

<b>STUDY MODULE DESCRIPTION FORM</b>		
Name of the module/subject <b>Mathematical methods in economic sciences</b>		Code <b>1010342641010347416</b>
Field of study <b>Mathematics</b>	Profile of study (general academic, practical) <b>(brak)</b>	Year /Semester <b>2 / 4</b>
Elective path/specialty <b>Modelling in applied sciences</b>	Subject offered in: <b>Polish</b>	Course (compulsory, elective) <b>obligatory</b>
Cycle of study: <b>Second-cycle studies</b>	Form of study (full-time, part-time) <b>full-time</b>	
No. of hours Lecture: <b>15</b> Classes: <b>-</b> Laboratory: <b>15</b> Project/seminars: <b>-</b>		No. of credits <b>3</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>the sciences</b> <b>Mathematical sciences</b>		ECTS distribution (number and %) <b>3 100%</b> <b>3 100%</b>
<b>Responsible for subject / lecturer:</b>  dr Maciej Grzesiak email: maciej.grzesiak@put.poznan.pl tel. 61 665 2807 Wydział Elektryczny ul. Piotrowo 3A 60-965 Poznań		
<b>Prerequisites in terms of knowledge, skills and social competencies:</b>		
1	<b>Knowledge</b>	Mathematical analysis (sequences, differential and integral calculus). Matrices. Fundamentals of functional analysis. Annuities and insurances.
2	<b>Skills</b>	Freely use of derivatives, integrals and linear algebra methods. Basic calculations of credits, annuities and insurances.
3	<b>Social competencies</b>	Understanding of limitation of their own knowledge and willingness to learn.
<b>Assumptions and objectives of the course:</b> Demonstration of usefulness of linear algebra methods to production planning. Choice of best projects when a budget is limited. Presentation of advanced concepts from calculus and functional analysis and their application to optimization problems.		
<b>Study outcomes and reference to the educational results for a field of study</b>		
<b>Knowledge:</b> 1. Student can identify and describe basic problems of economy planning - [K_W01+K_W03+++K_W08 ++] 2. Student can construct mathematical model for a given optimization problem. - [K_W01 +K_W12 ++]		
<b>Skills:</b> 1. Student can state economical problems in the language of mathematics. - [K_U11 +K_U28 ++K_U37+++] 2. Student can find mathematical solution and adapt it to the original problem. - [K_U28] 3. Student uses advanced functions of a spreadsheet. - [K_U28]		
<b>Social competencies:</b> 1. Student understands that confidence is necessary in economy. - [K_K01+K_K03 ++K_K04+++] 2. Student understands negative consequences of financialization. - [-]		
<b>Assessment methods of study outcomes</b>		
Lecture: assesment of knowledge and skills by a written classwork and activity duering lectures. Laboratory: assesment of knowledge and skills by solving problems.		
<b>Course description</b>		

Update 2017/2018		
Input-output Leontief model. Capital budgeting Portfolio optimization. Functions of several variables and Lagrange multipliers. Convex sets and convex functions. Karush-Kuhn-Tucker theorem. Nonlinear optimization.		
Lecture.		
1. Beamer presentation with examples and explanations on the blackboard.		
2. Student's activity is taken into account when grading.		
3. The theory is presented with connection to students' ability.		
Lab: demonstration, work in groups. The tools used give the students' chance to work at home (open source programs).		
<b>Basic bibliography:</b>		
1. D. G. Luenberger, Teoria optymalizacji, PWN 1974		
2. D. G. Luenberger, Teoria inwestycji finansowych, PWN 2003		
3. J. Palczewski, Optymalizacja II, <a href="http://mst.mimuw.edu.pl/wyklady/op2/wyklad.pdf">http://mst.mimuw.edu.pl/wyklady/op2/wyklad.pdf</a> , Uniwersytet Warszawski, 2014		
4. B. Sozański, I. Dziedzic, Algebra i analiza w zagadnieniach ekonomicznych, Wyd. Biła, Rzeszów 2007		
<b>Additional bibliography:</b>		
1. S. I. Gass, Programowanie liniowe, PWN 1980		
<b>Result of average student's workload</b>		
<b>Activity</b>	<b>Time (working hours)</b>	
1. Participation in lectures and laboratories.	30	
2. Home work: preparing to lectures, work with text. Consulting the lecturer.	30	
3. Preparation to the tests.	15	
<b>Student's workload</b>		
<b>Source of workload</b>	<b>hours</b>	<b>ECTS</b>
Total workload	75	3
Contact hours	40	2
Practical activities	35	1