

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Mathematics		Code 1010104121010340004
Field of study Civil Engineering First-cycle Studies	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: 16 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 of the first semester of undergraduate study
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 of the first semester of undergraduate study. 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 physics - [-K_U01] 2. Is able to use analytical methods to formulate and solve problems in the area of measuring physical quantities - [-K_U01] 3. Is able to extract information from the literature, databases and other sources, interpret it and draw conclusions, formulate and justify opinions - [-K_U02] 4. Is able to plan and arrange self-education process - [-K_U03] 5. 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

VECTOR ALGEBRA AND VECTOR ANALYSIS

(scalars, vectors, affine vectors, definition of vector, linear combinations, definition of scalar multiplication of a vector, parallelism, definition of vector addition, linear independence, free vectors, definition of the scalar product, orthogonality, definition of the vector product, triple product, expressions in a Cartesian coordinate system)

FUNCTION OF TWO VARIABLES (the definition of a real-valued function, the definition of partial derivatives, higher partial derivatives, the derivative of implicit functions, the definition of the total differential, Schwarz? theorem, local extrema ? necessary and sufficient condition for a local extremum, the local minimum and local maximum)

ORDINARY DIFFERENTIAL EQUATIONS OF FIRST-ORDER (definition, the initial-value problem, the general solution, an explicit solution, the equation with separated variables, the homogeneous equation, linear homogeneous and non-homogeneous equations, Bernoulli equation, the exact differential equation, and a general strategy for finding solutions).

ORDINARY DIFFERENTIAL EQUATIONS OF SECOND-ORDER REDUCIBLE TO ORDINARY DIFFERENTIAL EQUATIONS OF FIRST-ORDER (types and a general strategy for finding solutions).

ORDINARY LINEAR DIFFERENTIAL EQUATIONS OF SECOND-ORDER WITH CONSTANT COEFFICIENTS (a form of linear second-order equations with real constant coefficients, homogeneous differential equations with constant coefficients, auxiliary equation - characteristic equation, the complementary function, nonhomogeneous differential equations with constant coefficients, the method of undetermined coefficient, the particular solution, linear dependence and independence of solutions, the Wronskian)

Basic bibliography:

1. M. Gewert, Z. Skoczylas: Analiza I, Analiza II, Ównania różniczkowe zwyczajne GiS, Wrocław, 2006.
2. I. Folyńska, Z. Ratajczak, Z. Szafranski: Matematyka dla studentów uczelni technicznych, Wydawnictwo Politechniki Poznańskiej, Poznań, 2000.
3. N. M. Matwiejew: Zadania z równań różniczkowych zwyczajnych, PWN, Warszawa 1974.

Additional bibliography:

1. W. Krysicki, 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	30	
3. Exam preparation	20	
Student's workload		
Source of workload	hours	ECTS
Total workload	120	6
Contact hours	38	2
Practical activities	38	1