

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Ordinary differential equations		Code 1010341731010348814
Field of study Mathematics in Technology	Profile of study (general academic, practical) general academic	Year /Semester 2 / 3
Elective path/specialty -	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: First-cycle studies (Polish Qualifications Framework level six)	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 30 Classes: 30 Laboratory: - Project/seminars: -		No. of credits 4
Status of the course in the study program (Basic, major, other) basic		(university-wide, from another field) university-wide
Education areas and fields of science and art The sciences Mathematical sciences		ECTS distribution (number and %) 4 100% 4 100%
Responsible for subject / lecturer: dr hab. Małgorzata Migda email: malgorzata.migda@put.poznan.pl tel. 61 665 2359 Faculty of Electrical Engineering ul. Piotrowo 3A 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Basic knowledge from linear algebra and mathematical analysis.- [K_U01 (P6S_WG)]
2	Skills	Ability to solve elementary problems from linear algebra and mathematical analysis by using acquired knowledge.- [K_K01 (P6S_UW)]
3	Social competencies	Understanding necessity of broadening ones competences,- [K_K01 (P6S_KK)]
Assumptions and objectives of the course: The introduction of basic concepts and theorems of the theory of differential equations; introducing students to the basic methods of finding and analysing the properties of the solutions of ordinary differential equations.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
1. Student knows the majority of basic definitions and theorems in the general theory of differential equations. - [K_W01 (P6S_WG)]		
2. Student knows the connections between topics from the general theory of differential equations with other areas of theoretical and applied mathematics. - [K_W02 (P6S_WG), K_W03 (P6S_WG)]		
Skills:		
1. Student is able to solve basic types of differential equations. - [K_U01 (P6S_UW)]		
2. Student is able to solve systems of linear differential equations with constant coefficients. -[K_U02 (P6S_UW)]		
Social competencies:		
1. Student understand necessity of systematic work and developing of their skills. - [K_K02 (P6S_KK)]		
2. Student is able to solve problems and work in team. - [K_K03 (P6S_KO)]		
3. Student is able search out some information in literature, also in different language.- [K_K05 (P6S_KR)]		

Assessment methods of study outcomes	
Lecture: written test. Classes: evaluation of two written tests and the direct activity during the classes.	
Course description	
<p>Update: 29.10.2018</p> <p>Preliminaries - the definition of a differential equation and its solutions; geometrical interpretation of integration of the equation. Examples of problems leading to differential equations.</p> <p>Equations with separated variables, the Cauchy problem.</p> <p>Homogeneous differential equations, first order linear differential equations.</p> <p>Nonhomogeneous differential equations - the method of variation of parameters.</p> <p>Nonhomogeneous differential equations - the method of undetermined coefficients.</p> <p>Bernoulli and Riccati differential equations.</p> <p>Exact differential equations, the integrating factor.</p> <p>Lagrange and Clairaut differential equations.</p> <p>The Picard's Existence Theorem and the Peano theorem, the Picard iterative process.</p> <p>Second order differential equations reduced to first order differential equations.</p> <p>Euler differential equations.</p> <p>Higher order differential equations with constant coefficients.</p> <p>Systems of linear differential equations. Solving linear systems - the Eigenanalysis method, the elimination method.</p> <p>Applied methods of education:</p> <ul style="list-style-type: none"> - lecture with multimedia presentation accompanied with examples presented on the blackboard, theory presented with connections of current knowledge from previous lectures and with questions to the group of students; - classes: solving problems on the board, initiating discussion about the solutions. 	
Basic bibliography:	
<ol style="list-style-type: none"> 1. N. M. Matwiejew, Metody całkowania równań różniczkowych zwyczajnych, PWN Warszawa 1982. 2. A. Palczewski, Równania różniczkowe zwyczajne (teoria i metody numeryczne z wykorzystaniem komputerowego systemu obliczeń symbolicznych), Wyd. Naukowo-Techniczne, Warszawa 1999. 3. M. Gewert, Z. Skoczylas, Równania różniczkowe zwyczajne. Teoria, przykłady, zadania, Oficyna Wydawnicza GiS, Wrocław 2011. 4. W. Kryszicki, L. Włodarski, Analiza matematyczna w zadaniach, t. 2, Wydawnictwo Naukowe PWN, Warszawa 2013. 5. A. Sołtysiak, Część II, Wydawnictwo Naukowe UAM, Poznań 2004. 	
Additional bibliography:	
<ol style="list-style-type: none"> 1. N. M. Matwiejew, Zadania z równań różniczkowych zwyczajnych, PWN, Warszawa 1976. 2. J. Mikołajski, Z. Sołtysiak, Zbiór zadań z matematyki dla studentów wyższych szkół technicznych, cz.III, Kalisz 2008. 3. I. Folyńska, Z. Ratajczak, Z. Szafranski, Matematyka dla studentów studiów technicznych dla pracujących, Wydawnictwo PP 1992. 4. R. Rudnicki, Wykłady z analizy matematycznej, PWN 2006. 	
Result of average student's workload	
Activity	Time (working hours)
1. Lectures	30
2. Classes	30
3. Preparing for classes	12
4. Preparing for tests	12
5. Familiarisation with suggested literature	8
6. Consultations	12
7. Preparing for final test	6
Student's workload	

Source of workload	hours	ECTS
Total workload	110	4
Contact hours	72	3
Practical activities	50	2