

STUDY MODULE DESCRIPTION FORM		
Name of the module/subject Mathematical methods in economic sciences		Code 1010342641010347416
Field of study Mathematics	Profile of study (general academic, practical) (brak)	Year /Semester 2 / 4
Elective path/specialty -	Subject offered in: Polish	Course (compulsory, elective) obligatory
Cycle of study: Second-cycle studies	Form of study (full-time, part-time) full-time	
No. of hours Lecture: 15 Classes: - Laboratory: 15 Project/seminars: -		No. of credits 3
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 the sciences		ECTS distribution (number and %) 3 100%
Responsible for subject / lecturer: dr Maciej Grzesiak email: maciej.grzesiak@put.poznan.pl tel. 61 665 2807 Wydział Elektryczny ul. Piotrowo 3A 60-965 Poznań		
Prerequisites in terms of knowledge, skills and social competencies:		
1	Knowledge	Mathematical analysis (sequences, differential and integral calculus). Matrices. Fundamentals of functional analysis. Annuities and insurances.
2	Skills	Freely use of derivatives, integrals and linear algebra methods. Basic calculations of credits, annuities and insurances.
3	Social competencies	Understanding of limitation of their own knowledge and willingness to learn.
Assumptions and objectives of the course: 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.		
Study outcomes and reference to the educational results for a field of study		
Knowledge:		
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 ++]		
Skills:		
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]		
Social competencies:		
1. Student understands that confidence is necessary in economy. - [K_K01+K_K03 ++K_K04+++]		
2. Student understands negative consequences of financialization. - [-]		
Assessment methods of study outcomes		
Lecture: assesment of knowledge and skills by a written classwork and activity duering lectures.		
Laboratory: assesment of knowledge and skills by solving problems.		
Course description		

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.

Basic bibliography:

1. D. G. Luenberger, Teoria optymalizacji, PWN 1974
2. D. G. Luenberger, Teoria inwestycji finansowych, PWN 2003
3. J. Palczewski, Optymalizacja II, <http://mst.mimuw.edu.pl/wyklady/op2/wyklad.pdf>, Uniwersytet Warszawski, 2014
4. B. Sozański, I. Dziedzic, Algebra i analiza w zagadnieniach ekonomicznych, Wyd. Biła, Rzeszów 2007

Additional bibliography:

1. S. I. Gass, Programowanie liniowe, PWN 1980

Result of average student's workload

Activity	Time (working hours)	
1. Participation in lectures and laboratories.	30	
2. Home work: preparing to lectures, work with text. Consulting the lecturer.	28	
3. Preparation to the tests.	8	
Student's workload		
Source of workload	hours	ECTS
Total workload	66	3
Contact hours	34	2
Practical activities	36	1