MATH 201 Linear Algebra

PHYS102 Engineering Physics II							
Course Name	**Course Code**	**Semester**	**h/w**	**Appl.**	**Lab. h/w**	**Credit**	**ECTS**
Linear Algebra	MATH201	3	3	0	0	3	4

Prerequisites	No
Course Language	English
Course Type	Compulsory
Course Level	Undergraduate
Way of teaching	Online, face to face
Learning and teaching techniques	Expression, question answer, application

Course Objectives

This is an introductory course in linear algebra. The aim of this course is to teach you the mathematical fundamentals of linear algebra in a way that illustrates their relevance to computer science. This is a course in mathematics. But, in it, you will use the mathematical concept to illustrate facts about computers, and you will use computers to help you improve your understanding of the mathematics. You will also see how linear algebra is applied in various areas of computer science.

Course Educational / Learning Outcomes

Students who can successfully complete this course;

1.	Define basic terms and concepts of matrices, vectors and complex numbers
2	apply the matrix calculus in solving a system of linear algebraic equations
3	analyze the solution set of a system of linear equations.
4	generalize the concepts of a real (complex) vector space to an arbitrary finite-dimensional vector space.
5	investigate properties of vector spaces and subspaces using by linear transformations.
6	determine whether a subset of a vector space is linear dependent.
7	express linear transformation between vector spaces.
8	represent linear transformations by matrices.
9	
10	

Topics Covered

Vectors, matrices, linear equations, vector spaces and subspaces, orthogonality, determinants, Eigenvalues and Eigenvectors, linear transformations, complex vectors and matrices, numerical linear algebra.

Weekly Topics and Releated Preparation Studies		
Week	**Topics**	**Preparation**
1	Introduction to vectors, vectors and linear combinations, algebraic properties, lengths and dot products, matrices	
2	Solving linear equations, vectors and linear equations, elimination, row echelon form.	
3	Matrix operations, rules of matrix operations, independence, transposes, inverse matrices, factorization and permutations	
4	Vector spaces and subspaces, null space, dimensions, vector independence	
5	Orthogonality, least squares approximations, orthonormal bases and Gram-Schmidt	
6	Determinants, permutations and cofactors, inverses and volumes	
7	Eigenvalues and eigenvectors, diagonalization, systems of differential equations,	
8	Midterm-1	
9	Symmetric matrices, diagonalization of symmetric matrices, quadratic forms, positive definite matrices	
10	Linear transformations (mapping), the matrix of a linear transformation	
11	Complex vectors and matrices, complex numbers, systems with complex numbers, vector spaces	
12	Midterm-2	
13	Eigenvectors and inner products in complex vector spaces, hermitian matrices and unitary diagonilazation	
14	Final Exam	
15		
16		

Textbook
G. Strang, *Introduction to Linear Algebra*, 5th Ed., Wellesly-Cambridge Press, 2016.
S. Lipschutz and M. Lipson, *Schaum's Outline of Linear Algebra*, 6th Edition. New York: McGraw-Hill Education, 2017.

Assessment System		
Works	**Number**	**Contribution**
Attendance		
Laboratory		
Practice		
Field Study		
Course-Specific Internship (if applicable)		
Quizzes		
Homework		
Presentation		
Project		
Report		
Seminar		
Midterm Exams / Midterm Jury	2	% 60
Final Exam / Final Jury	1	% 40

	Total	**% 100**
Contribution to the success grade of semester studies		% 40
Contribution of the studies at the end of semester to the success grade		% 60
	Total	**% 100**

Course Category	
Basic Vocational Courses	X
Expertise / Field Courses	
Support Courses	
Communication and Management Skills Courses	
Transferable Skill Courses	

The Relationship between Course Learning Outcomes and Program Competencies							
No	**Program Competencies / Outcomes**	**Contribution Level**					
		1	**2**	**3**	**4**	**5**
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						

ECTS/Workload Table			
Activities	**Number**	**Time (h)**	**Total Workload**
Course hours (Including exam week: 16 x total weekly course hoursi)	16	3	48
Laboratory	16	2	32
Application			
Course specific internship			
Field Study			
Out-of-class study time	16	2	32
Presentation/Seminar Preparation			
Projects			
Reports			
Homeworks	3	2	6
Quizzes			
Preparation time for Midterm Exams / Midterm Jury	2	15	30
Preparation time for Final Exam / Final Jury	1	15	15
Total Workload	**(178/40 = 4.45)**		**178**