

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Mathematics		Code 1010101221010340004
Field of study Environmental 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) full-time	
No. of hours Lecture: 30 Classes: 15 Laboratory: - Project/seminars: -		No. of credits 4
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		ECTS distribution (number and %)
Responsible for subject / lecturer: Małgorzata Zbąszyniak email: -malgorzata.zbaszyniak@put.poznan.pl tel. -66552712 Faculty of Electrical Engineering ul. Piotrowo 3A 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Knowledge of real function calculus.
2	Skills	Calculations of derivatives and integrals of one variable functions.
3	Social competencies	Student understands the need and knows the possibility of studying, improving language skills, professional, personal and social skills.
Assumptions and objectives of the course: -The recognizing methods and applications of analytical geometry (vectors, lines in space, planes), mathematical analysis (calculus of functions of several variables) and differential equations.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Methods of calculation and applications of multiple and line integrals to describe and analyze selected physical phenomena. - [K_W01]		
2. Methods of solving differential equations. - [K_W01]		
3. The student explains the basic mathematical laws and explains conditions for their application. - [K_W02]		
Skills:		
1. The student uses the literature and also other sources of knowledge. - [K_U01]		
2. The student learns to calculate and apply multiple and line integrals to describe and analyze selected physical phenomena. - [K_U10]		
Social competencies:		
1. The sense of usefulness of mathematical competence in engineering practice. - [K_K01]		
2. The ability to work in a team. - [K_K03]		
Assessment methods of study outcomes		

<p>-LECTURE. A two-part written examination at the end of the semester: -sat.1 theoretic knowledge (30%); -sat.2 applications in practical exercises (70%). Duration of test: 90 minutes.</p> <p>Classes: tests during the semester (5x15 minutes).</p>		
Course description		
<p>-Vectors, the dot product, the vector product. Lines in space, planes, the paraboloid of revolution, cylinders and the axis of the cone. -Functions of several variables. Partial derivatives, differentials, extrema of functions of several variables, gradient, directional derivative, tangent planes and normal lines to surfaces. -Multiple integrals and line integrals with applications. -Ordinary differential equations (separable, exact, homogeneous, Bernoulli, first-order and second-order linear). -Number series and power series.</p>		
Basic bibliography:		
<p>1. W. Stankiewicz, J. Wojtowicz, Zadania z matematyki dla wyższych uczelni technicznych, PWN, część pierwsza i druga, Warszawa. 2. M. Gewert, Z. Skoczylas, Analiza matematyczna 2. Definicje, twierdzenia, wzory. Oficyna Wydawnicza GiS.</p>		
Additional bibliography:		
<p>1. E. Swokowski, Calculus with analytic geometry, Prindle, Weber & Schmidt, Boston, Massachusetts 2. Dennis G. Zill, A first course in differential equations with applications, Prindle, Weber & Schmidt, Boston. 3. W. Kryszicki, L. Włodarski, Analiza matematyczna w zadaniach, PWN, Warszawa.</p>		
Result of average student's workload		
Activity	Time (working hours)	
1. Share in lectures	30	
2. Share in classes	15	
3. Preparing for classes and for written tests	30	
4. Preparing for examination	30	
5. Share in consultations. Examination period	10	
Student's workload		
Source of workload	hours	ECTS
Total workload	115	4
Contact hours	55	2
Practical activities	0	0