MTH 215: Introduction to Linear Algebra

Spring 2019

University of Rhode Island, Department of Mathematics

INSTRUCTOR:	**Jonathan A. Chávez Casillas**
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LECTURE TIMES:	Tues. and Thurs., 9:30 - 10:15 (Beaupre 105) and 12:30 - 1:45 (Swan 203).
OFFICE:	Lippitt Hall 200A
OFFICE HOURS:	Wednesday 11 am - 3pm (Or by appointment)[1]

Course Objectives and Goals: This course provides the fundamental concepts and terminology of Linear Algebra. Linear Algebra is, arguably, on of the most important tools in modern mathematics and its concepts and ideas extend to a diverse set of applications in Engineering, Computer Science, Finance, Economics, Statistics, etc. If time permits, some real life applications will be studied.

Brief Course Description: The course will be divided mainly in three parts:

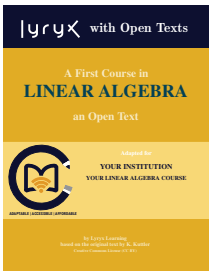
- **Matrix Analysis, Determinants and Linear Systems of Equations:** Become familiar with the operations that can be applied to matrices. Compute sums, products, determinants, inverses and transform matrices in order to study how to solve linear systems of equations.

- **Vector Spaces, Linear Transformations and $\mathbb{R}^n$:** Understand what a linear transformation is and why it is important. Comprehend how different "operations" or "transformations" that we have been doing for years are particular examples of linear transformations (i.e., rotations, translations, etc). Study the particular example of the vector space $\mathbb{R}^n$.

- **Inner product spaces and Spectral Theory:** Arguably, the most difficult but useful part of the course for future courses in mathematics, engineering, computer science, etc. In this part we will analyze the basic tools used to study different type of vector spaces, how they decompose in basic "building blocks" and, if time permits, apply these tools to real life problems to see the potential of them.

[1] The student should supply a reason why he/she cannot attend the regular office hours

Textbook: "A First Course in Linear Algebra". Original text by K. Kuttler. Adapted by Lyryx. This is an open source textbook. Originally created by K. Kuttler and enhanced by the Lyryx company.



Open source textbook. Click in the image above to get a copy of it.

Grade Description: There will be two Midterms and a *Cumulative* Final Exam. There are no make-up quizzes or exams. If you need to be absent from a class or test for valid reasons, you should notify the instructor with anticipation and the weight will be sent to the final examination. for reference see section 8.51 of the University Manual. The grade will be computed as follows:

Exam 1:	15%	March 19th
Exam 2:	15%	April 16th
Quizzes:	15%	Usually, one per week
Final Project by Teams:	10%	Instructions TBA.
Homework:	15%	Once every lecture.
***Cumulative* Final Exam:**	30%	TBA

- **Exams:** Both midterms (Exam 1 and Exam 2) and the *Cumulative* Final Exam will be a combination of multiple choice questions and open answer questions. There is no partial credit for the multiple choice questions. However, there will be partial credit in the open answer questions. **Most (if not all) of the questions will be taken as minor modifications from the homework!**. **There are no make-up exams**. If, for any **valid** reason (up to the discretion of the instructor), you cannot attend any of the midterms, the weight will be shifted towards the final exam.

- **Grade distribution**[2]**:**

92.00 - 100	A		68.00 - 70.99	C
87.00 - 91.99	A-		65.00 -67.99	C-
82.00 - 86.99	B+		61.00 - 64.99	D+
78.00 - 81.99	B		55.00 - 60.99	D
75.00 - 77.99	B-		0.00 - 54.99	F
71.00 - 74.99	C+			

[2]Different grades may be given for borderline cases, to the discretion of the instructor.

- **Quizzes:** Quizzes will be given at the consideration of the instructor. Usually, there will be one quiz per week, but some weeks there may be two or none. The questions at the quizzes will be slight modifications of the Homework (See below). At the end of the semester, the lowest 3 quizzes will be dropped. Since the lowest 3 quizzes will be dropped, there is no re-weighting of quizzes. If you miss a quiz (even with a valid reason) it will count towards those 3 dropped quizzes. A re-weighting of quizzes may be given only in the event that you have missed more than 3 quizzes, all with valid reasons.

- **Homework:** Homework will be assigned at the end of each lecture. It is the student's responsibility to complete all the assign exercises and to go to office hours or ask in class if there are questions. Homework becomes of vital importance since the quizzes' content and exams content will be primarily generated from the homework questions.

- **Final Project:** A final project by teams will be assigned. A brief presentation of the results will be required in class. More details will be given by the first midterm.

Attendance and Course Expectations: The student is expected to attend all the lectures even-though there is no official "roll call". **This is a very demanding course** and it is expected hard work from the students. Students are responsible for all missed work, regardless of the reason for absence. It is also the student's responsibility to get all missing notes and material covered within that missed lecture. Moreover, the student is expected to:

- **Clear Writing:** All the student work presented to the instructor (quizzes, exams, homework questions) should be legible and clean. No steps should be skipped when doing a rational deduction.

- **Homework:** Do all the homework assigned even-though it is not graded. The fast pace of the class require that the student perform work out of class.

- **Prepare for lecture:** The student is expected to read the material of the class prior to attending. The different topics and fast pace require that the student reads the textbook before coming to class.

- **Ask for questions:** If the student does not understand some points of the lecture, the student is expected and encouraged to ask questions in lectures and attend office hours if needed.

- **Standards of behavior:** Students are responsible for being familiar with and adhering to the "Community Standards of Behavior: University Policies and Regulations" (found at `web.uri.edu/studentconduct/university-student-handbook`). If the student arrives late to class, he/she should not disrupt the class. All cell phones or any electronic devices must be turned off.

Make up policy: As mentioned above, there are no make-up exams or quizzes. If there is a valid reason for missing a test, the weight will be redistributed towards the final exam. For

quizzes, since the lowest 3 grades are dropped, no weight will be re-distributed for the first 3 missed quizzes (even-thought there is a valid reason). For more than 4 justified absences, a re-weighting can be done.

- **Electronic Devices and other policies:** No electronic devices are allowed, except for note-taking devices (and being used for taking notes) and other particular electronic devices that the instructor allows.

- **Academic Honesty Policy:** Cheating is defined in the University Manual section 8.27.10 as the claiming of credit for work not done independently without giving credit for aid received, or any unauthorized communication during examinations. Students are expected to be honest in all academic work. Consequences for any charge of cheating or plagiarism will follow the guideline established in the University Manual 8.27.10-8.27.21, `http://web.uri.edu/manual/chapter-8/chapter-8-2/`.

- **Special Needs:** Students with disabilities should contact the instructor at the beginning of the semester so that he/she is provided reasonable accommodations. Students must also contact Disability Services for Students: Office of Student Life, 330 Memorial Union, 874-2098 to determine the appropriate accommodations.

- **Academic Enhancement Center (AEC):** In addition to lecture and office hours, the Academic Enhancement Center (AEC) offers extra academic help. For more information on AEC services, study tips, and SI session, visit the AEC website at `http://web.uri.edu/aec/`.

- **Religious holidays:** Per policy of the University of Rhode Island, on an individual basis, the student has the opportunity to observe their traditional religious holidays. However, a written notification to each instructor is required.

- **Tentative Course Outline:** The weekly coverage might change as it depends on the progress of the class. Sections marked with an asterisk will be covered should time permit.

Date	Section Number	Homework
Jan. 24	1.1, 1.2.1-1.2.3	**1.1:** 3; **1.2:** 3,5,9,16,22,29,41
Jan. 29	1.2.3-1.2.4, 2.1.1	**1.2:** 47,50,57,59; **2.1:** 1,2,3
Jan. 31	2.1.2-2.1.5	**2.1:** 4,11,13,15,16,18,26
Feb. 5	2.1.6-2.1.8	**2.1:** 28,30,32,33,34,39,44,48,49
Feb. 7	2.1.9-2.1.10	**2.1:** 54,56,57,60
Feb. 12	2.2.1-2.2.3	**2.2:** 4,10,13,14
Feb. 14	3.1.1-3.1.3	**3.1:** 2,9,15,17,18,19,20,21
Feb. 19	3.1.4 -3.1.5	**3.1:** 22,24,25
Feb. 21	3.2.1-3.2.3	**3.2:** 4,7,8,11,12,18,19
Feb. 26	4.1-4.2, 4.10.1	**4.2:** 1,2,4; **4.10:** 1,2,3
Feb. 28	4.10.2-4.10.5	**4.10:** 10,13,18,28,32,48,53,58,59,62,69
Mar. 5	4.11.1-4.11.3	**4.11:** 2,4,7,9,10,12,13,15
Mar. 7	4.11.4-4.11.5	**4.11:** 16,18,19,21,22,23
Mar. 19	Midterm	
Mar. 21	7.1	**7.1:** 1,2,4,5,8,10,14,15,16
Mar. 26	7.2	**7.2:** 1,4,7,8,9,13
Mar. 28	7.3.1,7.3.2,7.3.5	**7.3:** 1,2,3
Apr. 2	7.4.1-7.4.2	**7.4:** 1,2,4,6,7,9,11,13,14,
Apr. 4	7.4.3-7.4.4	**7.4:** 15,19,20,21,23
Apr. 9	5.1-5.2	**5.1:** 1,2,3; **5.2:** 3,5,7,8,9,10,11,12
Apr. 11	5.3-5.4	**5.3:** 1,3,6,7; **5.4:** 1,6,10,15,16
Apr. 16	Midterm	
Apr. 18	5.5-5.6	**5.5:** 1,4,5,7,8; **5.6:** 1,2,3
Apr. 23	5.6-5.7	**5.6:** 5,6,8,9,11; **5.7:** 1,2,4,5
Apr. 25	5.8	**5.8:** 1,2,3
Apr. 30	Final Review	

*: Depending on time, these topics may be omitted or partially covered.