

Linear Algebra - MTH 42, Sec. D01–52850

Professor: Dr. Luis Fernández

Class times and room: Tu, Th, 14:00 to 15:50 at NI 300A.

Course page: <http://fsw01.bcc.cuny.edu/luis.fernandez01>

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Overview of the course.

Linear algebra is one of the most important tools in all of the sciences and mathematics. It appears in optimization, differential equations, web-searching algorithms, finance, cryptography, population growth... You name it. This course aims to give an working understanding of linear algebra **It is important that you master these tools as you will need them in your future studies.** The main topics that we will cover are:

- Systems of linear equations. Vectors in Euclidean space. Matrices and operations. Subspaces of Euclidean space. Determinants. Diagonalization. Vector spaces in general. Linear transformations.

Some resources:

- **Classes:** Attendance is essential to succeed in the class. In class you will have time to learn new material, practice, and ask questions.
- **Math Tutorial Lab:** In the Math Tutorial Lab you will find permanent tutors for all math courses. It is located at CP 305 and opens 10–17 Monday to Thursday, 10–20 Friday, and 10–15 Saturday and Sunday.
- **Meetings with the instructor:** If you need help, or for any other matters concerning the course, you can talk to me during office hours or at other time we arrange.
- **Email:** If you have questions while doing homework and need help quickly, please email me anytime (address above).
- **Computer algebra programs:** Students are strongly encouraged to use computer algebra programs (the university has Mathematica; there are also many resources online) in this class. Use them to be able to do examples quickly, once you have learned to do everything by hand.

Textbook:

- *Linear Algebra and Applications*, 1st or 2nd Ed., by Jeffrey Holt. You need to have to book. You can find it online new or used at a good price.

Student's responsibilities

- To use the **resources** available (some are above) to attain the main goal: to learn.
- To **prepare** each class by studying the material in the previous class, solving the recommended exercises and reading ahead in the text.
- To work on many **exercises**, as it is impossible to learn mathematics without doing so. The main purpose of the exercises is not quite to find the answer, but to learn from them. Therefore, if you work in an exercise for a long time without finding a correct answer, do not feel frustrated, instead consider how much you have learned in the process.
- To **ask** questions during class or tutorials about anything that has not been understood. **EVEN IF YOU THINK THAT YOUR QUESTION IS TOO TRIVIAL, I GUARANTEE THAT MANY OTHER STUDENTS WILL BENEFIT FROM THE ANSWER.** So when in doubt do your classmates a favor and **ASK!**

Instructor's responsibilities

- To act as *facilitator* of the learning process of the students, and to assist with any question that students may have about the material.
- To give tests and exams of appropriate difficulty. To grade tests and exams promptly and explain the students the meaning of their grades.

Some Rules

- Cell phones, music devices and laptops are not allowed during class time.
- Tests will not be repeated. The only exception, in some situations, is if the instructor receives notice of the absence (via e-mail or telephone) **on or before the day of the test or quiz.**

Exams and homeworks:

- There will be a **midterm exam**, worth **30%** of the final grade.
- **Weekly homework** will be done via WebWork. It counts **15%**.
- **Project and quizzes** will count **15%**. They will be announced in class.
- The **final exam** will count **40%** of the final grade.

Class plan and assigned exercises. MTH 42. Professor Luis Fernández

Use this to prepare each class in advance. Note that dates may change depending on how fast we advance.

Date	Section	Exercises from text	WebWork Assignment
Tu 8/27	Chapter 1. Linear Equations.		
Th 8/29	1.1 Lines and Linear Equations	1.1: 1, 3, 5, 9, 11, 17, 19, 35, 37, 43.	HW1 Fall19
Tu 9/3	1.2 Linear Systems and Matrices	1.2: 1, 3, 5, 7, 19, 21, 23, 25, 27, 29.	HW2 Fall19
Th 9/5	1.4 Applications of Linear Systems	1.4: 1, 3, 8, 9, 11.	HW3 Fall19
	NO CLASS - MONDAY SCHEDULE.		
	Chapter 2. Euclidean Space.		
Tu 9/10	2.1 Vectors	2.1: 1, 3, 7, 9, 11, 13, 15, 17, 19, 27, 29, 41.	HW4 Fall19
Th 9/12	2.2 Span	2.2: 1, 3, 7, 11, 13, 15, 21, 25, 29, 35, 41.	HW5 Fall19
Tu 9/17	2.3 Linear Independence	2.3: 1, 5, 9, 11, 13, 19, 21, 29, 33, 35.	HW6 Fall19
	Chapter 3. Matrices.		
Th 9/19	3.1 Linear Transformations	3.1: 1, 3, 5, 9, 11, 13, 15, 17, 21, 23, 29, 31.	HW7 Fall19
Tu 9/24	3.2 Matrix Algebra	3.2: 1, 3, 5, 7, 9, 11, 13, 15, 21.	HW8 Fall19
Th 9/26	3.3 Inverses	3.3: 1, 3, 5, 7, 9, 11, 16, 21, 23.	HW9 Fall19
Tu 10/1	NO CLASS.		
	Chapter 4. Subspaces.		
Th 10/3	4.1 Introduction to Subspaces	4.1: 1, 3, 5, 17, 19, 21, 23, 25, 35.	HW10 Fall19
Tu 10/8	NO CLASS.		
Th 10/10	4.2 Basis and Dimension	4.2: 1, 3, 5, 7, 17, 19, 29, 31, 33.	HW11 Fall19
Tu 10/15	4.3 Row and Column Spaces	4.3: 1, 3, 5, 7, 9, 11, 15, 17, 19.	HW12 Fall19
Th 10/17	MIDTERM EXAM	Covers from 1.1 to 4.3	
	Chapter 5. Determinants.		
Tu 10/22	5.1 The Determinant Function	5.1: 1, 3, 7, 9, 11, 13, 15, 17, 27, 29, 45, 47.	HW13 Fall19
Th 10/24	5.2 Properties of the Determinant	5.2: 1, 3, 5, 15, 17, 19, 25, 35.	HW14 Fall19
Tu 10/29	5.3 Applications of the Determinant	5.3: 1, 3, 5, 13, 15, 19, 21, 29, 31.	HW15 Fall19
	Chapter 6. Eigenvalues, Eigenvectors.		
Th 10/31	6.1 Eigenvalues and Eigenvectors	6.1: 1, 3, 5, 7, 11, 21, 23, 25, 27, 31, 35.	HW16 Fall19
Tu 11/5	6.3 Change of Basis	6.3: 1, 3, 5, 7, 9, 11, 13, 15, 19, 25, 33.	HW17 Fall19
Th 11/7	6.4 Diagonalization	6.4: 1, 3, 5, 7, 9, 11, 13, 19, 25, 27.	HW18 Fall19
	Chapter 7. Vector Spaces.		
Tu 11/12	7.1 Vector Spaces and Subspaces	7.1: 1, 3, 5, 7, 9, 13, 15, 21, 33.	HW19 Fall19
Th 11/14	7.2 Span and Linear Independence	7.2: 1, 3, 9, 13, 19, 21, 23, 27.	HW20 Fall19
Tu 11/19	7.3 Basis and Dimension	7.3: 1, 3, 7, 11, 13, 21, 23.	HW21 Fall19
	Chapter 9. Linear Transformations.		
Th 11/21	9.1 Definition and Properties	9.1: 1, 3, 5, 7, 9, 13, 16, 17.	HW22 Fall19
Tu 11/26	9.2 Isomorphisms	9.2: 1, 3, 5, 11, 13, 15, 17, 23.	
Th 11/28	9.3 The Matrix of a Linear Transformation	9.3: 1, 3, 7, 11, 13, 15, 19, 21.	HW23 Fall19
	NO CLASS - THANKSGIVING.		
	Chapter 8. Orthogonality.		
Tu 12/3	8.1 Dot Products and Orthogonal Sets	8.1: 1, 3, 5, 7, 9, 13, 17, 29, 33, 35.	HW24 Fall19
Th 12/5	8.2 Projection. Gram-Schmidt Process	8.2: 1, 3, 5, 7, 9, 13, 17,	HW25 Fall19
Tu 12/10	REVIEW FOR THE FINAL	Prepare questions for the review	
Th 12/12	REVIEW FOR THE FINAL	Prepare questions for the review	

REMEMBER: The exercises listed correspond to the material that will be covered on the date they are listed.

Academic Integrity:

Academic dishonesty (such as plagiarism and cheating) is prohibited at Bronx Community College and is punishable by penalties, including failing grades, dismissal and expulsion. For additional information and the full policy on Academic Integrity, please consult the BCC College Catalog.

Accommodations/Disabilities:

Bronx Community College respects and welcomes students of all backgrounds and abilities. In the event you encounter any barrier(s) to full participation in this course due to the impact of a disability, please contact the disAbility Services Office as soon as possible this semester. The disAbility Services specialists will meet with you to discuss the barriers you are experiencing and explain the eligibility process for establishing academic accommodations for this course. You can reach the disAbility Services Office at: disability.services@bcc.cuny.edu, Loew Hall, Room 211, (718) 289-5874.