Course Unit Title	Linear Algebra
Course Unit Code	MAT112
Type of Course Unit	Compulsory
Level of Course Unit	1^{st} year BSc program
National Credits	3
Number of ECTS Credits Allocated	6
Theoretical (hour/week)	4
Practice (hour/week)	-
Laboratory (hour/week)	-
Year of Study	1
Semester when the course unit is delivered	2
Course Coordinator	Assist. Prof. Dr. Ali Denker
Name of Lecturer (s)	
Name of Assistant (s)	-
Mode of Delivery	Face to Face
Language of Instruction	English
Prerequisites	MAT101 (Calculus I)
Recommended Optional Programme Components	Basic background in mathematics

Course description:

System of linear equations: elementary row operations, echelon forms, Gaussian elimination method. Matrices: elementary matrices, invertible matrices. Determinants: adjoint and inverse matrices, Crammer's rule. Vector spaces: linear independents, basis, dimension. Linear mapping. Inner product spaces: Gram-Schmit ortogonalization. Eigenvalues and eigenvectors, Cayley-Hamilton theorem, diagonalization.

Objectives of the Course:

- To provide a student with methods for solving systems of linear equations
- To introduce the basic properties of determinants and some of their applications
- To show that the notion of a finite-dimensional, real vector space is not as remote as it may have seemed when first introduced
- To deal with magnitude and direction in inner product spaces
- To study linear transformations
- To consider eigenvalues and eigenvectors and solve the diagonalization problem for symmetric matrices

Learning Outcomes

When this course has been completed the student should be able to		Assessment
1	Solve the systems of linear equations. Provide arithmetic operations with matrices. Compute the inverse of matrix.	1, 2
2	Determine the value of determinant of a matrix. Use Cramer's rule to solve the systems of linear equations.	1, 2
3	Realize the importance of the concepts of vector space, basis and dimention.	1, 2
4	Compute the matrix representation of a linear transformation.	1, 2

5	Evaluate the eigenvalues and the corresponding eigenvectors of the matrix.	1, 2

Assessment Methods: 1. Written Exam, 2. Assignment

Course's Contribution to Program

		CL
1	Apply knowledge of mathematics, natural science with relevant to life science and multidisciplinary context of engineering science.	5
2	Analyze, design and conduct experiments, as well as to analyze and interpret data.	4
3	Design a system, component or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability and sustainability.	1
4	Function on multidisciplinary teams.	5
5	Control in design work, by using simulation, modeling and tests and integration in a problem solving oriented way.	2
6	Display an understanding of professional and ethical responsibility.	4
7	Communicate effectively aware of the non-technical effects of engineering.	1
8	Search technical literature and other information sources.	1
9	Recognize of the need for, and an ability to engage in life-long learning.	1
10	Exhibit knowledge of contemporary issues.	2
11	Use the techniques, skills and modern engineering tools necessary for engineering practice to develop marketable products for the global market.	1

CL: Contribution Level (1: Very Low, 2: Low, 3: Moderate, 4: High, 5: Very High)

Course Contents

Week	Chapter	Topics	Exam
1	1	Introduction to Systems of Linear Equations. Gaussian Elimination.	
2	1	Matrices and Matrix Operations. Inverses, Rules of Matrix Arithmetic.	
3	1	Elementary Matrices and a Method for Finding A^{-1}.	
4	1	Further Results on Systems of Equations and Invertability. Diagonal, Triangular and Symmetric Matrices	
5	2	Determinants by Cofactor Expansion.	
6	2	Evaluating Determinants by Row Reduction. Properties of the Determinant Function.	
7	4	Euclidean *n*-Space. Linear Transformations from $R^n$to R^m.	
8	4	Properties of Linear Transformations from $R^n$to R^m.	
9	4	Linear Transformations and Polynomials.	
10			Midterm
11	5	Real Vector Spaces. Subspaces. Linear Independence.	
12	5	Basis and Dimension.	
13	5	Row Space, Column Space and Nullspace. Rank and Nulity	
14	6	Inner Products. Angle and Orthogonality in Inner Product Spaces. Orthonormal Bases. Gram-Schmidt Process	
15	7	Eigenvalues and Eigenvectors. Diagonalization.	

16	7	Orthogonal Diagonalization.	
17			Final

Recommended Sources

Textbook:
Howard Anton , Chris Rorres, Elementary Linear Algebra, John Wiley Publications, 9th edition, 2005.

Supplementary Course Material
- Bernard Kolman, David R.Hill , Elementary Linear Algebra with Applications,9 th edition, 2008.
- Ron Larson, David C. Falvo, ElementaryLinear Algebra, sixth edition 2010.

Assessment

Attendance	10%	
Assignment	10%	
Midterm Exam	30%	Written Exam
Final Exam	50%	Written Exam
Total	100%	

Assessment Criteria

Final grades are determined according to the Near East University Academic Regulations for Undergraduate Studies

Course Policies
- Late assignments will not be accepted unless an agreement is reached with the lecturer.
- Cheating and plagiarism will not be tolerated. Cheating will be penalized according to the Near East University General Student Discipline Regulations

ECTS allocated based on Student Workload

Activities	Number	Duration (hour)	Total Workload(hour)
Course duration in class (including Exam weeks)	16	4	64
Labs and Tutorials	2	2	4
Assignment	5	4	20
Project/Presentation/Report	-	-	-
E-learning activities	-	-	-
Quizzes	-	-	-
Midterm Examination	1	15	15
Final Examination	1	15	15
Self Study	14	3	42

Total Workload	160
Total Workload/30(h)	5.33
ECTS Credit of the Course	5