MATH 2418 Su 2016

Section	Course Number	Location	Days	Time	Instructor
0U1	Math 2418	JSOM 2.112	Tu-Th	3pm-5.15pm	Dr. Viswanath Ramakrishna

Instructor Information

Instructor	Phone	Office	E-mail	Office Hours
Dr. Viswanath Ramakrishna	(972) 883 6873	FO 2.408C	vish@utdallas.edu	Tu-Th 2-3pm

Problem Sections

Section	**Day**	**Room**	**Time**	**TA's Name**	**Office**	**Contact**
2418.8U1	M	SLC3.102	Tu 5.30-7.45 pm	Ofori-Boateng		
2418.8U2	M	JSOM 12.202	Tu 5.30-7.45pm	Herzig		

Optional Problem Session

Starting June 1st (Wednesday), I (not the TAs) will conduct an optional problem session every Wednesday between **4 and 5pm** in SLC 2.304. The problem session is optional. It will be used to cover HWs and additional material related to the course. Though optional, it is recommended. Students in the past have found it to be important for succeeding in this and subsequent courses which use this course as a prerequisite.

Textbook

Class Lecture Notes will be provided. **They supersede all textbooks.** Recommended book Strang's *Linear Algebra*, IV edition.

Course Description

The course basics of matrix theory and vector spaces. Topics include ordinary and block matrix algebra, Gaussian elimination, determinants, eigenvalues and diagonalization, inner products, spectral theorem for normal matrices, quadratic forms and positivity, generalized inverses, singuar value decomposition, abstract vector spaces.

Student Learning Objectives

1. Students will be able to work with and manipulate matrices.
2. Students will be able to use Gaussian elimination to find the rank of a matrix and bases for its four fundamental subspaces.
3. Students will be able to calculate eigenvalues, singular values and normal forms for matrices.
4. Students will be able to study linear transformations between vector spaces via matrices.

Assignments, Quizzes and Exams

Assignments: The homework assignments will be posted weekly at `e-Learning` and they very important part of this class. All the assignments should be completed independently by the students. Each assignment is due on the due date posted on the HW. **Late assignments will NOT be accepted**.

Quizzes: From May 31st, there will be a weekly quiz during the problem session organized and marked by the teaching assistants.

Exams: There will be three common examinations for all sections. Textbooks, notes, calculators or other electronic devices won't be allowed during examination. Missed exams and assignments are assigned a zero. The midterms and final examinations have been scheduled as following:

1. I Midterm on 6/21 in the problem session you are signed up for. The examination starts at 6pm and lasts 90 minutes. It is worth **25 percent of your grade**.
2. II Midterm on 7/19 in the problem session you are signed up for. The examination starts at 6pm and lasts 90 minutes. It is worth **25 percent of your grade**.
3. III midterm will be held in class on August 4th. The exam starts at 3pm and lasts 2hours. It is worth **20 percent of your grade**.

Makeup Policy:

- In general makeups will be allowed only if there is a valid reason which is supported by official documentation. Examples of valid documentation are i) Doctors' notes; ii) Letter from employer (in case there is required work related travel, which conflicts with the day of an examination); iii) Travel documents (e.g., when a dire family related emergency travel conflicts with the day of an examination). Furthermore, the onus is on the student to intimate the instructor in a timely fashion (in particular, before the scheduled test), the possibility of having to miss the scheduled assignment.
- However, note that all such documentations will be rendered null and void, if there is any evidence that the student was, in fact, in a position to take the examination/quiz/HW at the originally scheduled time. Thus, for instance, a doctor's note advising rest on the date of an examination for this course will be considered null and void, if the student was known to have taken an examination for a different course on the same day.
- The makeup quiz/HW/examination must be taken at the earliest opportunity convenient to the instructor, once the reason for missing the scheduled examination is no longer in force.
- The makeup quiz/HW/examination cannot be guaranteed to be at the same level of difficulty as the original quiz/HW/examination which was missed.
- Failure to observe any of the above procedures will result in a score of zero being assigned for the quiz/HW/examination in question.

Grading Policy

Your grade is based on your cumulative score out of a 100 and the grading scale indicated below:
Grading Scale:

- ≥ 95 : A+; $\geq 88, < 95$: A; $\geq 82, < 88$: A-
- $\geq 78, < 82$: B+; $\geq 75; < 78$: B; $\geq 72 :< 75$: B-
- $\geq 68, < 72$: C+; $\geq 65; < 68$: C; $\geq 62 :< 65$: C-
- $\geq 58, < 62$: D+; $\geq 55; < 58$: D; $\geq 52 :< 55$: D-
- < 52: F

Your cumulative score will be calculated as follows:

1. Homeworks: 20 percent;
2. Quizzes: 10 percent;
3. I Midterm: 25 percent
4. II Midterm: 25 percent
5. Final: 20 percent

The UTD academic calendar lists important dates, such as university closings and withdrawal deadlines. Please consult that for these important dates.

Detailed Course Description

The course consists of the following topics. For all topics my lecture notes are the main source. Where possible, I hav indicated the appropriate sections in the texts by Stewart; and Marsden & Tromba. Please note that for certain topics neither of these books is adequate. But my lecture notes cover all that is needed.

1. Vectors and matrices, Linear maps between R^n and R^m, composition and matrix products, transposes, permutation matrices, block matrix algebra, quadratic forms and symmetric matrices, other matrix products, complex numbers.

   (Corresponds roughly to Ch1 of Strang)

2. Gaussian elimination, elementary matrices, using GE to find the rank of a matrix and bases for the four fundamental subspaces, LU decomposition, matrix inverses (Corresponds roughly to Ch2 of Strang)
3. Abstract vector spaces, bases, linear transformations and matrix representations, rank-nulliy theorem. (Corresponds roughly to Ch3 and 8 of Strang)
4. Determinants, Laplace expansion, Cramer's rule, Volumes. (Corresponds roughly to Ch5 of Strang)
5. Inner products, orthogonality, Gram matrices, Cauchy-Schwarz Inequality, Norms, orthogonal projections. (Corresponds roughly to Ch4 of Strang)
6. Eigenvalues, eigenspaces, generalized eigenvectors, Cayley-Hamilton theorem, diagonalization, matirx exponential and differential equations, spectral theorem, specialization to positive definite matrices, statement of the Jordan canonical form (Corresponds roughly to Ch6 of Strang)
7. Singular Value Decomposition, principal component analysis, applications of the SVD, matrix norms. (Corresponds roughly to Ch7 of Strang)
8. Time permitting: Basic aspects of graphs and matrices, Nonnegative matrices, Applications to cryptography, Fourier series and DFT, Convex sets.

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. For these policies, please go to

`http://coursebook.utdallas.edu/syllabus-policies/`

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