STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Mathematics**		Code **1010134221010340004**
Field of study **Environmental Engineering Extramural First-**	Profile of study (general academic, practical) **(brak)**	Year /Semester **1 / 2**
Elective path/specialty **-**	Subject offered in: **Polish**	Course (compulsory, elective) **obligatory**
Cycle of study: **First-cycle studies**	Form of study (full-time,part-time) **part-time**	
No. of hours Lecture: **20** Classes: **20** Laboratory: **-** Project/seminars: **-**		No. of credits **5**
Status of the course in the study program (Basic, major, other) **(brak)**	(university-wide, from another field) **(brak)**	
Education areas and fields of science and art **technical sciences** **Technical sciences**		ECTS distribution (number and %) **5 100%** **5 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Knowledge of mathematics defined by the core curriculum of mathematics education at the advanced level of secondary school.
2	**Skills**	The ability to associate facts, information processing, reasoning, interpretation and ability to reflect.
3	**Social competencies**	Focus on expanding knowledge and learn new skills in order to participate more fully in life and society.

Assumptions and objectives of the course:

1). Familiarize students with the methods linear algebra in the section on complex numbers, matrix, vector calculus and education skills to apply them to the analysis of the problems in the field of engineering.

2). Developing skills related to finding information not directly expressed, finding connections between distributed information, inference on the basis of several factors.

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

Knowledge:

1. The student knows the concept of a complex number. - [K_W01]

2. The student knows the concept of a matrix and the determinant of a matrix. - [K_W01]

3. The student understands the meaning of the linear transformation in Euclidean space. He knows that for specific bases, any such transformation is represented by a numerical matrix. He knows the meaning of the eigenvector linear transformation. - [K_W01]

4. The student knows the various forms of the equation straight line and plane, the equations surface of the second degree (canonical equation of the ellipsoid, paraboloid, cone, cylinder). - [K_W01]

Skills:

1. The student can find solutions of simple algebraic equations in the set of complex numbers. - [K_U01, K_U02]

2. The student can use the matrix operations to solve linear equations and study the solvability of such a system - [K_U02, K_U07]

3. The students can find the eigenvalues ??and corresponding eigenvectors of a linear transformation. - [K_U02, K_U07]

4. The student can describe using mathematical formulas basic geometric figures and he analyses their relative position. - [K_U09, K_U10]

5. The student is able to identify surfaces second-degree. - [K_U09]

Social competencies:
1. . The sense of usefulness of mathematical competence in engineering practice - [K_K04]
2. The ability to reflect and critically assess their own performance - [K_K02, K_K06]

Assessment methods of study outcomes
Lecture. A two-part written examination at the end of the semester: - Sat. 1 knowledge test (3 questions) - Sat. 2 test of skills (3 jobs). Method of evaluation: Each of the two parts of the test is evaluated in a scoring system using a scale of 0-15 points. Duration of test: 60 minutes. TUTORIALS: - 2 colloquia written during the semester (7 and 14 weeks), each rated on a scoring system, - continuous evaluation for each course.
Course description
1. Complex numbers. 2. Matrix algebra. Systems of linear equations. 3. Vectors and solid analytic geometry. 4. Power series. 5. Vector spaces. Matrix of linear transformation. 6. Eigenvalues and eigenvectors of linear transformation.
Basic bibliography:
1. M. Gewert, Z. Skoczylas, Analiza matematyczna 2, Oficyna Wydawnicza GiS, Wrocław 2007 2. T. Jurlewicz, Z. Skoczylas, Algebra liniowa 1, Oficyna Wydawnicza GiS, Wrocław 2003 3. T. Jurlewicz, Z. Skoczylas, Algebra liniowa 2, Oficyna Wydawnicza GiS, Wrocław 2002
Additional bibliography:
1. W. Krysicki, L. Wlodarski, Analiza matematyczna w zadaniach cz.1, Wydawnictwo Naukowe PWN, Warszawa, 2010 2. I. Foltyńska, Z. Ratajczak, Z. Szafrański, Matematyka dla studentów uczelni technicznych, t.II i III, Wydawnictwo Politechniki Poznańskiej, Poznań 2004

Result of average student's workload

Activity	**Time (working hours)**
1. Preparing for classes	30
2. Preparing for written tests	30
3. Studying for exam	30

Student's workload

Source of workload	**hours**	**ECTS**
Total workload	130	5
Contact hours	40	2
Practical activities	0	0