

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Mathematics</b>		Code <b>1010101221010340004</b>
Field of study <b>Environmental Engineering First-cycle Studies</b>	Profile of study (general academic, practical) <b>general academic</b>	Year /Semester <b>1 / 2</b>
Elective path/specialty <b>-</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>obligatory</b>
Cycle of study: <b>First-cycle studies</b>	Form of study (full-time, part-time) <b>full-time</b>	
No. of hours Lecture: <b>30</b> Classes: <b>15</b> Laboratory: <b>-</b> Project/seminars: <b>-</b>		No. of credits <b>4</b>
Status of the course in the study program (Basic, major, other) <b>other</b>		(university-wide, from another field) <b>university-wide</b>
Education areas and fields of science and art		ECTS distribution (number and %)
<b>Responsible for subject / lecturer:</b>  Małgorzata Zbąszyniak email: -malgorzata.zbaszyniak@put.poznan.pl tel. -66552712 Faculty of Electrical Engineering ul. Piotrowo 3A 60-965 Poznań		
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	Knowledge of real function calculus.
2	<b>Skills</b>	Calculations of derivatives and integrals of one variable functions.
3	<b>Social competencies</b>	Student understands the need and knows the possibility of studying, improving language skills, professional, personal and social skills.
<b>Assumptions and objectives of the course:</b> -The recognizing methods and applications of analytical geometry (vectors, lines in space, planes), mathematical analysis (calculus of functions of several variables) and differential equations.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b> 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]		
<b>Skills:</b> 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]		
<b>Social competencies:</b> 1. The sense of usefulness of mathematical competence in engineering practice. - [K_K01] 2. The ability to work in a team. - [K_K03]		
<b>Assessment methods of study outcomes</b>		

<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 or 6x15 minutes).</p>		
<b>Course description</b>		
<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>		
<b>Basic bibliography:</b>		
<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>		
<b>Additional bibliography:</b>		
<p>1. E. Swokowski, Calculus with analytic geometry, Prindle, Weber &amp; Schmidt, Boston, Massachusetts          2. Dennis G. Zill, A first course in differential equations with applications, Prindle, Weber &amp; Schmidt, Boston.          3. W. Krysicki, L. Włodarski, Analiza matematyczna w zadaniach, PWN, Warszawa.</p>		
<b>Result of average student's workload</b>		
<b>Activity</b>	<b>Time (working hours)</b>	
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	
<b>Student's workload</b>		
<b>Source of workload</b>	<b>hours</b>	<b>ECTS</b>
Total workload	115	4
Contact hours	55	2
Practical activities	0	0