North South University
Department of Mathematics and Physics

Course Title:	**Introduction to Linear Algebra**
Course Code:	**MAT-125**
Section No:	**11&12**
Semester:	**Summer 2020**
INSTRUCTOR & DEPARTMENT INFORMATION	
Instructor's Name:	Dr. Mohammed Forhad Uddin (MFU)
Office Room:	
Office Hours:	
Office Phone:	
Email Address:	forhad.uddin@northsouth.edu
Department:	**Mathematics and Physics**
Links:	

Text Book   :Elementary Linear Algebra By Howerd Anton (10/11 th Edition)

supplementary   : Introduction to Linear Algebra By Gilbert Strang (Third Edition)

Marks Distribution:
Grading Policy:

Attendance	10%
Assignments	10%
Quizzes	20%
Mid-Term	30%
Final Exam	30%
Total	100%

Credit: 3 credit points

Final Exam (Comprehensive)

Numerical Scores	Letter Grade	Grade Points
93 & above	A Excellent	4.0
90 - 92	A-	3.7
87 – 89	B+	3.3
83 – 86	B	3.0
80 – 82	B-	2.7
77 – 79	C+	2.3
73- 76	C	2.0
70 – 72	C-	1.7
67 - 69	D+	1.3
60 - 66	D	1.0

Classroom Rules of Conduct

1. Electronic devices e.g**. cell phone**, **laptop, notepad, iPad, iPod, mp3, etc.** are strictly prohibited in the class.

2. It is imperative that the students maintain absolute discipline in class. Students are expected to arrive on time in the class.

3. **Academic Integrity Policy:** Department of Mathematics and Physics does not tolerate academic dishonesty by its students. At minimum, students must not be involved in cheating, copyright infringement, submitting the same work in multiple courses, significant collaboration with other individuals outside of sanctioned group activities, and fabrications.

Students are advised that violations of the Student Integrity Code will be treated seriously, with special attention given to repeated offences.

Please Refer to NSU Student Handbook, Sections: "Disciplinary Actions" and "Procedures and Guidelines".

EXAMS & MAKE UP POLICY

Four quizzes will be taken (best **Three** out of **Four** will be considered). **NO makeup for quizzes or midterms will be taken under any circumstances.** If a student misses any of the Midterm exams due to the circumstances beyond their control (official valid documents are required) and informed beforehand (if possible), reasonable arrangement may be considered. There will be **no extra question** in the Midterm and Final exams, so that students should have to answer all the questions given in the exam script.
Cell phones are **prohibited** in exam sessions.

ATTENDANCE POLICY

Students are required and expected to attend all classes regularly and on time and participate in class discussions. North South University mandates to fail students who are absent 25% or more from their classes, even if such absences are excusable. It is the responsibility of the student to become aware of other course-related announcements missed during an absence.
Please Refer to NSU Student Handbook, Section: "Study Principles and Policies"

COMMUNICATION POLICY

All communications should take place using the instructor's **email**. Announcements in class will override any statement made here or in any other handouts. It is the student's responsibility to be aware of any announcements made in classes.

APPROPRIATE USE POLICY

All members of the North South University community must use electronic communications in a responsible manner. The University may restrict the use of its computers and network systems for electronic communications subject to violations of university policies/codes or local laws or national laws. Also, the university reserves the right to limit access to its networks through university-owned or other computers, and to remove or limit access to material posted on university-owned computers.

STUDENTS WITH SPECIAL NEEDS

North South University will provide educational opportunities that ensure fair, appropriate and reasonable accommodation to students who have disabilities/special needs that may affect their ability to participate in course activities or meet course requirements. Students with disabilities are encouraged to contact their instructors to ensure that their needs are met. The University through its Special Need section will exert all efforts to accommodate special needs.

Special Needs Section
Telephones: +88-02-**5566 8200 ext-1220**
Location: **Room # 413/A, Admin Building (**4th floor).

Please Refer to NSU Student Handbook, Section: "Special Needs Services"

STUDENTS COMPLAINTS POLICY

Students at North South University have the right to pursue complaints related to faculty, staff, and other students. The nature of the complaints may be either academic or non-academic. For more information about the policy and processes related to this policy, you may refer to the students' handbook.

Marks distribution for attendance:

Number of class	0-12	13	14	15	16	17	18	19	20	21	22	23-24
Marks	0	0.8	1.6	2.2	2.7	3.2	3.6	4	4.3	4.6	4.8	5

Suggested reading by the students:

Chapter 3: Vectors in 2-Space and 3-Space: Introduction to Vectors, Norm of a Vector; Vector Arithmetic, Dot Product; Projections, Lines and Planes in 3-Space
Chapter 6: Inner Product Spaces: Inner Products, Angle and Orthogonality in Inner Products, Orthonormal Bases; Gram-Schmidt Process, Orthogonal Matrices; Change of Basis.

Note: The instructor reserves the right to make changes to the syllabus if necessary.

Course Objectives:

1. Understanding of the basic concepts of system of linear equations, matrix algebra, vector spaces, eigenvalues and eigenvectors, orthogonality and diagonalization.
2. Use formula, mathematical methods, algebra, geometry, graphs and solve problems of system of linear equations, matrix algebra, vector spaces, eigenvalues and eigenvectors, orthogonality and diagonalization.
3. To demonstrate understanding of linear algebra perceptions solve applications problems (Linear Programming or others).

Course Outcomes:

Sl. #	Course Outcomes (CO)	Bloom's taxonomy domain/level (C: Cognitive P: Psychomotor A: Affective)	Delivery methods and activities	Assessment tools
CO-1	Understand and learn the basic concepts of computational techniques of solving system of linear equations, matrix algebra, vector spaces, eigenvalues and eigenvectors, orthogonality and diagonalization.	**C1, C2**	Lecture, Notes	Quiz, Assignment
CO-2	Apply the concept, techniques, visualizations, geometric properties etc. to solve problems related to Linear Algebra.	**C3**	Lecture, in-class group discussion	Midterms, Final, Assignment, Class participation
CO-3	Interpret, analyze, formulate mathematical models to solve applications involving Linear Programming problems.		Lecture, in-class group discussion	Final, Assignment, Class participation

Contents

Chapter 1: System of Linear Equations and Matrices

- Introduction to System of Linear Equations
- Gaussian Eliminations
- Matrices and Matrix Operations
- Inverse; Rules of Matrix Arithmetic
- Elementary Matrices and a Method for Finding inverse of Matrix
- Further Results on Systems of Equations and Invertibility
- Diagonal, Triangular and Symmetric Matrices

Chapter 2: Determinants:

- Determinant by Cofactor Expansion
- Evaluating Determinants by Row Reduction
- Properties of Determinant Function

Chapter 4.   Euclidean Vector Spaces:

- Euclidean n-space
- Linear Transformation from $\mathbf{R}_n$ to $\mathbf{R}_m$
- Properties of Linear Transformations

Mid-Term Exam

Chapter 5:   General Vector Spaces

- Real Vector Spaces
- Subspaces
- Linear Independence and Dependence
- Basis, Dimension, Solution Space and Null Space
- Row Space, Column Space and Null Space
- Rank and Nullity

Chapter 7: Eigenvalues and Eigenvectors

- Eigenvalues and Eigenvectors
- Diagonalization

Chapter 11: Applications of Linear Algebra

- Electric Circuits
- Linear Programming
- Graph Theory
- Network problems
- Markov Chain
- Instructor can add more

Final Exam

Suggest only for reading: (Out of lectures)

Chapter 3: Vectors in 2-Space and 3-Space

- Introduction to Vectors
- Norm of a Vector; Vector Arithmetic
- Dot Product; Projections
- Lines and Planes in 3-Space

Chapter 6: Inner Product Spaces

- Inner Products
- Angle and Orthogonality in Inner Products
- Orthonormal Bases; Gram-Schmidt Process
- Orthogonal Matrices; Change of Basis