

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Mathematics		Code 1010104111010340004
Field of study Civil Engineering First-cycle Studies	Profile of study (general academic, practical) (brak)	Year /Semester 1 / 1
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: 22 Classes: 22 Laboratory: - Project/seminars: -		No. of credits 6
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 %) 6 100% 6 100%
Responsible for subject / lecturer: dr hab. inż. Ewa Magnucka-Blandzi email: ewa.magnucka-blandzi@put.poznan.pl tel. 61 665 2354 Faculty of Electrical Engineering ul. Piotrowo 3A 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Has knowledge of mathematics at the secondary level.
2	Skills	Has the ability to think logically (derivation of new facts basing on known). Has the ability to use mathematical tools to solve problems in the field of secondary education. Has the ability to learn with the understanding.
3	Social competencies	Knows the limits of his own knowledge and understands the need for further education. Can independently search for information in the literature, including in foreign languages.
Assumptions and objectives of the course: Learning the use of mathematical tools and methods to describe and solve simple technical problems. Indication of the possibility of the application of mathematics in more complex issues.		
Study outcomes and reference to the educational results for a field of study		
Knowledge: 1. Knows mathematical methods essential for describing basic physical laws and solving problems related to technical physics including: basic concepts of differential and integral calculus, linear algebra and analytical geometry - [K_W01] 2. Has knowledge of mathematics needed to use mathematical tools to describe aspects of mechanics, constructions and technological processes - [K_W07] 3. Has knowledge of the appropriate use of computational techniques, supporting the work of the engineer while understanding the limitations - [K_W01]		
Skills: 1. Is able to use knowledge she or he has acquired to describe processes, create models in the area of technical sciences - [K_U01] 2. Is able to extract information from the literature, databases and other sources, interpret it and draw conclusions, formulate and justify opinions - [K_U02] 3. Is able to plan and arrange self-education process - [K_U03] 4. Is able to make correct use of standard analytical tools, including numerical and calculation ones, to solve detailed physical and technical problems; is able to make a critical evaluation of results of such analysis - [K_U09]		
Social competencies:		

1. Follows the rules of professional ethics, is responsible for the reliability of results obtained in his or her work and their interpretation, and the assessment of work done by others - [K_K02]
2. Understands the need of and opportunities for continuous self-improvement (first- and second-cycle studies, postgraduate studies) ? raising his or her professional, personal and social competences - [K_K03]
3. Is able to think and act in a creative and entrepreneurial manner - [K_K08]

Assessment methods of study outcomes

Lectures:

- Assessment of knowledge and skills in the written exam
- Assessment of knowledge and skills during the oral exam

Classes:

- Assessment of knowledge and skills related to solving the tasks on the basis of written tests
- Assessment of students readiness for exercises (the questions devoted to issues / tasks discussed in the lecture) on the basis of written tests

Course description

SEQUENCES OF REAL NUMBERS (the definition of a sequence, bounded sequences, increasing and decreasing sequences, the fundamental definition of limit, rules for manipulating limits, improper limits, rules for manipulations with infinity, theorem of three sequences, Euler number and its value, indeterminate expressions).

ELEMENTARY FUNCTIONS (the definition of a real-valued function, increasing and decreasing functions, injective functions, inverse functions, composed functions, the trigonometric functions, the hyperbolic functions, the inverse trigonometric functions, limits of functions, definition of continuous function at a point, asymptotes, the definition of the derivative and the geometric interpretation, basic rules of derivatives, the rule for differentiating inverse functions, higher derivatives, the derivative of a composed function - the chain rule, L'Hospital's rule, applications of derivatives, curvature and curvature radius, mean value theorem, local extrema and critical points ? necessary and sufficient condition for a local extremum, criterions for increasing or decreasing, inflection points ? necessary and sufficient condition for an inflection point, local concavity and local convexity).

INDEFINITE INTEGRAL (definition of the indefinite integral and the primitive function, properties of integrals, integration by parts, substitution formula).

DEFINITE INTEGRAL (definition of the definite integral, properties of integrals, integration by parts, substitution formula, the geometric interpretation of the definite integral, applications to arc length of a plane curve, applications to plane area, applications to the lateral surface and to the volume of a solid of revolution with respect to the axis OX, and OY).

LINEAR ALGEBRA (the Cartesian product, definition of a matrix, algebraic operations: addition of two matrices, multiplication of a matrix by a number, multiplication of two matrices, the definition of the determinant, properties of determinants, the calculation of three-rowed determinants, Laplacian rule for the development of determinants, inverse matrices, transposed matrices, the definition of the rank of a matrix, algorithms for determining the rank, systems of linear equations and solutions: Cramer's theorem, Kronecker-Capelli theorem, a homogeneous system, the Gaussian algorithm)

COMPLEX NUMBERS (absolute value, arguments, the principal value of the argument; a geometric interpretation, Cartesian representation, in polar coordinates, Gaussian plane, rules for arithmetic, roots, square roots, solving quadratic equations in the complex domain, De Moivre's formula)

Basic bibliography:

1. M. Gewert, Z. Skoczylas: Analiza I, Analiza II, Algebra liniowa, GiS, Wrocław, 2006.
2. I. Folyńska, Z. Ratajczak, Z. Szafranski: Matematyka dla studentów uczelni technicznych, Wydawnictwo Politechniki Poznańskiej, Poznań, 2000.

Additional bibliography:

1. W. Kryszicki, L. Włodarski, Analiza matematyczna w zadaniach cz.1, Wydawnictwo Naukowe PWN, Warszawa, 2010

Result of average student's workload

Activity	Time (working hours)
1. Preparation for exercise	40
2. Preparation for colloquia	40
3. Exam preparation	30
Student's workload	
Source of workload	hours
Total workload	150
Contact hours	44
	ECTS
Total workload	6
Contact hours	2

Practical activities	44	2
----------------------	----	---