POZNAN UNIVERSITY OF TECHNOLOGY

COURSE DESCRIPTION CARD - SYLLABUS

Course name
Mathematics [S1Bud1>MAT2]

Course

Field of study	**Year/Semester**
Civil Engineering	1/2
Area of study (specialization)	**Profile of study**
–	general academic
Level of study	**Course offered in**
first-cycle	polish
Form of study	**Requirements**
full-time	compulsory

Number of hours

Lecture	**Laboratory classes**	**Other (e.g. online)**
30	0	0
Tutorials	**Projects/seminars**	
15	0	

Number of credit points

3,00

Coordinators

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Lecturers

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Prerequisites

Knowledge of mathematics in the extended high school area and the first semester .

Course objective

To acquaint students with extended mathematical knowledge in the field of algebra, geometry and differential and integral calculus of functions of two variables, to develop the ability to apply it in engineering and to prepare them for effective study.

Course-related learning outcomes

Knowledge:
Student
1. Has basic knowledge of complex numbers, linear algebra and geometry in three dimentions.
2. Knows the idea of partial derivatives and knows how to calculate extrema for functions of two variables.

3. Comprehends the concept of double integral and is able to solve it.

Skills:
Student
1. Can perform operations on complex numbers and solve quadratic equations in complex domain.
2. Is able to calculate determinants of different orders, to perform operations on matrices, to solve the systems of linear equations using the Gaussian elimination method.
3. Can perform operations on vectors in three dimentions, is able to determine equations of lines and planes in three dimentions.
4. Can calculate partial derivatives, extrema for functions of two variables.
5. Can calculate double integral.

Social competences:
The graduate is ready to critically evaluate his or her knowledge. The graduate understands the need for and knows the possibilities of continuous learning - improving professional, personal and social competences. The graduate is aware of responsibility for own work and willingness to conform to the principles of teamwork.

Methods for verifying learning outcomes and assessment criteria
Learning outcomes presented above are verified as follows:

Learning outcomes presented above are verified as follows:
Lecture: written exam to check theoretical knowledge and the abillity of its practical use. Exam is passed if student gains 50% of all points.
Tutorials: 2 written tests during the semester and activity during tutorials. Students have an opportunity to gain additional points (10% from the total) for their activity (e.g. giving correct answers to teacher"s or colleagues" questions).
Range of grades:
50% - 3.0
60% - 3,5
70% - 4,0
80% - 4,5
90% - 5,0

Programme content
LECTURE:
Complex numbers. Operations on matrices. Determinants. Systems of linear equations (Cramer"s Rule, Gaussian elimination method). Vectors, lines and planes in three dimensions. Quadric surfaces.
Differential calculus of functions of two variables - partial derivatives, total differential and extrema.
Double integral - definition, interpretation, evaluation (iterated integral, polar coordinates) and applications. Line integrals. Linear differential equations.
Tutorials:
Operations on determinants. Operations on matrices. Solutions of systems of linear equations.
Operations on complex numbers. Applications of operations on vectors. Equations of lines and planes in three dimentions. Evaluation of partiel derivatives, extrema for functions of two variables. Evaluation of double integral (iterated integral, polar coordinates) .

Teaching methods

1. Interactive lecture with questions to the group of students which is supported by solving examples on board.
2. Classes during which students solve tasks on board.Teacher"s detailed assessment of students" solutions followed by discussion and comments.

Bibliography
Basic
1. W. Żakowski, M. Kołodziej, Matematyka cz. 2, Analiza matematyczna, WNT, Warszawa 2013.
2. F. Leja, Rachunek różniczkowy i całkowy, PWN, Warszawa 1978.
3. I. Foltyńska, Z. Ratajczak, Z. Szafrański, Matematyka cz. I, II i III, Wydawnictwo Politechniki

Poznańskiej, Poznań 2001.

Additional

1. W. Krysicki, L. Włodarski, Analiza matematyczna w zadaniach cz, I, II, PWN, Warszawa 2013.
2. W. Stankiewicz, Zadania z matematyki dla wyższych uczelni technicznych. cz. I, II, PWN, Warszawa 2012.
3. M. Gewert, Z. Skoczylas, Analiza matematyczna 2, GiS, Wrocław 2012.
4. M. Gewert, Z. Skoczylas, Elementy analizy wektorowej, GiS, Wrocław 2012.

Breakdown of average student's workload

	Hours	ECTS
Total workload	92	3,00
Classes requiring direct contact with the teacher	47	1,50
Student's own work (literature studies, preparation for laboratory classes/ tutorials, preparation for tests/exam, project preparation)	45	1,50