

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Mathematics		Code 1010321321010340025
Field of study Electrical Engineering	Profile of study (general academic, practical) general academic	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: 45 Classes: 30 Laboratory: - Project/seminars: -		No. of credits 6
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		ECTS distribution (number and %)
Responsible for subject / lecturer: dr Marian Liskowski email: marian.liskowski@put.poznan.pl tel. (61)665 2842 Wydział Elektryczny ul. Piotrowo 3A 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Knowledge of real function calculus. Equations of selected curves on the plane.
2	Skills	Calculation of the function limits, the calculation of derivatives and integrals of one variable functions.
3	Social competencies	Focus on expanding knowledge and learn new skills in order to participate more fully in professional and social life.
Assumptions and objectives of the course: 1). Understanding the key concepts and applications of calculus of functions of several variables. 2). Knowledge of methods of solving equations and systems of ordinary differential equations. 3). Understanding the elements of the series theory, in particular the power series and Fourier series.		
Study outcomes and reference to the educational results for a field of study		
Knowledge: 1. The student obtains a basic knowledge of the partial derivatives and the total differential of functions of several variables. - [K_W01] 2. The student has knowledge about the methods of calculation and applications of multiple and curved integrals to describe and analyze physical phenomena. - [K_W01] 3. He has knowledge of power series representation and Fourier series representations of functions. - [K_W01] 4. He has knowledge about methods of solving differential equations and systems of ordinary differential equations. - [K_W01]		
Skills: 1. The student can apply partial derivatives to study local extremes and to indicate the direction of the fastest growth of the two variable function - [K_U10] 2. The student can use a total differential of a function in approximate calculations. - [K_U10] 3. The student can calculate and apply multiple and curvilinear integrals to describe and analyze selected physical phenomena. - [K_U10] 4. The student can solve simple ordinary differential equations of the first, second and higher order. - [K_U10]		
Social competencies: 1. The student is aware of the usefulness of mathematical competence in engineering practice. - [K_K01] 2. The student is able to reflect and critically assess their own achievements. - [K_K03]		

Assessment methods of study outcomes		
<p>Lecture. A two-part written examination at the end of the semester:</p> <ul style="list-style-type: none"> - Sat. 1 knowledge test (3 questions) - Sat. 2 test of skills (3 jobs). <p>Method of evaluation: Each of the two parts of the test is evaluated in a scoring system using a scale of 0-15 points. Duration of test: 60 minutes.</p> <p>TUTORIALS:</p> <ul style="list-style-type: none"> - 2 colloquia written during the semester (7 and 14 weeks), each rated on a scoring system, - continuous evaluation for each course. 		
Course description		
<ol style="list-style-type: none"> 1). The concept of a function of several variables, field, graph, limit of a function at a point. 2). Differential calculus of functions of several variables with selected applications in engineering practice (directional derivative, differential complete, local extremes). 3). Integral calculus of functions of several variables with selected applications in engineering practice. 4). Curvilinear integrals with applications in engineering practice. 5). Power series, the concept of convergence of the series, the study of convergence. Fourier series. The development of selected types of functions in power series or Fourier series. 		
Basic bibliography:		
<ol style="list-style-type: none"> 1. W. Żakowski, Matematyka, T.2, WNT, Warszawa 2003 2. W. Leksiński, W. Żakowski, Matematyka T. 4, WNT, Warszawa 2003 3. W. Krysiński, L. Włodarski, Analiza matematyczna w zadaniach, T.1, T.2, PWN, Warszawa 2011 4. M. Gewert, Z. Skoczylas, Analiza matematyczna 2 (definicje, twierdzenia, wzory), Wydawnictwo GiS, Wrocław 2007 		
Additional bibliography:		
<ol style="list-style-type: none"> 1. W. Stankiewicz, J. Wojtowicz, Zadania z matematyki dla wyższych uczelni technicznych, t.1 i t.2, PWN, Warszawa 2001 2. I. Foltińska, Z. Ratajczak, Z. Szafranski, Matematyka dla studentów uczelni technicznych, t.II i III, Wydawnictwo Politechniki Poznańskiej, Poznań 2004 3. M. Gewert, Z. Skoczylas, Równania różniczkowe zwyczajne (teoria, przykłady, zadania), Wydawnictwo GiS, Wrocław 2006 		
Result of average student's workload		
Activity	Time (working hours)	
1. Preparing for classes	25	
2. Preparing for written tests	25	
3. Studying for exam	25	
Student's workload		
Source of workload	hours	ECTS
Total workload	150	6
Contact hours	75	3
Practical activities	0	0