

MATH 122.D – Applied Linear Algebra / Spring 2021

Textbook:	Intro to Linear Algebra, by L.W. Johnson, R.D. Riess, J.T. Arnold, 5th Ed.
Class Meets:	MWF: 1:10 – 2:00, (Remote instructions via MS Teams)
Instructor:	Dr. Taras I. Lakoba, Innovation Hall, Room E436 (pre-COVID location) (802) 656-2610, tlakoba@uvm.edu, https://tlakoba.w3.uvm.edu
Office Hours (via MS Teams)	M: 4:00–5:00 pm; W: 9:00–10:00 am; F: 2:45–3:45 pm; and by appointment.
Important deadlines:	Add/Drop and Pass/no Pass: Friday, February 12; Last day to withdraw: Thursday, April 8. Last class day: May 10 (M); Reading (no class) day: March 24 (W).

Course contents Verbal description: Echelon and reduced echelon forms, consistent linear systems, matrix operations, linear (in)dependence, (non)singular matrices, matrix inverses; properties of vector space R^n , subspaces, bases, coordinates, and dimension, orthogonal bases, linear transformations, least-squares solutions; eigenvalue problems, determinants, eigenvectors and eigenspaces, similarity and diagonalization, singular value decomposition. By Section: 1.1–1.3, 1.5–1.7, 1.8 (if time permits), 1.9; 3.1–3.5, 3.7, 3.8; 4.1, 4.2, 4.4, 4.5, 4.7.

Homework: Homework is posted on the **course webpage**, which you can navigate to from the **instructor’s webpage listed above**. Homework for any given section is considered assigned on the day that section has been covered.

The purpose of the homework is to help you master the techniques covered in class. As such, **homework problems will be substantially based on examples and material presented in class. Therefore, you should study your notes before you attempt the homework, and mimic your solutions on the examples in the notes** and the indicated examples from the book. Please watch a 15-minute video on the course webpage explaining how I expect you to work on homework problems. See the instructor for help **as soon as** you find out that you are having difficulty with the homework.

Homework will not be graded; however, both quizzes and tests will be based on the homework problems.

Projects: There will be five projects (to be done outside of lecture time), whose primary purpose will be to show you a connection between the concepts learned in class and some real-life applications. Some of the projects will involve Matlab; however, prior experience with this software is not required. You need to upload to **Blackboard** (Bb) **a pdf** of your completed project. Your file **must** satisfy the requirements for size and format found in the link **File Submission Rules**, posted below this syllabus. For Projects 2, 4, 5 you will *also* need to **email** me Matlab codes.

Tests and Quizzes:

Submission requirements for quizzes and tests are found in the aforementioned link **File Submission Rules**.

(a) **Regular Quizzes**, sometimes unannounced (see below), will be given via Bb *approximately* once a week. They will be based on the homework problems that have been due at least one day ago. You are encouraged to ask which section’s homework will be covered in the next quiz.

The main purpose of the quizzes is to help you monitor your understanding of the material. If you receive a low grade on a quiz, it is a flag that you need to review the corresponding material. A **structured, 3-step process of such a review** is posted on the course website. If you receive a couple of low quiz grades in a row, see the instructor for help as soon as possible.

I will announce when the next quiz will be and what it will be on *only after someone asks me that in class*.¹
No electronic announcement of regular quizzes will be made.

(b) **Pre-lecture Quizzes** will be given via Bb before every lecture. Their purpose is to make you *browse* through the lecture notes² of the upcoming class, so that you have some idea of what will be covered. The pre-lecture quizzes will consist of a small number of simple questions verifying whether you have browsed the material. Unlike regular quizzes, pre-lecture ones *will be announced electronically* on Bb. Each pre-lecture quiz will be available no later than at 9 a.m. of the class day and will close at the time when the class is scheduled to commence.

(c) There will be 3 (three) midterm tests during the semester. Their dates will be announced in class at least a week before each test. In terms of material covered, midterms 1, 2, and 3 will be given after we cover Sections 3.1, 3.7, and 4.5, respectively. The midterms will be given via Bb, similar to regular quizzes.

Make-up exams will be given to those students who have documented excused absence.

(d) The final exam will be on ... TBA. Similarly to a midterm, the final exam will be available on Bb for several hours, after which it must be upload back to Bb.

¹ *Example:* I give a regular quiz on October 1. If someone has asked me *in class* on October 1 or during a previous class when the next quiz would be, I would answer: ‘On October 1’. If no one asks, I will still give a quiz on October 1. I will *not answer questions about a quiz asked outside of class*, unless that question has already been asked *in class*. This will be done to encourage your (i) initiative asking questions in class and (ii) attendance.

²Lecture notes are also posted on the aforementioned course webpage, around the middle.

Academic integrity:

When working on any quizzes and tests, you are allowed to use **only** the following: Any materials posted on the course webpage (the one mentioned above), your notes *based on that material*, and the textbook (sections listed earlier under “Course contents”). You are expected to produce your preparation notes/sheets to the instructor upon request. When working on any quizzes and tests, you are **not allowed to use any of the outside help in any form**.

When working on Projects, you are allowed to work with no more than one partner on any given Project. (You may change partners, or work without a partner, on different Projects.) See the ‘**My Policy on Projects**’ on the course webpage. You and your partner may use class notes, textbook, and materials posted on the course webpage. If you decide to use materials found online (which you will *never really need* and hence are *discouraged* from using), you must *conspicuously reference the URL* where the material is found.

Violations of academic integrity on *any assignment* will be dealt with as described in the link ‘**Sanctions for academic integrity violations**’, found below this Syllabus. See also the rubrics ‘Academic integrity’ and ‘Prohibition of sharing course materials’ in the Generic Syllabus (posted next to this one).

Grading policy: Each midterm test will be worth 14% of the final grade. All regular quizzes combined will be worth 19% of the final grade. All projects combined will be worth 15% of the final grade. All pre-lecture quizzes done after Add/Drop deadline combined will be worth 4% of the final grade. The final exam will be worth 20% of the final grade. Extra credit may be earned, as explained below.

Note: I do **NOT** drop your lowest grade. Thus, **ALL** the grades that you earn during the semester will contribute to your final grade, as detailed above.

Grading scheme: I do not curve exams and quizzes. Instead, when issuing final grades, I slightly adjust the grading brackets. This will work as follows. The threshold between **A–** and **A** will be set at X , where $92.00 < X \leq 93.00$ will be adjusted based on my subjective criteria. The freedom of choosing this X *within the above range* is my equivalent of other instructors’ curving exam grades.

Once a value of X is selected, letter grades will be put in correspondence with the following brackets for the numeric grade, which is computed as described in rubric Grading policy:

D–	$[X - 30 - 3.33, X - 30)$;	D	$[X - 30, X - 30 + 3.34)$;	D+	$[X - 30 + 3.34, X - 20 - 3.33)$;
C–	$[X - 20 - 3.33, X - 20)$;	C	$[X - 20, X - 20 + 3.34)$;	C+	$[X - 20 + 3.34, X - 10 - 3.33)$;
B–	$[X - 10 - 3.33, X - 10)$;	B	$[X - 10, X - 10 + 3.34)$;	B+	$[X - 10 + 3.34, X - 3.33)$;
A–	$[X - 3.33, X)$;	A	$[X, X + 5.00)$;	A+	$\geq X + 5.00$.

Note that these brackets are *strict*. This means that if your grade doesn’t make the next bracket even by 0.01, that is it — it doesn’t make it. This is what brackets, and thresholds in general, are for.

Extra credit (No penalty will be given if you choose not to do any of the extra credit assignments.)

- **1a (easy):** Post-lecture quizzes will be posted on Bb after most lectures and available for 24 hours after the class. They will check your general understanding of the covered material (there will be no difficult calculations). However, some of the questions may be a little tricky (after all, this is Extra credit) and will require you to read the lecture notes carefully. Just for completing any one of these quizzes, you will be able to receive 0.01%, added to your overall final grade. If, in addition, you answer questions on the lecture material correctly, you will receive 0.01% per correct answer. I will post those quizzes starting with the second or third lecture, but the earned scores will begin being added to your grade after the Add/Drop deadline.

- **1b (easy):** I encourage you to use copies of my posted lecture notes and take your own notes on them during lectures. You can submit a scan of these notes that show your own note-taking and receive 0.02% added to your overall final grade for each approved submission. I reserve the right to reject any such note that fails to either follow the **Submission requirements** or contain your meaningful notes.

- **2 (harder):** Extra credit problems will be occasionally posted on the Homework page (see rubric ‘Homework’ on the first page of this syllabus). They will be graded (on a coarse scale). Before you do a particular extra credit assignment, please review more detailed instructions found on the course website. The submitted files must satisfy the **Submission requirements**. I will *return without grading* poorly scanned or poorly legible Extra Credit assignments.

- I reserve the right, at my sole discretion, to increase the final grade of any student by one level (e.g., from B- to B) for a demonstrated achievement, some examples of which are: active and constructive class participation, regular and active attendance of office hours, excelling on the final exam, being the “most improved” student in terms of performance or attitude, etc. This provision, however, has been used *only in very rare and truly exceptional cases*.

Learning objectives: Upon successful completion of this course, the students will be able to recognize and independently work with the following concepts: Gaussian elimination and Reduced Echelon Form of a linear system; Linear (in)dependence of vectors; (Non-)singular matrices; Vector spaces and subspaces; Basis for a vector space; Linear transformations; Least-square solution of inconsistent linear systems; Eigenvalues and eigenvectors; Similarity transformation and Diagonalization of a matrix.