

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Difference equations</b>		Code <b>1010341741010347258</b>
Field of study <b>Mathematics in Technology</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>2 / 4</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>15</b> Classes: <b>15</b> Laboratory: <b>-</b> Project/seminars: <b>-</b>		No. of credits <b>2</b>
Status of the course in the study program (Basic, major, other) <b>(brak)</b>		(university-wide, from another field) <b>(brak)</b>
Education areas and fields of science and art <b>technical sciences</b> <b>Technical sciences</b>		ECTS distribution (number and %) <b>2 100%</b> <b>2 100%</b>
<b>Responsible for subject / lecturer:</b>  dr hab. Małgorzata Migda email: malgorzata.migda@put.poznan.pl tel. +48 61 665 2359 Wydział Elektryczny ul. Piotrowo 3A 60-965 Poznań		
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	Basic knowledge from linear algebra and mathematical analysis
2	<b>Skills</b>	Ability to solve elementary problems from linear algebra and mathematical analysis by using acquired knowledge, ability to prepare and give presentation
3	<b>Social competencies</b>	Understanding necessity of broadening ones competences, readiness to working and cooperating in team and taking responsibility for jointly realized task
<b>Assumptions and objectives of the course:</b> To pass on to students knowledge from difference equations and its applications in mathematical modeling. To develop students ability of solving simple difference equations and analyzing phenomena and building their mathematical models. To form students ability of team working.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b> 1. one knows most basic definition and theorems and their proofs from general linear difference equations theory - [K_W01, K_W04] 2. one can explain goal and meaning of simple discrete models - [K_W02] 3. one knows connections between issues from difference equations theory and other theoretical and applied mathematics sections - [K_W07]		
<b>Skills:</b> 1. to solve simple difference equations - [K_U06] 2. to construct discrete mathematical models, used also in other sections of mathematics - [K_U13] 3. to carry out proofs, also using, if need it, tools from other sections of mathematics - [K_U14] 4. to define ones interests and developing them, to understand lectures directed to young mathematicians from difference equations - [K_U13, K_U10]		
<b>Social competencies:</b> 1. the ability to cooperate in team, to fulfill obligations entrusted by devanning work in team, understanding necessity of systematic work - [K_K03] 2. independency in looking for information in literature, also in different language - [K_K06] 3. acting in coherence with basic ethical principals - [K_K04]		

<b>Assessment methods of study outcomes</b>		
Lecture: evaluation of knowledge and preparation of presentation.		
Classes: evaluation of written test and the direct activity during the classes.		
<b>Course description</b>		
UPDATE: 2017/2018		
1. Preliminaries. Difference calculus. 2. Linear first order difference equations. 3. Dynamics of first order difference equations. Equilibrium points. Criteria of asymptotic stability of equilibrium points. 4. General theory of linear difference equations. 5. Linear homogeneous equations with constant coefficients. 6. Linear nonhomogeneous equations: method of undermined coefficients. 7. Nonlinear equations transformable to linear equations. 8. Applications of difference equations in biology, and economics.		
Applied methods of education: - lecture with multimedia presentation accompanied with examples presented on the blackboard and with questions to the group of students, the students' activity is taken into account during the final evaluation (the students prepare and deliver the presentations in small groups) - classes: solving problems on the board, initiating discussion about the solutions.		
<b>Basic bibliography:</b>		
1. D. Bobrowski, Systemy dynamiczne z czasem dyskretnym, zagadnienia deterministyczne, Wydawnictwo PP, 1994. 2. S. Elaydi, An Introduction to Difference Equations, Undergraduate Texts in Mathematics, Springer, New York, USA, 2005.		
<b>Additional bibliography:</b>		
1. H. Levy, F. Lessman, Równania różnicowe skończone, PWN 1966. 2. M.R.S. Kulenovic, G. Ladas, Dynamics of second order rational difference equations, Chapman Hall/CRS Press 2002.		
<b>Result of average student's workload</b>		
Activity	Time (working hours)	
1. Active participation in meetings (lectures)	15	
2. Active participation in meetings (classes)	15	
3. Preparation of presentation	12	
4. Preparation to classes	12	
5. Meetings with the lecturer	6	
6. Preparation to test	10	
<b>Student's workload</b>		
Source of workload	hours	ECTS
Total workload	70	2
Contact hours	36	1
Practical activities	34	1