STUDY MODULE DESCRIPTION FORM

Name of the module/subject **Mathematical modeling in technical sciences**		Code **1010342631010347414**
Field of study **Mathematics**	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: **Second-cycle studies**	Form of study (full-time,part-time) **full-time**	
No. of hours Lecture: **30** Classes: **-** Laboratory: **30** Project/seminars: **-**		No. of credits **6**
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 Andrzej Maćkiewicz
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Faculty of Electrical Engineering
ul. Piotrowo 3A 60-965 Poznań

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Multi-dimensional calculus, Numerical linear algebra.
2	**Skills**	Programming in high-computer languages.
3	**Social competencies**	Ability of working in a group.

Assumptions and objectives of the course:

This first course in mathematical programming is aimed
at integrating methods and applications. The objective
is to present material on linear and quadratic programming
that leads to greater understanding of applied problems and to
an ability to structure and carry out the implementation
of projects that utilize mathematical programming models.

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. Knows the basics of optimization modelling - [[K_W09]]
2. He/She knows how to relate optimization with other theoretical and applied mathematical dysciplines. - [[K_W07].]
3. He?She has in-depth knowledge of operational research. - [[K_W04])]

Skills:

1. Can construct mathematical models used in operational research. - [[K_U16]
2. He or she can construct correct numerical algorithms, taking into account their computational complexity. - [[K_U20]]

Social competencies:

Assessment methods of study outcomes

Homeworks 30%
Midterm 30%
Final examination 40%

Course description

Introduction
Linear Programming Models
The Simplex Method
Geometry of the Simplex Algorithm
KKT Conditions for Linear Programming Problems
Farkas Lemma
Duality
Sensitivity and Parametric Linear Programming
Quadratic Programming and Complementarity Problems
Active Set Method in Quadratic Programming

Basic bibliography:

1. Mokhtar S. Bazaraa, John J. Jarvis, Hanif D. Linear programming and network flows ; Wiley 2010.
2. Gass, Saul I., Programowanie liniowe., PWN, 1980.

Additional bibliography:

1. Ferris, Michael C., Mangasarian, Olvi L., and Wright, Stephen J., Linear Programming with MATLAB, SIAM, 2007.

Result of average student's workload

Activity	Time (working hours)

Student's workload

Source of workload	hours	ECTS
Total workload	100	6
Contact hours	30	3
Practical activities	30	3