MATH 2418 Fall 2016: Linear Algebra

Tues & Thurs : 4:00pm-5:15pm at JO 3.516

Instructor Information and Office Hours

Section: MATH 2418.004 Instructor: Dr. Qingwen Hu Office: Founders Building 2.610E Office hours: Fri.: 9:00am - 11:30am Telephone: (972) 883 6599 E-mail: qingwen@utdallas.edu

Textbook and Reference

Gilbert Strang, *Introduction to Linear Algebra*, Willesley Cambridge Press, 5th Edition. ISBN: 978-0-9802327-7-6.

Problem Sessions and elearning

- Students must enroll in one of the problem sessions.
- The instructors will post important announcements through the course homepage at eLearning. The website of eLearning is https://elearning.utdallas.edu.

Materials to Cover

We will cover the following sections of the textbook.

- Chapter 1: Sections 1.1, 1.2, 1.3
- Chapter 2: Sections 2.1–2.7
- Chapter 3: Sections 3.1–3.5
- Chapter 4: Sections 4.1–4.4
- Chapter 5: Sections 5.1, 5.2
- Chapter 6: Sections 6.1–6.5
- Chapter 7: Sections 7.1, 7.2 and 7.3

Course Description and Objectives

Students will learn concepts and techniques of linear algebra. Course topics include systems of linear equations, determinants, vectors and vector spaces, linear transformations, eigenvalues and eigenvectors, and quadratic form.

- 1) Given a system of linear equations, students will be able to apply the Gauss-Jordon and Gaussian algorithms to determine all solutions, and determine whether the system is consistent and whether the solution is unique.
- 2) Given a square matrix, students will be able to accurately calculate its determinant, and deduce whether the matrix is invertible or singular using elementary row operations; Basic properties of determinants and elementary matrices; Equivalence conditions of invertibility of a square matrix.
- 3) Given definitions of a set of objects with a well-defined addition and scalar multiplication, students will be able to evaluate whether this constitutes a real vector space. If valid, students will be able to demonstrate each axiom; if invalid, students will be able to present and verify an explicit counter-example to a vector space property.
- 4) Given an explicit matrix, students will be able to determine its eigenvalues, and for each such eigenvalue students will be able to create a basis for the corresponding eigen-space; Diagonalizability of square matrices.
- 5) Given a matrix, students will be able to accurately determine basis vectors for its row space, column space, null space and their othogonal complements.
- 6) Students will be able to use the Gram-Schmidt process to construct an orthogonal basis for an inner product spaces; Students will be able to find the least squares solutions of a linear system.

Course Policy & Grading Scheme

Assignments:

• A pdf file for assignment will be posted weekly during each weekend except for exam weeks. *Assignments* will be posted at the course homepage on

https://elearning.utdallas.edu

- The assignments will be collected by the TA during the problem sessions.
- NOT all the problems will be collected, but each quiz (see below) is based on ALL the problems in the corresponding homework. Five homework problems will be collected each week.
- The lowest score will be dropped.

Remark: The point of assignments is to increase the understanding of the material not simply to prepare students for exams. The list of exercises from the book provide ample materials to practice. It is highly recommended and is a very good learning habit that one works on the exercises immediately after each lecture, without waiting for problem sessions or posting of assignments. To be prepared for exams students should work through as many of the suggested problems as one needs in order to become comfortable with the materials. Quizzes

- There are weekly quizzes taken in the problem sessions except for exam weeks.
- Each quiz is based on the homework that is due during the problem session.
- The lowest score will be dropped.

Exams

- Details of each exam will be posted to eLearning about a week before the exam.
- The final is technically cumulative but with more emphasis on what was covered after the second midterm.
- See Important Dates below for the time and dates.

Late/Missed Coursework

- There is no make-up for late or missed assignments, quizzes, or exams, unless extreme circumstances with proper documentation accepted by the instructor.
- In cases of extreme circumstances, one is expected to report to the instructor before the deadline of the coursework and resolve the problem within one week after the deadline.

Calculators

• You may use a basic or scientific calculator, but not programmable calculators with matrix and/or graphing features during quizzes and exams.

Grading scheme:

- – Two midterm exams: 20% each
 - Weekly assignments: 20%
 - Weekly quizzes: 15%
 - Final exam: 25%
- All letter grades will be assigned in accordance with the table of numeric to alphabetic conversions given below.

[90; 93) A-, [93; 97) A, [97; 100⁺] A+ [80; 83) B-, [83; 87) B, [87;90) B+ [70; 73) C-, [73; 77) C, [77;80) C+ [60; 63) D-, [63; 67) D, [67;70) D+ [0, 60) F.

Important Dates

Classes begin:	Monday, August 22, 2016
Labor Day University Closing:	Monday, September 5, 2016
Last Day to Drop a Class without a "W":	Wednesday, September 7
Midterm Exam I:	Thursday 8:30pm–9:45pm, September 29
Midterm Exam II:	Thursday 8:30pm–9:45pm, November 17
Fall Break:	Thursday Nov. 21–Sat. Nov. 23
Thanksgiving holiday University Closings:	Thursday Nov. 24–Sat. Nov. 26
Last Day of Classes Full-Term Session:	Wednesday December 7, 2016
Reading Day:	Thursday December 8, 2016
Final Exam:	Available at Galaxy after August 29, 2016

Schedule (subject to change)

The following is a tentative schedule which shows the materials to be covered every week and which contains the due days of the homework assignments and quizzes.

Week	Tuesday		Wednesday		Thursday	
Ι	8/23th	1	8/24th	2	8/25th	3
	Sec. 1.1		Problem Session		Sec. 1.2	
II	8/30th	4	8/31st	5	9/1st	6
	Sec. 1.3		HW 1 Due – Quiz 1		Sec. 2.1	
III	9/6th	7	9/7th	8	9/8th	9
	Sec. 2.2		HW 2 Due – Quiz 2		Sec. 2.3	
IV	9/13th	10	9/14th	11	9/15th	12
	Sec. 2.4		HW 3 Due – Quiz 3		Sec. 2.5	
V	9/20th	13	9/21st	14	9/22nd	15
	Sec. 2.6		HW 4 Due – Quiz 4		Sec. 2.7	
VI	9/27th	16	9/28th	17	9/29th	18
	Sec. 3.1		Exam Week - no quiz		Sec. 3.2	
VII	10/4th	19	10/5th	20	10/6th	21
	Sec. 3.3		HW 5 Due – Quiz 5		Sec. 3.4	
VIII	10/11th	22	10/12th	23	10/13th	24
	Sec. 3.5		HW 6 Due – Quiz 6		Sec. 4.1	
IX	10/18th	25	10/19st	26	10/20th	27
	Sec. 4.2		HW 7 Due – Quiz 7		Sec. 4.3	
X	10/25th	28	10/26th	29	10/27th	30
	Sec. 4.4		HW 8 Due – Quiz 8		Sec. 5.1	
XI	11/1st	$\overline{31}$	11/2nd	32	11/3rd	33
	Sec. 5.2		HW 9 Due – Quiz 9		Sec. 6.1	

VII	11/8th	34	11/9th	35	11/10th	36
	Sec. 6.2		HW 10 Due – Quiz 10		Sec. 6.3	
XIII	11/15th	37	11/16th	38	11/17th	39
	Sec. 6.4		Exam Week – no quiz		Sec. 6.5	
VIV	11/22nd	40	11/23rd	41	11/24th	42
ΛIV	Winter Break		Winter Break		Winter Break	
XV	11/29th	43	11/30th	44	12/1st	45
	Sec. 7.1		HW 11 Due – Quiz 11		Sec. 7.2	
XVI	12/6th	46	12/7th	47	12/8th	48
	Sec. 7.3		HW 12 Due – Quiz 12		No Class	
XVII	12/12th $- 12/18$ th Final Examination Week					

UT Dallas Syllabus Policies and Procedures

The information contained in the following link constitutes the University's policies and procedures segment of the course syllabus. Please go to

 ${\tt http://go.utdallas.edu/syllabus-policies}$

for these policies.

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