MATH 2418 LINEAR ALGEBRA

Syllabus-Summer 2021

Class Information:			
Section	Course Meeting Times	Class Modality	Instructor
MATH 2418.0u1	TR 3:00pm–5:15pm	Online(BlackBoard Collaborate)	Rabin Dahal
MATH 2418.0u2	TR 3:00pm–5:15pm	Remote(BlackBoard Collaborate)	Jigar Patel

Instructor Information:

Instructor: Jigar Patel	**Email:** jsp061000@utdallas.edu
Office: FO 2.410E	**Phone:** 972-883-3965
Office Hours: By appointment	**Office Hours Platform:** BB Collaborate
Instructor: Rabin Dahal	**Email:** Rabin.Dahal@utdallas.edu
Office: FO 2.410B	**Phone:** 972-883-6584
Office Hours: TR 1-2:30pm & by appt.	**Office Hours Platform:** Microsoft Teams

Problem Section Information			
Problem Section	Location	Day/ Time	TA
MATH 2418.8u1	Remote	Tue 5:30-7:45pm	1)**Buddhika Jayawardana** 2)Ali Ahammed Mozumder 3) Hyunjoong Gang
MATH 2418.8u2	Remote	Tue 5:30-7:45pm	1) **Lashika Rajapaksha** 2) Abdullah Mamun 3) Huan Chen

TA Information:

TA	Email	Office Hours	Office Hour Platform
Ali Ahammed Mozumder	AliAhammed.Mozumder@utdallas.edu	Tue 11am-12pm	
Buddhika Jayawardana	Buddhika.Jayawardana@utdallas.edu	Mon 2-3pm	MS Teams
Hyunjoong Gang	Hyunjoong.Gang@utdallas.edu	Mon 9:30-10:30am	MS Teams
Huan Chen	huanchen@utdallas.edu	Wed 2-3pm	MS Teams
Abdullah Mamun	Abdullah.Mamun@utdallas.edu	Mon 12-1pm	
Lashika Rajapaksha	lnr170001@utdallas.edu	Mon 11-12pm	BB Collaborate

Course Modalities and Expectations:

1. Instructional Mode: Full descriptions of the instructional modes listed above can be found at

   `https://www.utdallas.edu/fall-2020/fall-2020-registration-information/`

2. Course Platform: Microsoft Teams or BlackBoard Collaborate. The section instructor will send an email before the first meeting.

3. Expectations: For remote/virtual synchronous learning students must download Microsoft Teams and log in using UTD log in credentials.

4. Asynchronous Learning Guidelines: Asynchronous learning option is available regardless of instructional mode. Your instructors will post recording of lectures or/and other relevant materials on elearning for asynchronous learning.

COVID-19 Guidelines and Resources:
The information contained in the following link lists the University's COVID-19 resources for students and instructors of record. Please see `http://go.utdallas.edu/syllabus-policies`

Classroom Conduct Requirements Related to COVID-19:
UT Dallas requires that all students must wear a face covering that covers the nose and mouth in all university buildings and classrooms. To help protect the health and safety of students, instructors, and the University community, students who choose not to wear a face covering may not attend class in person but may attend a course remotely. Anyone attending class in person without a face covering will be asked to put one on or leave. Instructors may end the class if anyone present refuses to appropriately wear a face covering for the duration of class. Students should also be sure they are at least six feet away from their fellow students and faculty, and seated in a seat that is designated to ensure that distance. Students who either refuse to wear face coverings appropriately or to adhere to other social distancing protocols may face disciplinary action for **Student Code of Conduct** violations. Students who are unable to comply with the university policies including wearing a face covering should consult the Comets United webpage for further instructions. Students who have tested positive for COVID-19 or may have been exposed should not attend class in person and should instead follow required disclosure notifications as posted on the university's website (see **"What should I do if I become sick?"** webpage)

Class Attendance:
The University's attendance policy requirement is that individual faculty set their course attendance requirements. Regular and punctual class attendance is expected regardless of modality. Students who fail to attend class regularly are inviting scholastic difficulty. In some courses, instructors may have special attendance requirements; these should be made known to students during the first week of classes. These attendance requirements will not be used as part of grading (see Class Participation below for grading information). In-person participation records may be used to assist the University or local public health authorities in performing COVID-19 occurrence monitoring. Please note – in-person attendance requires consistently adhering to University requirements, including wearing a face covering and other public safety requirements related to COVID-19, as presented in this syllabus. Failure to comply with these University requirements is a violation of the **Student Code of Conduct**.

Class Participation:
Regular class participation is expected regardless of course modality. Students who fail to participate in class regularly are inviting scholastic difficulty. A portion of the grade for this course is directly tied to your participation in this class. It also includes engaging in group or other activities during class that solicit your feedback on homework assignments, readings, or materials covered in the lectures (and/or labs). Class participation is documented by faculty. Successful participation is defined as consistently adhering to University requirements, as presented in this syllabus. Failure to comply with these University requirements is a violation of the **Student Code of Conduct**.

Class Recordings:
The instructor may record meetings of this course. Any recordings will be available to all students registered for this class as they are intended to supplement the classroom experience. Students are expected to follow appropriate University policies and maintain the security of passwords used to access recorded lectures. Unless the Office of Student AccessAbility has approved the student to record the instruction, students are expressly prohibited from recording any part of this course. Recordings may not be published, reproduced, or shared with those not in the class, or uploaded to other online environments except to implement an approved Office of Student AccessAbility accommodation. If the instructor or a UTD school/department/office plans any other uses for the recordings, consent of the students identifiable in the recordings is required prior to such use unless an exception is allowed by law. Failure to comply with these University requirements is a violation of the **Student Code of Conduct**.

Class Materials
The instructor may provide class materials that will be made available to all students registered for this class as they are intended to supplement the classroom experience. These materials may be downloaded during the course, however, these materials are for registered students' use only. Classroom materials may not be reproduced or shared with those not in class, or uploaded to other online environments except to implement an approved

Office of Student AccessAbility accommodation. Failure to comply with these University requirements is a violation of the **Student Code of Conduct**.

Course Description: Students will learn concepts and techniques of linear algebra. Course topics include systems of linear equations, determinants, vectors and vector spaces, eigenvalues and eigenvectors, and singular value decomposition of a matrix.(4 semester credit hours)
Prerequisite: A grade of at least a C- in either MATH 2306 or MATH 2413 or MATH 2417.

Co-requisite: Students must enroll in one of the problem sections MATH 2418.8u1 or MATH 2418.8u2 in addition to a lecture section MATH 2418.0u1 or MATH 2418.0u2.

Textbook and Materials:

- **Required Textbook:** *Introduction to Linear Algebra, fifth edition;* Gilbert Strang. Wellesley Cambridge Press. ISBN: 978-0-9802327-7-6.
- **Suggested for additional reading:** Howard Anton, Elementary Linear Algebra, Wiley 11th Edition.
- **Sections Covered:** The course will cover the Chapter 1-6 and chapter 7 (Sec 7.1-7.2) of the textbook.

eLearning:

You must regularly check the MATH 2418.701 page of eLearning:

`https://elearning.utdallas.edu`

Weekly Homework Assignments, quizzes, grades, and important announcements will be posted under the course MATH 2418.701 on eLearning.

Mathlab:

The Student Success Center Math Lab offers free help in math, physics and statistics courses to UT Dallas students currently enrolled in classes. Please contact Math Lab for appointment and info. Website:

`http://www.utdallas.edu/studentsuccess/mathlab/`

Students Learning Outcomes

1. Given a system of linear equations, students will be able to apply the Gauss-Jordon 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. The students will also be able to determine the invertibility of the matrix using determinant or/and other equivalent invertibility conditions.
3. Given definitions of a set of objects with a well-defined addition and scalar multiplication, students will be able to determine 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. Students will be able to find LU and LDU decomposition of a given square matrix.
5. Given a square matrix, students will be able to determine its eigenvalues, and find a basis for each eigenspace, and determine the diagonalizability.
6. Given a matrix, students will be able to accurately determine basis vectors for its row space, column space and their orthogonal complements.
7. Students will be able to use the Gram-Schmidt process to construct an orthogonal basis for an inner product space; Students will be able to find the least squares solutions of a linear system.
8. Students will be able to find the singular value decomposition (SVD) of a given matrix.

Honorlock:

"This course will use `Honorlock`–an online exam proctoring tool for exams and quizzes. To successfully take an exam or a quiz, you must have a web camera with microphone, a laptop or desktop computer (no tablets/phones), Chrome browser, a reliable internet connection and your photo ID. You will be prompted to install the Honorlock Chrome Extension (which you can remove after you finish the test). You will then access the exam within your eLearning course and go through the authentication process. The web camera will monitor you throughout your test. Please see the `Testing Guidelines` and `Support Information` for additional information."

Course Policy & Grading Scheme

1. **Homework(HW):**
   - A pdf file of weekly Homework(HW) will be posted each week on eLearning. You can print the pdf of HW, write your solutions in the space provided. If printer is not available, write the solutions on separate sheets of paper. Be sure to write your name, your TA information, and problem number clearly. Scan HW as a single pdf file and upload it on elearning every Monday 11:59am or before.
   - Late submission will not be accepted and a zero will be assigned.
   - You must show all of your work to earn full credit. Correct answers without sufficient supporting work will receive no or reduced credit.
   - You may ask questions about HW to your instructor or TA or your class mate. Group work is encouraged, however the final write up should be yours. Two identical HW solutions will receive a score of zero.
   - Only a subset of assigned problems will be graded. You will not be told in advance which one.
   - HW will count as 20% towards your final grade.
   - The lowest HW will be dropped at the end of the semester.
   - Technical issues such as power outage/ internet outage/elearning malfunction or other unexpected events may occur at any time. So, we suggest you to plan to submit each HW at least 24 hrs before it is due. This way you can still make an alternate arrangement to submit the HW within the deadline.
2. **Quizzes:**
   - Weekly quizzes will be assigned on elearning every Tuesday 7:15pm except for exam weeks.
   - You will have 30 minutes to complete a quiz. In addition, you will be given 15 minutes to scan and upload you quiz on elearning.
   - The quizzes will be closed books/notes. Collaboration, assistance from any person or internet searches are not allowed.
   - The lowest quiz will be dropped at the end of the semester. The quiz average is worth 15% toward your course grade.
3. **Mid-Term Exams:**
   - Exam I: June 15, Tuesday, 6:30pm-8:00pm.
   - Exam II: July 13, Tuesday, 6:30pm-8:30pm.
   - Each midterm counts 20% toward your final grade.
4. **Final Exam**
   - Date and Time: Saturday, Aug 07, 2021, 5:00 pm- 7:45pm.
   - Comprehensive but more emphasis will be on the sections not covered in exam 1 or exam 2.
   - Final exam will count as 25% towards your final grade.

   Note: Detail exam information will be posted on elearning tentatively one week before the date of each exam.

LATE/MISSED COURSEWORK

- There is no make-up for late or missed assignments or exams, unless extreme circumstances with proper documentation accepted by the instructor.
- In case 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

- Only a standard scientific calculator is allowed in the exams. Graphing calculators, and programmable calculators are not allowed. Calculators with MATRIX or VECTOR functions are not allowed. For example: TI-36X Pro, Casio-fx115espus scientific calculators are not allowed.

GRADING SCHEME

- – Quiz: 15%
  – Homework: 20%
  – Exam 1: 20%
  – Exam 2: 20%
  – 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, May 24, 2021.
- Wednesday, June 09, 2021: Last Day to Drop a class without a "W" Full Term Session
- **Midterm Exam I**: Tuesday 6:30pm-8:00pm, June 15, 2021.
- **Midterm Exam II**: Tuesday 6:30pm-8:30pm, July 13, 2021. Location: Problem Section
- **Last Day of Classes** - Full Term Session: Wednesday, August 4, 2021.
- **Final Exam**: Saturday, 5:00pm- 7:45pm, August 07, 2021.

UT Dallas Syllabus Policies and Procedures:

The information at

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

constitutes university's syllabus policies and procedures segment of this syllabus.

Tentative Schedule

Monday	Tuesday	Wednesday	Thursday
May 24th **1**	25th **2** Lec: 1.1, 1.2 PS: 1.1, 1.2	26th **3**	27th **4** Lec: 1.3, 2.1
31st **5** HW 1 Due	June 1st **6** Lec: 2.1, 2.2 PS: 1.3, 2.1, 2.2 Quiz 1	2nd **7**	3rd **8** Lec: 2.3, 2.4
7th **9** HW 2 Due	8th **10** Lec: 2.4, 2.5 PS: 2.3, 2.4, 2.5 Quiz 2	9th **11**	10th **12** Lec: 2.6
14th **13** HW 3 Due	15th **14** Lec: 2.7 PS: 2.6, 2.7 Exam 1	16th **15**	17th **16** Lec 3.1, 3.2
21st **17** HW 4 Due	22nd **18** Lec: 3.2, 3.3 PS: 3.1, 3.2, 3.3 Quiz 3	23rd **19**	24th **20** Lec: 3.4, 3.5
28th **21** HW 5 Due	29th **22** Lec: 3.5, 4.1 PS: 3.4, 3.5, 4.1 Quiz 4	30th **23**	July 1st **24** Lec: 4.2, 4.3
5th **25** HW 6 Due	6th **26** Lec: 4.3, 4.4 PS: 4.2, 4.3, 4.4 Quiz 5	7th **27**	8th **28** Lec: 5.1, 5.2
12th **29** HW 7 Due	13th **30** Lec: 5.3 PS: 5.1, 5.2, 5.3 Exam 2	14th **31**	15th **32** Lec: 6.1, 6.2
19th **33** HW 8 Due	20th **34** Lec: 6.2, 6.3 PS: 6.1, 6.2, 6.3 Quiz 6	21st **35**	22nd **36** Lec: 6.4, 6.5
26th **37** HW 9 Due	27th **38** Lec: 6.5, 7.1 PS: 6.4, 6.5, 7.1, Quiz 7	28th **39**	29th **40** Lec: 7.2
Aug 2nd **41** HW 10 Due	3rd **42** Lec: Review PS: 7.2	4th **43**	5th **44**

Note: The polices and timeline on this syllabus are subject to change at the discretion of the professors.