STUDY MODULE DESCRIPTION FORM

Name of the module/subject		Code
Linear algebra with analytic geometry		**1010341711010342811**
Field of study	Profile of study (general academic, practical)	Year /Semester
Mathematics in Technology	**general academic**	**1 / 1**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
-	**Polish**	**obligatory**
Cycle of study:	Form of study (full-time,part-time)	
First-cycle studies (Polish Qualifications Framework level six)	**full-time**	
No. of hours		No. of credits
Lecture: **30** Classes: **30** Laboratory: **-** Project/seminars: **-**		**5**
Status of the course in the study program (Basic, major, other)	(university-wide, from another field)	
basic	**university-wide**	
Education areas and fields of science and art		ECTS distribution (number and %)
The sciences		**5 100%**
Mathematical sciences		**5 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic knowledge with range of secondary school [PQF 4]
2	**Skills**	The skill of efficient executing of algebraic operations, acquaintance of number sets as well as fundamental operations [PQF 4]
3	**Social competencies**	He has consciousness of need of broadening his competences, readiness to undertaking of co-operation [PQF 4]

Assumptions and objectives of the course:

To be acquainted with a matrix calculus and its applications to solving systems of linear equations. To know basic notions of the theory of linear spaces and linear operators, to be able to solve the eigenvalue problem. To use vector calculus to analysis of straight line and the plane in the space. The know basic notions of calculus of complex numbers.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. explain basic notions of matrix calculus, theory of linear spaces and linear operators, understand proofs (or their ideas) of more important selected theorems, explain operations on complex numbers - [K_W01 (**P6S_WG**), K_W03 (**P6S_WG**)]

2. explain basic notions of vector algebra, distinguish equations of straight line and plane in the space - [K_W01 (**P6S_WG**), K_W03 (**P6S_WG**)]

Skills:

1. calculate determinants and rank of matrix, apply matrix calculus to solving systems of linear equations, distinguish linear subspaces and the dimension of linear space, solve of an eigenvalue problem of linear operator given by a matrix - [[K_U01 (**P6S_UW**)]

2. determine of the straight line equation and plane equation in the space by applying vector algebra, use basic calculus of complex numbers - [K_U01 (**P6S_UW**)]

Social competencies:

1. can think and behave in good mathematical manner in the area of linear algebra analitical geometry - [K_K01 (**P6S_KK**)]

2. knows the limitation of own knowledge and understand the need of more far education and the necessity of systematic work - [K_K02 (**P6S_KK**)

Assessment methods of study outcomes

The lecture:

-written exam concerning mainly the theoretic part of the subject.

Classes :

-evaluation of written tests and the direct activity during the classes (solving problems and preparing of reports)

-continuous evaluation during each meeting - taking into account the activity in discussion and in cooperation concerning practical exercises.

-continuous evaluation during each meeting,

-getting extra points related with activity, in partucular presenting reports concerning applications of theory in different branches or putting the theory in history of mathematics

-notes concerning the improvement of basic materials,

-active participation in consultations.

Course description

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Scalar fields (complex numbers). Linear spaces, basis, dimension. Linear operators, eigenvalues and eigenvectors of linear operators. Matrix, determinants, systems of linear equations. Vector algebra (scalar and vector product), straight line and plane in the space.

The applied methods of education:

-lectures

1. lecture led in the interactive way with questions formulating to group,
2. the students' activity is taken into account during the final evaluation (the preparation of historical reports connected with the mathematicians' related to material, presenting the proofs leaving to independent making),
3. in track of lecture initiating the discussion,
4. theory presented with connections of current knowledge from previous lectures.

-classes

1. solving on board example tasks
2. detailed the reviewing by leader the solutions of tasks of practice and the discussions over comments.

Basic bibliography:

1. A. I. Kostrykin, Wstęp do algebry, cz.1 Podstawy algebry, PWN, Warszawa 2004.
2. A. I. Kostrykin, Wstęp do algebry, cz.2 Algebra liniowa, PWN, Warszawa 2004.
3. A. I. Kostrykin, Zbiór zadań z algebry, PWN, Warszawa 2005.
4. M. Grzesiak, Liczby zespolone i algebra liniowa, Poznań 1999.
5. T. Jurlewicz, Z. Skoczylas, Algebra liniowa 1, Wrocław 2003.
6. T. Jurlewicz, Z. Skoczylas, Algebra liniowa 2, Wrocław 2005.

Additional bibliography:

1. H. Arodź, K. Rościszewski, Zbiór zadań z algebry i geometrii analitycznej dla fizyków, PWN, 1990.
2. J.Rutkowski, Algebra liniowa w zadaniach, PWN.

Result of average student's workload

Activity	Time (working hours)
1. Active participation in meetings (classes)	30
2. Active participation in meetings (lectures)	30
3. Active participation in consultations with posing questions	15
4. preparing to classes	15
5. preparing to tests	15
6. the introduction with indicated literature / the didactic materials (10 sides of scientific text = 1 godz.)	10
7. preparing to exam and attending to the exam	15

Student's workload

Source of workload	hours	ECTS
Total workload	130	5
Contact hours	75	3
Practical activities	55	2