Department of Mathematics

Course Profile

Course Number: MATH 200	**Course Title: Linear Algebra**
Required / Elective: Required	**Prerequisite:** None
Catalog Description: Matrices. Solving linear systems. Real vector spaces. Linear spaces with inner product. Linear transformations and their matrix representations. Determinants. Eigenvalues and eigenvectors.	**Textbook / Required Material:** KOLMAN B., HILL D.R. *Elementary Linear Algebra*, 8th edition, Pearson Education International, 2004.
Course Structure / Schedule : (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	
Design content: None	**Computer usage:** No particular computer usage required.

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 fields of mathematics, including analysis, algebra, differential equations, differential geometry,

[7] Have an ability to function both independently and as a member of a multidisciplinary team.

Recommended reading: Any textbook on linear algebra

Teaching methods: Pre-readings and lectures.

Assessment methods: Midterm exams, final exam

Student workload:

Preparatory reading ……	50 hrs
Lectures, discussions ……	45 hrs
Homework ……	23 hrs
Midterm Exams ……	4 hrs
Final Exam ……	3 hrs
TOTAL ……	**125 hrs … to match 25 x 5 ECTS**

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