Fall 2015 ENGR 2300 Sections 501 and 003
Linear Algebra for Engineers

Use of mobile phone, laptop, or tablet during lectures or tests is prohibited. * PLEASE *

Instructor Contact Information (Please use freely; you have paid for this service)
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Phone: (972) 883 3846
Room ECSN 4.608
Office hours: Tuesday and Thursday 10 – 11 am, Friday 12 – 2 pm at ECSN 4.608 or by appointment

Pre- or co-requisites: MATH 2414 or MATH 2419 Pre- or Co-Requisite
Textbook: Ron Larson, "Elementary Linear Algebra", 7th edition, Cengage Learning.
Suggested Additional Material: S. Leon, "Linear Algebra with Applications", Prentice Hall
MATLAB Video Course from Vanderbilt University at https://www.coursera.org/course/matlab

Course Description:

This course is an undergraduate level intended for sophomore year B.S. students.
The course will cover aspects of:

- Matrices, vectors, linear systems of equations, Gauss-Jordan elimination, LU (Lower and Upper triangular) factorization and rank.
- Determinant of a matrix and its applications.
- Vector spaces, linear dependence/independence, basis, and change of basis.
- Linear transformations and matrix representation.
- Similarity transformation, scalar products, orthogonality, Gram-Schmidt procedures, and QR (Orthogonal and Right triangular) factorization.
- Eigenvalues, eigenvectors, and diagonalization.
- Introduction to problem solving using MATLAB.

Student Learning Outcomes:

Students are expected to be able to:

- Solve Ax = b for linear systems by elimination
- Deduce basis and dimension for the four fundamental subspaces
- Compute determinants and understand its properties
- Compute eigenvalues and eigenvectors

Topics:

Matrices and System of Linear Equations, Determinants (Chapters 1, 2, 3)

1. Systems of linear equations: Gaussian and Gauss-Jordan elimination.
2. Matrix algebra: addition, multiplication, inverse, transpose; identity, zero, symmetric and skew-symmetric matrices.
3. Solutions of linear systems, LU factorization.
4. Determinants: definition and computation; inverse, products, and singularity.

Vector Spaces, Orthogonality (Chaps. 4, 5)

1. Matrices and vectors; Subspaces; span and spanning sets.
2. Linear independence; basis and dimension; change of basis.
3. Row and column spaces of matrices; rank and nullity; implications for linear systems.

4. Dot product and norm; orthogonality; orthogonal subspaces, projection, and bases; orthogonal matrices; least-squares problems.
5. Gram-Schmidt orthogonalization; QR factorization.

Linear transformations, Eigenvalue problems (Chaps. 6, 7)

1. Linear transformations and operators; range and kernel; matrix representations.
2. Eigenvalues and eigenvectors: definition; characteristic polynomial; product and sum of eigenvalues; similar matrices.
3. Independence of eigenvectors; multiplicity/degeneracy of eigenvalues; diagonalization.
4. Complex matrices and eigenvalues; Hermitian, unitary, and normal matrices; orthonormal basis of eigenvectors.
5. Systems of linear differential equations; introduction.

Assignment and Grading

Exams

All exams would be "closed book" format and at the testing center. Students must reserve a seat in advance and show Comet card as ID to take the exam. Center would provide everything needed, including paper, pencil, and a TI30XS class calculator.

- Exam 1 (20 %)
  - Section 2300.003, Thursday, October 1, 4:00 pm – 5:15 pm.
  - Section 2300.501, Friday, October 2, 11:00 am – 12:15 pm.
- Exam 2 (20 %) TBA
  - Section 2300.003, Thursday, November 12, 4:00 pm – 5:15 pm.
  - Section 2300.501, Friday, November 13, 11:00 am – 12:15 pm.
- Final Exam (25 %)
  - Both Sections: (finals week) Wednesday, December 16, 5:00 pm – 7:45 pm.

Homework (15 %) (Due every class and MATLAB HW due every review session)
Homework would be graded both for effort and accuracy. This means that simply by turning in the homework before solutions are posted you get 25% of the allocated credit even for late submissions.
MATLAB (5 %) Students would learn solving problems using MATLAB during part of the review sessions and do related homework problems. There shall also be a MATLAB proficiency test.
Quiz (15 %) Format for quiz is "open book", short duration and strictly timed. (During review sessions)

** Adjustments to the assignment and grading may be made anytime by the instructor.*
** No exam, homework, quiz, or project grades will be dropped.*
** No Make-ups, late submissions, extra credits etc. (Exceptions may be made for emergencies with proper documentation and prior arrangement.)*

Tentative *percent to letter grade* conversion (*I preserve the right to curve/modify this conversion)*

97-100	A+	94-96	A	90-93	A-
87-89	B+	83-86	B	80-82	B-
77-79	C+	73-76	C	70-72	C-
67-69	D+	63-66	D	60-62	D-
<60	F				

Important Dates:
Late Registration and Last Day to Add/Swap 8/31/2015
Last day to drop a class without a "W" 9/9/2015
Undergraduate Courses, WL Ends, 10/29/2015
Last day of classes: 12/9/2015

Course & Instructor Policies

Late Work
No make-up for anything can be given without prior discussion and arrangement with the instructor.
Special Consideration
No "extra credit" or "special consideration" is possible to allow specific students a chance to raise their grade. If there is an emergency personal situation that may affect performance, e.g., death in the family or serious injury, then please discuss with the instructor as soon as possible. Delay in communication would make it difficult, if not impossible to help relieve the situation. If you wait until late in the semester, I may not be able to help you. I can work with you more easily if you speak to me when the situation arises. I cannot help you if I do not know you need help.

Classroom Citizenship

- *Class attendance is mandatory.*
- In keeping with this course's professional communication mandate, students are expected to always practice communicating in a civil and professional manner.
- It is not expected of a student to enter late or exit early during the lectures. If a student needs to leave early, he/she must let the instructor know before the class.
- Accessing an electronic messaging device, such as, a mobile phone, laptop, or tablet during lectures or tests is prohibited. * PLEASE *

Technology Requirements
The course is taught using eLearning. The student should develop the habit of checking both eLearning and their UTD email often for assignments and announcements. Reliable and frequent Internet connectivity is indispensable – not having Internet access is not a valid excuse for shortcomings. Failure to check UTD or eLearning email, errors in forwarding email, and email bounced from over quota mailboxes are not acceptable. Additionally, to protect your privacy rights, email will be sent through your official UTD email address or eLearning email. If you choose, you can redirect both of these addresses to external addresses.

Classroom and Equipment Use Policies
No laptops, cell phones, pagers, or other electronic messaging services may be used in the classrooms, unless the student either (i) need a laptops for the presentation or (ii) has cleared it with me first and then only on an emergency basis.

UT Dallas Syllabus Policies and Procedures

The information contained in http://go.utdallas.edu/syllabus-policies constitutes the University's policies and procedures segment of the course syllabus.

These descriptions and timelines are subject to change at the discretion of the Instructor.