FACULTY OF ELECTRICAL ENGINEERING

SUBJECT CARD

Name in Polish:	**Metody optymalizacji w elektroenergetyce przemysłowej**
Name in English:	**Optimization methods in electric power industry**
Main field of study (if applicable):	**Control Engineering and Robotics**
Specialization (if applicable):	**Automation and Control in Electrical Power Systems**
Level and form of studies:	**2nd level, full-time**
Kind of subject:	**optional**
Subject code:	**ARR042313**
Group of courses:	**NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU):	30				
Number of hours of total student workload (CNPS):	60				
Form of crediting:	crediting with grade				
For group of courses mark (X) final course:					
Number of ECTS points:	2				
including number of ECTS points for practical (P) classes :					
including number of ECTS points for direct teacher-student contact (BK) classes:	1.40				

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. He has ordered knowledge of the network topology distribution and receiving electrical network and environmental conditions of the installation.
2. He has expertise in the construction, use and performance, and security of power connectors used in electrical installations.
3. 3. He has knowledge in the field of technical standards and regulations in energetic.

SUBJECT OBJECTIVES

C1. Understanding the fundamentals of design methodology.
C2. Acquisition of basic knowledge about project strategies and structures in the electricity.
C3. Gain basic knowledge on the use of CAD software to design electrical power.
C4. Gaining basic knowledge of optimization, multi-criteria optimization and polyoptimization in the electric power.

SUBJECT EDUCATIONAL EFFECTS

relating to knowledge:

PEK_W01	The student has knowledge of design strategies and structures in the electric power.
PEK_W02	He knows the possibilities of using computer systems in design.
PEK_W03	The student has knowledge on issues of optimization, multi-criteria optimization and polyoptimization in the electric power.

relating to skills:

relating to social competences:

PEK_K01	He understands the need for self-education, including capacity building self-esteem and self-control and responsibility for the results of action.

PROGRAMME CONTENT		
Form of classes - lecture		**Number of hours:**
Lec 1	Familiar with the subject, program requirements and how to pass. Basic definitions of the scope of the design methodology.	2
Lec 2	The overall structure of the design process and the method of rationalization.	2
Lec 3	Characteristics of the system of design, modeling examples.	2
Lec 4	Strategies to design a model of the design process.	2
Lec 5	The structure of the design process in the power sector.	2
Lec 6	Analysis and synthesis of the design problem	2
Lec 7	Information technology in the design of energy	2
Lec 8	The rules for creating application software.	2
Lec 9	The organization of information in a computer-aided design systems - databases (database types, advantages and disadvantages).	2
Lec 10	The use of fuzzy sets and fuzzy numbers to description of the data uncertain.	2
Lec 11	Basic concepts and definitions of the optimization polyoptimization	2
Lec 12	The most important method polyoptimization (lexicographic method, the method of threshold limit, the utility function method, the method of max-min) - ranged function method.	2
Lec 13	Multicriteria optimization of the structures of power networks.	2
Lec 14	The unification of elements (limited range).	2
Lec 15	Final test.	2
	Total hours:	**30**

TEACHING TOOLS USED
N1. Lecture with audio-visual technology, multimedia presentations.
N2. Consultations

EVALUATION OF SUBJECT EDUCATIONAL EFFECTS ACHIEVEMENT		
Evaluation *F – forming (during semester)* *P – concluding (at semester end)*	**Educational effect number**	**Way of evaluating educational effect achievement**
F1(W)	PEK_W01 PEK_W02 PEK_W03 PEK_K01	Written test.
P(W)	P=F1	

PRIMARY AND SECONDARY LITERATURE
PRIMARY LITERATURE:
[1] Helt P., Parol M., Piotrkowski P., Metody sztucznej inteligencji w elektroenergetyce, Oficyna Wydawnicza Politechniki Warszawskiej, Warszawa 2000. [2] Sielicki A., Jeleniewski T., Metodologia projektowania, WNT, Warszawa 1981. [3] Kulczucki J., Optymalizacja struktur sieci elektroenergetycznych, WNT, Warszawa 1990
SECONDARY LITERATURE:
[1] Markiewicz H. Urządzenia elektroenergetyczne. Wyd. 4, WNT, Warszawa 2008. [2] Bujko., i inni, Komputeryzacja projektowania urządzeń elektroenergetycznych, WNT, Warszawa 1984

SUBJECT SUPERVISOR
Kazimierz Herlender, kazimierz.herlender@pwr.edu.pl

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT
ARR042313 - Optimization methods in electric power industry
AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY **Control Engineering and Robotics**
AND SPECIALIZATION **Automation and Control in Electrical Power Systems**

Subject educational effect	Correlation between subject educational effect and educational effects defined for main field of study and specialization (if applicable)	Subject objectives	Programme content	Teaching tool number
PEK_W01	S2ASE_W14	C.1 C.2	Lec1 Lec2 Lec3 Lec4 Lec5 Lec6	N.1 N.2
PEK_W02	S2ASE_W14	C.3	Lec7 Lec8 Lec9	N.1 N.2
PEK_W03	S2ASE_W14	C.4	Lec10 Lec11 Lec12 Lec13 Lec14	N.1 N.2
PEK_K01	K2AiR_K01	C.1 C.2 C.3 C.4	Lec1 Lec2 Lec3 Lec4 Lec5 Lec6 Lec7 Lec8 Lec9 Lec10 Lec11 Lec12 Lec13 Lec14 Lec15	N.1 N.2