HASAN KALYONCU UNIVERSITY
Faculty of Engineering
Course Description Form

COURSE: Linear Algebra				
CODE: MATH211	**SEMESTER:** FALL			
LANGUAGE: ENGLISH	**TYPE:** COMPULSORY			
PRE-REQUISITES:- **CO-REQUISITES:-**	**THEORY**	**PRACTICAL**	**CREDIT**	**ECTS**
WEEKLY HOURS:	3	0	3	5

CONTENT OF THE COURSE:
Systems of linear equations. Matrices. Algebraic properties of matrix operations. Special types of matrices. Echelon form of a matrix. Solving linear systems by Gauss-Jordan reduction. Finding the inverse of a matrix by row reduction. Equivalent matrices. Determinants. Properties of determinants. Cofactor expansion. Inverse of a matrix (via its determinant). Other applications of determinants (Cramers rule). Vectors in the plane and in 3-space. Vector spaces. Subspaces. Span and linear independence. Basis and dimension. Row space. Null space. Nullity and rank of a matrix. Homogeneos systems. Change of basis. Transition matrices. Orthogonalization. Linear transformations. Kernel and range of a linear transformation.

OBJECTIVE OF THE COURSE:
The course is standard first year course on linear algebra providing basic definitions, concepts and methods. Discussion and proofs are given in form of algorithms whenever is possible. The objective Concepts of basic operations in Linear algebra: Introduction to Systems of Linear Equations, Gaussian Elimination, Matrices and Matrix Operations. Inverses; Rules of Matrix Arithmetic, Elementary is twofold: to make students ready to see applications of linear algebra on subsequent courses and to enable them to continue their study on more advanced level.

WEEKLY SCHEDULE	
Week	**Topics**
1	Introduction to Systems of Linear Equations, Gaussian Elimination.
2	Matrices and Matrix Operations, Inverses; Rules of Matrix Arithmetic
3	Elementary Matrices and a method for
4	Diagonal, Triangular and Symmetric Matrices, The Determinant Function
5	Evaluating Determinants by Row Reduction, Properties of the Determinant Function
6	Cofactor Expansion; Cramer's Rule, Euclidean n-space
7	Linear Transformation Rn to Rn Properties of Linear Transformations from Rn to Rn
8	MIDTERM
9	Real Vector Spaces, Subspaces
10	Row Space, Column Space and Nullspace, Linear Independence, Basis and Dimension Rank and nullity
11	Inner Products, Angle and Orthogonality in Inner product Spaces
12	Orthogonal Bases; Gram-Schmidt Process
13	Eigenvalues and Eigenvectors
14	Diagonalization, Metric, Normed and Euclidean space

TEXTBOOK: Elementary Linear Algebra with Applications, 9 ed. B.Kolman, D.Hill, Person Inc. **REFERENCE BOOKS:** Elemantary Linear Algebra with Applications, 2nd ed., R.O.Hill, HBJ Pres.

EVALUATION SYSTEM:		
IN-TERM STUDIES	**QUANTITY**	**PERCENTAGE (%)**
Midterm Exam	1	45
Homework	0	0
Labworks	0	0
Quiz	0	0
Final Exam	1	55
TOTAL		
CONTRIBUTION OF INTERM STUDIES TO OVERALL GRADE	1	45
CONTRIBUTION OF FINAL EXAMINATION TO OVERALL GRADE	1	55
TOTAL		100

COURSE CATEGORY:	**PERCENTAGE (%)**
Mathematics and Basic Sciences	%60
Engineering	%30
Engineering Design	%10
Social Sciences	%0

TABLE OF ECTS / WORKLOAD:			
Activities	**QUANTITY**	**Duration (Hour)**	**Total Workload**
Course Duration	13	3	39
Hours for off-the-classroom study (Pre-study, practice)	14	7	98
Mid-term	1	2	2
Final examination	1	2	2
Labworks	0	0	0
Quiz	0	0	0
Total Work Load			**141**
Total Work Load / 30			**4,7**
ECTS Credit of the Course			**5**

INSTRUCTOR(S):	Asst. Prof. Dr. Ece Yetkin ÇELİKEL
FORM PREPARATION DATE:	25.11.2019

	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11
LO1	3	2	0	0	0	0	0	0	0	0	0
LO2	3	2	0	0	0	0	0	0	0	0	0
LO3	2	3	0	3	0	0	0	0	0	0	0
LO4	2	3	0	0	0	0	0	0	0	0	0
LO5	3	2	0	0	0	0	0	0	0	0	0
	PO: Program Outcomes | LO: Learning Outcomes Values: 0: None | 1: Low | 2: Medium | 3: High										

LEARNING OUTCOMES OF THE COURSE:	**PROGRAM OUTCOMES:**
LO1: A comprehension of mathematics (algebra, differential, integration …) and fundamentals of science LO2:Ability to apply knowledge of mathematics, science and engineering to problems in electronics engineering. LO3:Ability to recognize the needs and challenges of our age and to assess the global and social impact of engineering solutions LO4: Ability to identify, formulate and solve engineering problems. LO5: Ability to effectively communicate knowledge and opinions via written, oral visual means.	**PO1:** Adequate knowledge in mathematics, science and engineering subjects pertaining to the relevant discipline; ability to use theoretical and applied knowledge in these areas in complex engineering problems. **PO2:** Ability to identify, formulate, and solve complex engineering problems; ability to select and apply proper analysis and modeling methods for this purpose. **PO3:** Ability to design a complex system, process, device or product under realistic constraints and conditions, in such a way as to meet the desired result; ability to apply modern design methods for this purpose. **PO4:** Ability to devise, select, and use modern techniques and tools needed for analyzing and solving complex problems encountered in engineering practice; ability to employ information technologies effectively. **PO5:** Ability to design and conduct experiments, gather data, analyze and interpret results for investigating complex engineering problems or discipline specific research questions. **PO6:** Ability to work efficiently in intra-disciplinary and multi-disciplinary teams; ability to work individually. **PO7:** Ability to communicate effectively in Turkish, both orally and in writing; knowledge of a minimum of one foreign language; ability to write effective reports and comprehend written reports, prepare design and production reports, make effective presentations, and give and receive clear and intelligible instructions. **PO8:** Recognition of the need for lifelong learning; ability to access information, to follow developments in science and technology, and to

	continue to educate him/herself. **PO9:** Consciousness to behave according to ethical principles and professional and ethical responsibility; knowledge on standards used in engineering practice. **PO10:** Knowledge about business life practices such as project management, risk management, and change management; awareness in entrepreneurship, innovation; knowledge about sustainable development. **PO11:** Knowledge about the global and social effects of engineering practices on health, environment, and safety, and contemporary issues of the century reflected into the field of engineering; awareness of the legal consequences of engineering solutions.