DOCTORAL SCHOOL OF WROCŁAW UNIVERSITY OF SCIENCE AND TECHNOLOGY

SUPERVISOR DECLARING/CONDUCTING COURSE: dr inż. Arsalan Najafi
DEPARTMENT: K38W05D02
SCIENTIFIC DISCIPLINE: D02

COURSE CARD

Course name in Polish: Matematyczne metody optymalizacji w inżynierii
Course name in English: Mathematical Optimization Methods in Engineering
Course language: English
The course is intended for all PhD students: YES
1) SPECIALIST COURSE

Subject code: AEQ100270W

* delete as applicable

	Lecture	Foreign language course	Seminar	Mixed forms
Number of hours of organized classes in university (ZZU)	15			15
Grading	Oral presentation	Exam	Oral presentation	Exam, inspection, evaluation classes

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Basic knowledge in calculus
2. Basic knowledge in linear algebra

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COURSE OBJECTIVES
C1 To acquire a fundamental knowledge on optimization methods for solving various optimization problems,
C2 To be skilled in formulating optimization problems,
C3 To be skilled in solving optimization problems in practice,

PROGRAM CONTENTS

Form of classes		Number of hours
Lec 1	Introduction, requirements, static optimization. Optimization problems: types, sizes, and examples	1
Lec 2	Linear programming: Simplex method, two-phase method Revised simplex method	2
Lec 3	Linear programming: Duality, Primal-dual algorithms, Optimality conditions	2

Lec 4	Unconstrained optimization: Optimality conditions, examples Constrained optimization: Convexity, Lagrange functional and multipliers	2
Lec 5	Stochastic Programming	2
Lec 6	Constrained optimization: KKT conditions, example	2
Lec 7	Robust Optimization	2
Lec 8	Basic model of Benders Decomposition	2
Mix1-15	Practical problem solving, presentation of results	15
	Total hours	30

TEACHING TOOLS USED

N1. Lectures with using blackboards and slides
N2. Computational exercises – discussions
N3. Consultations
N5 Homework

ACHIEVED SUBJECT LEARNING OUTCOMES

Type of learning outcome	Code of learning outcome	Assessment of learning outcome
SzD_W1	P8UW	Test
SZD_U1	P8U_U	Presentation of Solutions

PRIMARY AND SECONDARY LITERATURE

PRIMARY LITERATURE:

[1] D. G. Luenberger, Y. Ye, Linear and Nonlinear Programming, Springer, 2008 (3rd Edition).
[2] A. Conejo, M. Carrion, J. M. Morales, Decision Making Under Uncertainty in Electricity Markets, Springer, 2010.
[3] J. M. Morales , A. Conejo , H. Madsen, P. Pinson, M. Zugno, Integrating renewables in electricity market operational problems, Springer, 2014.
[4] Steven A. Gabriel, Antonio J. Conejo, J. David Fuller, Benjamin F. Hobbs, Carlos Ruiz, Complementarity modeling in energy markets, Springer, 2013.
[5] J. Nocedal, S. J. Wright, Numerical Optimization, Springer, 1999.
[6] M. Shahidehpour, Y. Fu, Tutorial: Benders Decomposition in restructured power systems, 2005.

SECONDARY LITERATURE:

DOCTORAL SCHOOL OF WROCŁAW UNIVERSITY OF SCIENCE AND TECHNOLOGY

SUBJECT SUPERVISOR (NAME AND SURNAME, E-MAIL ADDRESS)
arsalan.najafi@pwr.edu.pl