## **Department of Mathematics**

## **Course Profile**

Course Number: MATH 200	Course Title: Linear Algebra
Required / Elective: Required	Prerequisite: None
Catalog Description:	Textbook / Required Material:
Matrices. Solving linear systems. Real vector spaces. Linear spaces with inner product. Linear transformations and their matrix representations. Determinants. Eigenvalues and eigenvectors.	Algebra, 8th edition, Pearson Education
<b>Course Structure / Schedule :</b> (3+0+0) 3 / 5 ECTS	

## **Extended Description:**

Matrices: i) matrix addition, matrix and scalar multiplication; ii) algebraic properties of matrix operations; iii) special types of matrices. Solving linear systems: i) elementary row and column operations; ii) echelon form of a matrix; iii) Gauss and Gauss-Jordan method; iv) elementary matrices and finding the inverse of a matrix by using elementary operations. Real vector spaces: i) definition; ii) subspaces; iii) span and linear independence; iv) basis and dimensions; v) homogeneous systems; vi) rank of a matrix. Linear spaces with inner product: i) definition of the inner product; ii) Gram-Schmidt Process iii) orthogonal complements. Linear transformation and their matrix representations: i) kernel and range of a linear transformation; ii) matrix of a linear transformation. Determinants: i) definition and properties of determinants; ii) cofactor expansion; iii) finding inverses by using cofactors. Eigenvalues and eigenvectors: i) characteristic polynomial and equation of a matrix; ii) eigenvalues and eigenvectors; iii) diagonalization of symmetric matrices

<b>Design content:</b> None <b>Computer usage.</b> No particular computer usage required.	Design content: None	<b>Computer usage:</b> No particular computer usage required.
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Course Outcomes: By the end of the course, the students should be able to

- 1. Recognize the basic ideas and main computational techniques of linear algebra [1, 2, 3, 5],
- 2. Work with abstract concepts of modern mathematics and to read and write proofs of elementary mathematical statements [1, 2, 3, 6, 7],
- 3. Apply elementary methods of linear algebra such as matrices, determinants and so on in other fields of mathematics, engineering and science [1, 2, 3, 6].

[1] Demonstrate the ability of solving problems by using techniques from calculus, linear algebra, differential equations, probability and statistics,

[2] Demonstrate knowledge of mathematics to construct, analyze and interpret mathematical models,

[3] Demonstrate the ability to apply mathematics to the solutions of problems,

[5] Have an ability to write computer programs and use algorithms for solving problems,

[6] Have a basic knowledge of the main fi algebra, differential equations, differentia	
[7] Have an ability to function both indep multidisciplinary team.	endently and as a member of a
Recommended reading: Any textbook on	linear algebra
Teaching methods: Pre-readings and lectur	es.
Assessment methods: Midterm exams, fina	l exam
Student workload:	
Preparatory reading	50 hrs
Lectures, discussions	45 hrs
Homework	
Midterm Exams	
Final Exam	3 hrs
TOTAL	125 hrs to match 25 x 5 ECTS
Prepared by: Elman Hasanoğlu	Revision Date: 08.02.2010