MATH 2418 Fall 2017: Linear Algebra

Tues & Thurs : 4:00pm-5:15pm at GR 3.302

Instructor Information and Office Hours

Section: MATH 2418.006
Instructor: Dr. Qingwen Hu
Office: Founders Building 2.610E
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Textbook and Reference

- Gilbert Strang, *Introduction to Linear Algebra*, Willesley Cambridge Press, 5th Edition. ISBN: 978-0-9802327-7-6.
- Suggested for additional reading: Howard Anton, Elementary Linear Algebra, Wiley 11th Edition (Textbook and student solutions manual are recommended)

Problem Sessions and elearning

- Students must enroll in one of the problem sessions MATH 2418.30x in addition to the lecture sections MATH 2418.00x.
- The section MATH 2418.701 is the exam section for the entire MATH 2418 students.
- 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.
Chapters 1, 2, 3, 4, 5, 6 and part of Chapter 7.

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.

7) Students will be able to find the singular value decomposition (SVD) of a given matrix.

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.

Remarks: i) 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. ii) *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.* iii) Dr. Strang prepared solutions to all problems in his book as well as valuable resources for everyone learning and doing linear algebra. Make sure you visit his website: http://math.mit.edu/∼gs/linearalgebra/ (make sure you type "∼gs" to reach the website - copy and paste of the symbol "∼" will not work)

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 21, 2017
Labor Day University Closing:	Monday, September 4, 2017
Last Day to Drop a Class without a "W":	Wednesday, September 6
Midterm Exam I:	Thursday 8:30pm–9:45pm, September 28
Midterm Exam II:	Thursday 8:30pm–9:45pm, November 2
Fall Break:	Thursday Nov. 20–Wed. Nov. 22
Thanksgiving holiday University Closings:	Thursday Nov. 23–Sun. Nov. 26
Last Day of Classes Full-Term Session:	Wednesday December 6, 2017
Reading Day:	Thursday December 8, 2017
Final Exam:	Saturday, 2:00pm – 4:45pm, December 09, 2017.

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

XII	11/7th Sec. 6.2	**34**	11/8th HW 9 Due – Quiz 9	**35**	11/9th Sec. 6.3	**36**
XIII	11/14th Sec. 6.4	**37**	11/15th HW 10 Due – Quiz 10	**38**	11/16th Sec. 6.5	**39**
XIV	11/21st Break	**40**	11/22nd Break	**41**	11/23rd Break	**42**
XV	11/28th Sec. 7.1	**43**	11/29th HW 11 Due – Quiz 11	**44**	11/30th Sec. 7.2	**45**
XVI	12/5th Sec. 7.3	**46**	12/6th HW 12 Due – Quiz 12	**47**	12/7th No Class	**48**
XVII	12/12th – 12/19th 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

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

for these policies.

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