GDAŃSK UNIVERSITY OF TECHNOLOGY

Subject card

Subject name and code	Linear Algebra and Analytic Geometry, PG_00047802						
Field of study	Informatics						
Date of commencement of studies	October 2020		Academic year of realisation of subject	2020/2021			
Education level	first-cycle studies		Subject group	Obligatory subject group in the field of study Subject group related to scientific research in the field of study			
Mode of study	Part-time studies		Mode of delivery	at the university			
Year of study	1		Language of instruction	Polish			
Semester of study	2		ECTS credits	8.0			
Learning profile	general academic profile		Assessment form	assessment			
Conducting unit	Mathematics Center -> Vice-Rector for Education						
Name and surname of lecturer (lecturers)	Subject supervisor		dr Magdalena Musielak				
	Teachers		dr Magdalena Musielak				
Lesson types and methods of instruction	Lesson type	Lecture	Tutorial	Laboratory	Project	Seminar	SUM
	Number of study hours	30.0	30.0	0.0	0.0	0.0	60
	E-learning hours included: 0.0						
	Adresy na platformie eNauczanie: WETI - Inf. nstac - Algebra liniowa z geometrią analityczną 2020/21 (M.Musielak) - Moodle ID: 9828 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=9828						
Learning activity and number of study hours	Learning activity	Participation in didactic classes included in study plan		Participation in consultation hours	Self-study	SUM	
	Number of study hours	60		15.0	125.0	200	
Subject objectives	Students obtain competence in using methods of linear algebra and knowledge how to solve simple problems that can be found in the field of engineering.						

Learning outcomes

Course outcome	Subject outcome	Method of verification
[K6_W01] Knows and understands, to an advanced extent, mathematics necessary to formulate and solve simple issues related to the field of study	Student names the basic algebraic structures, uses the basic operations on complex numbers, knows various methods to solve problems in matrix algebra, is able to determine the number of solutions of a system of equations. Student analyses problems from analytical three- dimensional geometry. Student uses the basic methods of linear algebra to formulate and solve simple problems in the field of informatics	[SW1] Assessment of factual knowledge
[K6_U01] can apply mathematical knowledge to formulate and solve complex and non-typical problems related to the field of study and perform tasks, in an innovative way, in not entirely predictable conditions, by:n- appropriate selection of sources and information obtained from them, assessment, critical analysis and synthesis of this information,n- selection and application of appropriate methods and toolsn	Student is able to determine whether a given set with binary operations is an algebraic structure, performs binary operations using modular arithmetic, determines the real and complex roots of polynomials, and performs operations on polynomials using modular arithmetic. Student solves problems in matrix algebra: calculates the determinants, solves matrix equations and systems of linear equations - using various methods. Student is able to use scientific software to solve problems from analytical three-dimensional geometry. Student is able to process the acquired information, analyze and interpret it, draw conclusions and reason opinions.	[SU4] Assessment of ability to use methods and tools

Subject contents

Binary operations. Algebraic structures: groups, rings and fields. Modular arithmetic.
Complex numbers. Geometric interpretation. Basic operations. Polar and exponential form.
Natural power and n-th root of complex number.
The polynomial ring. Roots of polynomials. Horners scheme. Fundamental theorem of algebra.
Matrices and determinants. Matrices operations. Invertible matrices. Laplaces formula for determinants.
Properties of determinants.
Methods of matrix inversion.
Systems of linear equations. Cramers theorem.
Rank of matrix. Kronecker-Capelly theorem. Gauss-Jordan elimination.
Three-dimensional geometry. Cartesian coordinate system. Dot, cross and scalar triple products. Lines and planes in three-dimensional space.
Basic geometric tranformations on a plane and space.

Prerequisites and co-requisites

Assessment methods and criteria

Subject passing criteria	Passing threshold	Percentage of the final grade
Tests	50.0%	100.0%

Recommended reading

Basic literature	T. Jurlewicz, Z. Skoczylas - Algebra i geometria analityczna. Definicje, twierdzenia i wzory., Oficyna wydawnicza GiS, 2006; T. Jurlewicz, Z. Skoczylas - Algebra i geometria analityczna. Przykłady i zadania., Oficyna wydawnicza GiS, 2006 J. Topp - Algebra liniowa, Wydawnictwo PG, 2005
Supplementary literature	J. Długosz - Funkcje zespolone, GiS, 2002
eResources addresses	WETI - Inf. nstac - Algebra liniowa z geometrią analityczną 2020/21 (M.Musielak) - Moodle ID: 9828 https://enauczanie.pg.edu.pl/moodle/course/view.php?id=9828

Example issues/ example questions/ tasks being completed	1. Discuss the existence of the solution for the given system of linear equations. 2. Discuss the relation between two given lines l1 and l2. 3. Find all roots of the equation z3 - 8i=0. Give their algebraic form. 4. Show that the points A, B, C, D do not lie in a plane. 5. Solve the matrix equation AX=B, where A i B are given matrices. 6. Find the remainder of the division of two polynomials over the field modulo 5
Work placement	Not applicable