

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Mathematics		Code 1010324331010340025
Field of study Electrical Engineering	Profile of study (general academic, practical) (brak)	Year /Semester 2 / 3
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: 30 Classes: 18 Laboratory: - Project/seminars: -		No. of credits 5
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: dr Alina Gleska email: alina.gleska@put.poznan.pl tel. 616652320 Faculty of Electrical Engineering ul. Piotrowo 3A 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	The basic knowledge of differential and integral calculus is obligatory. The ability of calculating partial derivatives is advisable.
2	Skills	Students should be able to reformulate some formulas and equations, and to calculate derivatives and integrals.
3	Social competencies	Students should know the boundedness of their knowledge and understand the need of further education.
Assumptions and objectives of the course: The in-depth getting to know of differential equations. Using this knowledge both in the theory, and in applications in technical sciences.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Students have the basic knowledge of differential and integral calculus for function of several variables - [K_W01+++]		
2. Students can classify different types of differential equations - [K_W01+++]		
3. Students know different methods of solving ODE - [K_W01+++]		
4. Students know qualitative properties of differential equations and understand their meaning in the science - [K_W01+++]		
Skills:		
1. Students should be able to calculate line integrals - [K_U10+]		
2. Students should be able to solve differential equations - [K_U10+]		
3. Students should apply differential equations in physics and other technical sciences - [K_U10+]		
Social competencies:		
1. Students should be able to formulate proper questions leading to best knowledge of the problem - [K_K01+]		
Assessment methods of study outcomes		
Lecture A written exam. Tutorials Short tests during the term (50%) and final test at the end of the term (50%).		

Course description		
<p>Line integrals.</p> <p>Definition of first order ordinary differential equation (ode). General solutions, solution curves. Initial value problem. Direction fields. Equations without y. Equations without x. Equations with separated variables. Homogeneous equations. Homogeneous and nonhomogeneous linear first order differential equations. Bernoulli equation. An Exact equations (+ integrating factors). Methods of solving such equations. Orthogonal curves. Applications of first order equations.</p> <p>Definition of second order ordinary differential equation. Initial value problem. Order reducing. Homogeneous and nonhomogeneous linear second order differential equations. Linear independence. The Wronskian. Applications in physics.</p> <p>Linear higher order equations with constant coefficients.</p> <p>Linear systems of differential equations.. Such systems arise in many physical applications.</p> <p>The Laplace transforms. Applications of the Laplace transforms to solve initial value problems for constant coefficient second order differential equations.</p>		
<p>Basic bibliography:</p> <ol style="list-style-type: none"> 1. W.F. Trench, Elementary differential equations, Digital Trinity (on demand). 2. L. Brand, Differential and difference equations, John Wiley & Sons, Inc, New York 1966. 3. F. Chorltoni, Ordinary differential and difference equations, D. Van Nostrand Company LTD, London 1965. 4. M. Gewert, Z. Skoczylas, Równania różniczkowe zwyczajne, GiS, Wrocław 2007. 5. N.M. Matwiejew, Zadania z równań różniczkowych zwyczajnych, PWN, Warszawa 1976. 6. M. Gewert, Z. Skoczylas, Elementy analizy wektorowej, GiS, Wrocław 2004. 		
<p>Additional bibliography:</p> <ol style="list-style-type: none"> 1. W.W. Stiepanow , Równania różniczkowe, PWN, Warszawa 1956. 2. R. Gutowski, Równania różniczkowe zwyczajne, PWN, Warszawa 1971. 3. I.G. Pietrowski, Równania różniczkowe zwyczajne, PWN, Warszawa 1967. 4. J. Muszyński, A.D. Myszkis, Równania różniczkowe zwyczajne, PWN, Warszawa 1984. 		
Result of average student's workload		
Activity	Time (working hours)	
1. Lectures	30	
2. Tutorials	18	
3. Homeworks preparing for tutorials and exams	48	
4. Meetings with the lecturer	4	
Student's workload		
Source of workload	hours	ECTS
Total workload	100	5
Contact hours	48	3
Practical activities	18	2