LAGUARDIA COMMUNITY COLLEGE
CITY UNIVERSITY OF NEW YORK
DEPARTMENT OF MATHEMATICS, ENGINEERING, AND COMPUTER SCIENCE

MAT 210 – Linear Algebra

Prerequisite: MAT 201

Instructional Objectives:

The course is designed to introduce students to the theory and applications of algebraic structures by focusing on the solutions of systems of linear equations. The algebraic properties of these solutions will be analyzed and generalized in the theory of vector spaces. Matrices will be treated both as computational aids and as objects possessing algebraic structure. Major applications will be developed.

Performance Objectives:

During the course, the students will acquire the ability:

- To represent systems of linear equations as matrix equations and to obtain solutions by matrix methods such as Gaussian elimination.
- To perform matrix operations such as addition and multiplication, and find multiplicative inverses where possible.
- To compute the determinant of square matrices using various methods.
- To define vector spaces over the real numbers and to identify a variety of examples of such objects. To determine spanning sets, bases and the corresponding dimension, and coordinate systems for such spaces.
- To determine linear independence or dependence of sets of vectors.
- To recognize linear transformations and to characterize them both as matrices and by their action on basis elements.
- To find eigenvalues and eigenvectors for 2 x 2 and 3 x 3 matrices.

Textbook:

Linear Algebra and Its Applications (Fifth Edition)
by David C. Lay
Published by Pearson (2016)

Evaluation:

a.	Three Examinations	45%
b.	Final Examination	30%
c.	Project	15%
d.	Homework	10%

Addendum to the Syllabus due to Covid19 and Distance Learning.

"*In certain instances, at the discretion of the instructor, a student may be asked to demonstrate his/her ability of conceptually understanding the work he/she submitted. In such instances, the instructor may ask any student for a written or oral (live video session) clarification or explanation of solutions to any assignment, including homework, quizzes, tests, final exam, etc.*"

"*Solutions submitted by students for any assignment in this course, including homework, quizzes, tests, final exam, etc., must be based on the covered material. Solutions that are based on material that was not or will not be covered in this course, or will be covered but has not been covered yet, will not be accepted and will receive no credit.*"

EXAMS: This course will have three Tests and one Cumulative Final Exam. Regardless of the teaching modality (hybrid, online), the Final Exam and at least one of the Instructor's Tests (preferably 2nd test) will be conducted in-person. When the course is offered in-person, all Tests and the Final Exam will be conducted in-person. The Final Exam will be conducted during the finals week in the assigned classroom during the class time.

Comments:

a. The specific topics listed in the following lesson plan and the principles of evaluation listed above are both subject to modification.

b. Homework will be assigned relevant to the topics in the course. Each student is required to complete these assignments to the best of his or her ability consistently throughout the semester. Generally speaking, the student that follows this recommendation will maximize his or her understanding of the subject matter and achieve optimal performance on examinations.

LINEAR ALGEBRA (MAT210) SYLLABUS

Week	Topic	Section	Homework
1	• Systems of Linear Equations • Row Reduction and Echelon Forms	1.1 1.2	**p.10**: 1,3,5,7,13,15,17,19,23,25,29 **p.21**: 1,3,7,11,15,17,19,21,23,25
2	• Vector Equations • The Matrix Equation $A\mathbf{x} = \mathbf{b}$ • Solution Sets of Linear Systems	1.3 1.4 1.5	**p.32**:1,3,5,7,9,11,13,15,17,19,23,25, 29. **p.40**: 1,3,5,7,9,11,15,17,21,23,25,27. **p.47**:1,5,7,13,15,17,19,23,25,29
3	• Linear Independence	1.7 Exam 1	**p.60**: 1,5,9,11,15,21,23
4	• Introduction to Linear Transformations • The Matrix of a Linear Transformation	1.8 1.9	**p.68**: 1,3,7,9,11,13,17,19,21,25,29,33 **p.78:** 1,3,5,7,9,11,13,17,21,23,29,35
5	• Matrix Operations	2.1	**p.100**: 1,3,5,7,9,11,15,17,21,27

	• The Inverse of a Matrix	2.2	**p.109**: 1,5,7,9,11,13,15,17,21,23,31,33
6	• Characterizations of Invertible Matrices	2.3 Exam 2	**p.115**: 3,5,11,13,15,17,19,23,33,35,37
7	• Matrix Factorizations • Subspaces of ¡ ^{n}	2.5 2.8	**p.129**: 3,5,9,15,17,23,29 **p.151**: 5,7,9,11,13,15,17,21,23
8	• Dimension and Rank • Introduction to Determinants	2.9 3.1	**p.157**: 1,3,5,7,9,13,17,19,21 **p.167**: 1,3,9,15,19,21,23,33,39
9	• Properties of Determinants • Eigenvectors and Eigenvalues	3.2 5.1	**p.175**: 1,3,5,11,15,21,25 **p.271**: 1,3,5,7,9,13,17,21,23
10	• The Characteristic Equation	5.2 Exam 3	**p.279**: 1,5,9,13,15,17,19,21,25
11	• Diagonalization • Cramer's Rule, Volume, and Linear Transformations	5.3 3.3	**p.286**: 1,3,5,11,17,19,21,23 **p.184**: 5,7,11,15,19,23
12	• Partitioned Matrices • Course Review	2.4	**p.121**: 1,3,5,7,9,11,13,15
13	Final Exam		