

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Mathematics		Code 1010601211010340001
Field of study Transport	Profile of study (general academic, practical) general academic	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) full-time	
No. of hours Lecture: 5 Classes: 2 Laboratory: - Project/seminars: -		No. of credits 8
Status of the course in the study program (Basic, major, other) other		(university-wide, from another field) university-wide
Education areas and fields of science and art technical sciences		ECTS distribution (number and %) 8 100%
Responsible for subject / lecturer: dr inż. Agnieszka Szawiola email: agnieszka.szawiola@put.poznan.pl tel. 61 665 2712 Wydział Elektryczny ul. Piotrowo 3A, 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	It has a basic knowledge of mathematics resulting from the high school program
2	Skills	Able to solve mathematical problems incorporating elements of physics resulting from the high school program
3	Social competencies	Able to learn independently
Assumptions and objectives of the course: The aim of the course is to familiarize students with basic knowledge of mathematics to enable solving the objects directional		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. It has a basic and well-established expertise in mathematical analysis and in particular the differential and integral calculus of functions of one variable - [K1A_W01]		
2. It has a basic and well-established knowledge of complex numbers and linear algebra and in particular matrix algebra and vector calculus in space - [K1A_W01]		
3. It defines the basic concepts of mathematics concerned departments - [K1A_W01]		
Skills:		
1. Can apply known calculus to study some properties of functions, geometric calculations, the determination of selected physical quantities. - [K1A_U01]		
2. Can use issues in linear algebra, vector calculus and complex numbers to solve simple problems with technology. - [K1A_U01]		
3. Put using mathematical concepts to describe simple processes and issues in technology and physics - [K1A_U01]		
Social competencies:		
1. He is inquisitive and persistent in attaining the task. - [K1A_K01]		
2. He is aware of the responsible engineer's work in this regard is the need for continuous self-education. - [K1A_K02]		
Assessment methods of study outcomes		

Lecture: Final written exam at the end of the semester.		
Classes: Exam partial and ongoing assessment in the classroom.		
Course description		
<p>Lecture :</p> <p>String and its properties ; definition, monotonicity , boundary, Euler number . Functions of one and two variables ; definition , boundaries , ownership, inverse function , graphs of elementary functions . Differential calculus of functions of one variable ; definition of a derivative, Geometric and physical interpretation , calculation of derivatives , the Taylor and Maclaurin , mean value theorem , study properties of the function (L'Hospital's rule , extrema , monotonicity , inflection points , convexity , average value) . Differential calculus of functions of several variables ; partial derivative , extrema of functions of several variables and implicit function , differential complete. Integral calculus of functions of one and several variables with applications in geometry (field area , arc length , volume solids, the surface area of the solid of revolution) , and technique (center of gravity , moments of inertia) Selected ordinary differential equations and second order ; integral of general and specific , initial issue . Matrices and their properties. Systems of linear equations; Cramer's method and Gaussian elimination , Kronecker - Capelli's rule . Vectors in space; and vector dot product , and used in geometry. Complex numbers ; form of algebraic , trigonometric , exponential , operations on complex numbers , pattern Moivre , Euler's formulas , equations, complex .</p> <p>Exercise : Elementary functions and their graphs . Calculation of derivatives and study properties of functions of one variable . L'Hospital's rule . Maclaurin series . The calculation of indefinite integral ; integration by parts and by substitution , the integral of a rational function , a trigonometric function of the integral of the selected immeasurable . Definite and its use in the geometry (area of field , the length of the arc , the rotary body) , the use in the art (center of gravity , moments of inertia) . Matrices and determinants . Systems of linear equations ; Cramer's method and Gaussian elimination . Vector calculus in space ; scalar product , vector , mixed and their geometric interpretation . The actions in the set of complex numbers ; form of algebraic , trigonometric . Equations in the set of complex numbers. Elements of differential calculus of functions of two variables. Differential complete.</p>		
Basic bibliography:		
<ol style="list-style-type: none"> 1. M. Gewert, Z. Skoczylas, Analiza matematyczna 1 i 2, Oficyna Wydawnicza GiS, Wrocław 2006. 2. H. Jurlewicz, Z. Skoczylas, Algebra liniowa 1, Oficyna Wydawnicza GiS, Wrocław 2006. 3. W. Kryszewski, L. Włodarski, Analiza matematyczna w zadaniach, t I,t.II, PWN, Warszawa 2006. 		
Additional bibliography:		
<ol style="list-style-type: none"> 1. I. Foltynska, Z. Ratajczak, Z. Szafranski, Matematyka cz. I i II, Wydawnictwo Politechniki Poznańskiej, Poznań 2001. 2. D.A.McQarrie, Matematyka dla przyrodników i inżynierów, tom 1,2,3, Wydawnictwo Naukowe PWN, Warszawa 2005. 3. Dennis G.Zill, Differential Equations with Boundary-Value Problems, PWS-KENT Publishing Company, Boston 1986. 		
Result of average student's workload		
Activity	Time (working hours)	
1. Preparation for lectures	10	
2. Participation in the lecture	75	
3. Fixation of the lecture	20	
4. Consultation lecture	2	
5. Exam Preparation	10	
6. Participation in the exam	2	
7. Prepare for Training	10	
8. Participation in exercises	30	
9. Strengthening exercises content	20	
10. Strengthening exercises content	4	
11. Utrwalanie treści ćwiczeń	10	
12. Participation in completing	2	
Student's workload		
Source of workload	hours	ECTS
Total workload	200	8
Contact hours	117	5
Practical activities	83	3