

## General Information

**Name of Course:**

# LINEAR ALGEBRA

**Course Code:**

PMKMANB010HA

**Semester:**

Computer Science Engineering Bsc 2<sup>nd</sup>

**Credit Units:**

5

**Allotment of Hours per Week:**

2 Lecture Lessons /Week, 2 Practical Lessons /Week

**Evaluation:**

Two Midterm Exams (with grade) and two Homeworks

**Prerequisites:**

None

**Instructors:**

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## Introduction, Learning Outcomes:

After successful completion of the course the student will

- (1) know basic methods for solving systems of linear equations,
- (2) be familiar with the basic matrix operations,
- (3) know how to compute determinants, and will understand the role of determinants in the theory of solvability of linear equations, and invertability of matrices,
- (4) understand the role of the rank of a matrix for the solution set of linear equations,
- (5) know the basic concepts of eigenvalues and eigenvectors,
- (6) be familiar with typical engineering applications of matrices,
- (7) be familiar with the use of Maple software in matrix computations.

The Students must solve two intermediate (or midterm) tests successfully. The language of the exam is English.

## Prerequisites

To understand and apply concepts of linear algebra you need to have taken basic math classes such as Algebra and Calculus is useful)

## General Course Description and Main Content:

The Linear Algebra includes the following topics

- Linear systems of equations
- Gaussian Elimination
- Matrices and matrix operations
- Rank and inverse of a matrix
- Determinants
- Linear dependence and independence
- Basic vector spaces, orthogonality and basis
- Eigenvalues and eigenvectors
- Symmetric Matrices and diagonalization
- Applications

## Methodology:

The course gives an introduction to important mathematical techniques of exercise solving problems from linear algebra and understands the basic theory with and without using Maple computer algebra software. Equal emphasis is given to learning new mathematics concepts and to learning how to construct and write down correct linear algebraically arguments.

A graphing calculator with matrix capabilities is highly desirable. Students will use MAPLE program at class and homework which is available on campus computers.

**Schedule:**

week	Topics	Midterm Exam, Homework,
1.	System of Linear Equations, Gaussian elimination, Augmented matrix.	
2.	Reduced row Echelon Form of a Matrix, Parameterized solutions,	
3.	Span, Vector Spaces, Subspace, Linear independence, dimension, basis	
4.	Matrix Operations, elementary operations, matrix inverse	1. Homework & Quizes
5.	Matrix as a linear transformation; range, null space, rank-nullity	
6.	More on transformations; Length, direction, inner products	
7.	Gram Schmidt orthogonalization	1st midterm test from topics 1-6.
8.	Orthogonal Complements, Least Squares	
9.	<b>Spring holiday</b>	
10.	Determinants; properties; cofactor, adjoint	
11.	Determinants; volumes; inverses	
12.	Eigenvalues and Eigenvectors; Diagonalization	2. Homework & Quizes
13.	Finish of diagonalization	
14.	Discussion of old exams	
15.		2 <sup>nd</sup> midterm test from topics 7-14.

**Attendance:**

Attending is required all classes, and will impact the grade (max. 5%).. Unexcused absences will adversely affect the grade, and in case of absence from more than 30% of the total number of lesson will be grounds for failing the class. To be in class at the beginning time and stay until the scheduled end of the lesson is required, tardiness of more than 20 minutes will be counted as an absence. In the case of an illness or family emergency, the student must present a valid excuse, such as a doctor's note.

**Evaluation + Grading**

**Quizes, Homeworks and Attendance (20 %)**

**Midterm Exam # 1 (40 %)**

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1. Satisfactory work: Achieving more than 40% of the total points in the two written midterm assessments during the semester then the grading scale table will be applied to obtain the final result.
2. Unsatisfactory work: When the total points of the two midterm written tests are less than 40% together then a new test need to write from the whole topics of the semester in the exam period. A minimum of 40% is required to pass on this exam.

**Grading Scale:**

Numeric Grade:	excellent (5)	good (4)	satisfactory (3)	pass (2)	fail (1)
Evaluation in percentages:	[85%,100%]	[70%,85%)	[55%,70%)	[40%,55%)	[0%,40%)

**PTE Grading Policy:**

Information on PTE's grading policy can be found at the following location:

**Students with Special Needs:**

Students with a disability and needs to request special accommodations, please, notify the Deans Office. Proper documentation of disability will be required. All attempts to provide an equal learning environment for all will be made.

**Readings and Text books:**

- [1] Howard Anton, Chiss Rorres, Elementary Linear Algebra, Application version, 10th Edition, John Wiley & Sons, 2010.
- [2] Bernard Kolman, David Hill, *Elementary Linear Algebra with Applications*, 9th edition, Pearson Prentice Hall, 2008.

Materials are found on platform of Neptun <https://neptun.pte.hu/> login as student.