for using this account, which remains active even after graduation. Information about activating and using MavMail is available at <http://www.uta.edu/oit/cs/email/mavmail.php>.

Student Feedback Survey: At the end of each term, students enrolled in classes categorized as "lecture," "seminar," or "laboratory" shall be directed to complete an online Student Feedback Survey (SFS). Instructions on how to access the SFS for this course will be sent directly to each student through MavMail approximately 10 days before the end of the term. Each student's feedback enters the SFS database anonymously and is aggregated with that of other students enrolled in the course. UT Arlington's effort to solicit, gather, tabulate, and publish student feedback is required by state law; students are strongly urged to participate. For more information, visit <http://www.uta.edu/sfs>.

Final Review Week: A period of five class days prior to the first day of final examinations in the long sessions shall be designated as Final Review Week. The purpose of this week is to allow students sufficient time to prepare for final examinations. During this week, there shall be no scheduled activities such as required field trips or performances; and no

instructor shall assign any themes, research problems or exercises of similar scope that have a completion date during or following this week *unless specified in the class syllabus*. During Final Review Week, an instructor shall not give any examinations constituting 10% or more of the final grade, except makeup tests and laboratory examinations. In addition, no instructor shall give any portion of the final examination during Final Review Week. During this week, classes are held as scheduled. In addition, instructors are not required to limit content to topics that have been previously covered; they may introduce new concepts as appropriate.

Emergency Exit Procedures: Should we experience an emergency event that requires us to vacate the building, students should exit the room and move toward the nearest exit, which is located on the sides of the room. When exiting the building during an emergency, one should never take an elevator but should use the stairwells. Faculty members and instructional staff will assist students in selecting the safest route for evacuation and will make arrangements to assist individuals with disabilities.

Student Support Services: UT Arlington provides a variety of resources and programs designed to help students develop academic skills, deal with personal situations, and better understand concepts and information related to their courses. Resources include tutoring, major-based learning centers, developmental education, advising and mentoring, personal counseling, and federally funded programs. For individualized referrals, students may visit the reception desk at University College (Ransom Hall), call the Maverick Resource Hotline at 817-272-6107, send a message to resources@uta.edu, or view the information at www.uta.edu/resources.

<p>Emergency Phone Numbers: In case of an on-campus emergency, call the UT Arlington Police Department at 817-272-3003 (non-campus phone), 2-3003 (campus phone). You may also dial 911.</p>

Tentative Calendar - UTA Math 3330-004 SP17 - Mondays/Wednesdays

Week	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
1	15-Jan No Class	16-Jan	17-Jan 1.1	18-Jan	19-Jan	20-Jan	21-Jan
2	22-Jan 1.2	23-Jan	24-Jan 1.3	25-Jan	26-Jan	27-Jan	28-Jan
3	29-Jan 2.1	30-Jan	31-Jan 2.2 Census date	1-Feb	2-Feb	3-Feb	4-Feb
4	5-Feb 2.3	6-Feb	7-Feb 2.4	8-Feb	9-Feb	10-Feb	11-Feb
5	12-Feb Review	13-Feb	14-Feb Unit Exam1 (Ch 1,2)	15-Feb	16-Feb	17-Feb	18-Feb
6	19-Feb 3.1	20-Feb	21-Feb 3.2	22-Feb	23-Feb	24-Feb	25-Feb
7	26-Feb 3.3	27-Feb	28-Feb 3.4	1-Mar	2-Mar	3-Mar	4-Mar
8	5-Mar 7.1	6-Mar	7-Mar 7.2	8-Mar	9-Mar	10-Mar	11-Mar
9	12-Mar Spring Vacation	13-Mar	14-Mar Spring Vacation	15-Mar	16-Mar	17-Mar	18-Mar
10	19-Mar 7.3	20-Mar	21-Mar Review	22-Mar	23-Mar	24-Mar	25-Mar
11	26-Mar Unit Exam2 (Ch 3, 7)	27-Mar	28-Mar 5.1	29-Mar	30-Mar Last day to drop	31-Mar	1-Apr
12	2-Apr 5.2	3-Apr	4-Apr 5.3	5-Apr	6-Apr	7-Apr	8-Apr
13	9-Apr 5.4	10-Apr	11-Apr 8.1	12-Apr	13-Apr	14-Apr	15-Apr
14	16-Apr Ch5/8.1 review	17-Apr	18-Apr Unit Exam3 (Ch 5, 8.1)	19-Apr	20-Apr	21-Apr	22-Apr
15	23-Apr Topics from CH6	24-Apr	25-Apr 4.1	26-Apr	27-Apr	28-Apr	29-Apr
16	30-Apr Final Review	1-May	2-May Final Review	3-May	4-May Last day of classes	5-May	6-May
Finals	7-May	8-May	9-May	10-May	11-May Final 2:00—4:30 pm	12-May	13-May

"As the instructor for this course, I reserve the right to adjust this schedule in any way that serves the educational needs of the students enrolled in this course. —Ahmed T Ali"