ECTS

(B) Course information in english

General course information:

Course title:	Linear Algebra and Analytic Geometry		**Course code:**	ΓΚ0106	
Credits:	6		**Work load (hours):**	130	
Course level:	Undergraduate	☐	Graduate		☐
Course type:	Mandatory	☐	Selective		☐
Course category:	Basic	☐	Orientation		☐
Semester:	1st		**Hours per week:**	5	
Course objectives (capabilities pursued and learning results):					
The course focuses mainly on applications of linear algebra and analytic geometry without avoiding rigorous proofs of theorems where deemed necessary. The student is expected to be able to use vector algebra, handle matrices and determinants, solve linear systems, calculate eigenvalues and eigenvectors, find analytic or polar equations of straight lines and planes in space, and recognize analytic or polar equations of important curves and surfaces as they appear in engineering science.					
Prerequisites: Highschool algebra and analytic geometry					

Instructor's data:

Name:	Theophanes Grammenos
Level:	Ass. Professor
Office:	Civil Engineering Building, University of Thessaly, Pedion Areos, 38334 Volos
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Other tutors:	-

Specific course information:

Week No.	Course contents	Hours	
		Course attendance	**Preparation**
1	Vector algebra, collinear and coplanar vectors, vector bases	4	
2	Dot product, cross product, and triple product of vectors, vector normalization,	4	

	coordinate systems		
3-4	<u>Straight lines and planes in space</u>: vector, parametric, and analytic equations of lines and planes, relative positions, distance of a point from a plane, common vertical and minimal distance between skew lines, straight line as a section of planes, line projection onto a plane, plane defined by parallel lines <u>Regular polyhedra</u>: areas and volumes	8	
5	<u>Plane Curves</u>: analytic and parametric equations, polar coordinates, conic sections, remarkable curves, change of coordinate system (parallel shift and axis rotation) in the plane and in space	4	
6-7	Matrix properties and matrix algebra, inverse, orthogonal, symmetric, and block matrices. Determinants	8	
8-9	Linear systems, Gauss elimination method, determinant method of Cramer	8	
10	Vector spaces and subspaces, linear combination and linear independence, sum of subspaces, basis and dimension of vector spaces	4	
11	Matrices and linear mappings, change of basis, similar matrices, linear geometric transformations in the plane, rotation matrices	4	
12	Rank of a matrix and linear systems, Gram-Schmidt orthogonalization	4	
13-14	Eigenvalues and eigenvectors, matrix diagonalization, similarity transformation, Cayley-Hamilton theorem, minimal polynomial	8	

Additional hours for:			
Class project	**Examinations**	**Preparation for examinations**	**Educational visit**

Suggested literature (in Greek):

Author	Title	
Δονάτος Γ.-Αδάμ Μ.	Γραμμική Άλγεβρα – Θεωρία και Εφαρμογές (*Linear Algebra – Theory and Applications*)	
Ιωαννίδου Θ.	Εισαγωγή στη Γραμμική Άλγεβρα & Αναλυτική Γεωμετρία (*Introduction to Linear Algebra & Analytic Geometry*)	
Καδιανάκης Ν.-Καρανάσιος Σ.	Γραμμική Άλγεβρα, Αναλυτική Γεωμετρία και Εφαρμογές (*Linear Algebra, Analytic Geometry and Applications*)	
Μυλωνάς Ν.-Παπαδόπουλος Β.	Γραμμική Άλγεβρα και Αναλυτική Γεωμετρία (*Linear Algebra and Analytic Geometry*)	
Σουρλάς Δ.	Γραμμική Άλγεβρα και Αναλυτική Γεωμετρία (*Linear Algebra and Analytic Geometry*)	
Φελλούρης Α.	Γραμμική Άλγεβρα και Αναλυτική Γεωμετρία (*Linear Algebra and Analytic Geometry*)	
Χατζάρας Ι.-Γραμμένος Θ.	Εισαγωγή στη Γραμμική Άλγεβρα (*Introduction to Linear Algebra*)	
Χρυσάκης Θ.	Γραμμική Άλγεβρα και Αναλυτική Γεωμετρία (*Linear Algebra and Analytic Geometry*)	
Banchoff T.-Wermer J.	Η Γραμμική Άλγεβρα μέσω Γεωμετρίας (*Linear Algebra through Geometry*)	

Teaching method *(select and describe if necessary - **weight***):*		
Teaching	☑	80%
Seminars	☐	….%
Demonstrations	☐	….%
Laboratory	☐	....%
Exercises	☑	20%
Visits at facilities	☐	….%
Other *(describe):* ………………………	☐	….%
Total		100%

Evaluation method *(select)*- **weight:**				
	written	*%*	*Oral*	*%*
Homework	☐		☐	
Class project	☐		☐	
Interim examination	☑	20%	☐	
Final examinations	☑	80%	☐	
Other *(describe):* …………………………	☐		☐	