

FACULTY OF ELECTRICAL
ENGINEERING**SUBJECT CARD**

Name in Polish: **Sterowanie rozmyte**
 Name in English: **Fuzzy Logic Control**
 Main field of study (if applicable): **Electrical Engineering**
 Specialization (if applicable): **Renewable Energy Systems**
 Level and form of studies: **2nd level, full-time**
 Kind of subject: **optional**
 Subject code: **ELR053226**
 Group of courses: **NO**

	Lecture	Classes	Laboratory	Project	Seminar
Number of hours of organized classes in University (ZZU):	15		15		
Number of hours of total student workload (CNPS):	60		30		
Form of crediting:	crediting with grade		crediting with grade		
For group of courses mark (X) final course:					
Number of ECTS points:	2		1		
including number of ECTS points for practical (P) classes :			1		
including number of ECTS points for direct teacher-student contact (BK) classes:	1.40		0.70		

PREREQUISITES RELATING TO KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Has basic knowledge in automation, informatics and modeling.

SUBJECT OBJECTIVES

- C1. The acquisition of knowledge in the field of fuzzy sets, fuzzy controllers structures of different types and aspects of industrial applications of fuzzy systems.
- C2. Acquire skills in the design and testing of various types of fuzzy systems.

SUBJECT LEARNING OUTCOMES*relating to knowledge:*

- PEU_W01 He has knowledge of fuzzy sets, different types of fuzzy controllers
- PEU_W02 has knowledge of adaptive fuzzy system

relating to skills:

- PEU_U01 Can design different types of the fuzzy controllers, define operations in fuzzyfication, interference and defuzzyfication parts as well as define the base rules.
- PEU_U02 Can test the control system with fuzzy controller

relating to social competences:

- PEU_K01 Can solve different problem in creative way.

PROGRAMME CONTENT

Form of classes - lecture		Number of hours:
Lec 1	Introduction to fuzzy logic.	2
Lec 2	Classical and fuzzy controllers.	2
Lec 3	Mamdani fuzzy system type, blocks, blurring, sharpening, and inference.	2
Lec 4	Significant features of the rules, and the rule base fuzzy system.	2
Lec 5	TSK-type fuzzy systems, Tsukamoto and others.	2
Lec 6	Adaptive fuzzy system.	2
Lec 7	Industrial applications of fuzzy systems.	2
Lec 8	Summary.	1
Total hours:		15

Form of classes - laboratory		Number of hours:
Lab 1	Organizational matters. Introduction to the software.	2
Lab 2	Design of selected classical controllers.	2
Lab 3	Design of Mamdani type fuzzy controller, design and tests of the fuzzy controller working with the selected types of the plant, the selection of the control parameters.	4
Lab 4	Designing a TSK fuzzy system for the selected plant.	2
Lab 5	Design of adaptive fuzzy system.	4
Lab 6	Summary.	1
Total hours:		15

TEACHING TOOLS USED
N1. Multimedia Lecture with elements of traditional and problematic lectures
N2. Written tests
N3. Reports

EVALUATION OF SUBJECT LEARNING OUTCOMES ACHIEVEMENT		
Evaluation <i>F - forming (during semester)</i> <i>P - concluding (at semester end)</i>	Educational effect number	Way of evaluating educational effect achievement
F1(W)	PEU_W01 PEU_W02	written and/or oral tests
P(W)	P=F1	
F1(L)	PEU_U01 PEU_U02 PEU_K01	reports
P(L)	P=F1	

PRIMARY AND SECONDARY LITERATURE
PRIMARY LITERATURE: [1] Michels K., Klawonn F., Kruse R., Nürnberger A., Fuzzy Control: Fundamentals, Stability and Design of Fuzzy Controllers (Studies in Fuzziness and Soft Computing), Springer 2006. [2] Piegat A., Fuzzy Modeling and Control (Studies in Fuzziness and Soft Computing), Physica-Verlag HD, 2010.
SECONDARY LITERATURE: [1] J Yager R.R., Filev D.P., Essential of Fuzzy Modelling and Control, John Wiley & Sons, Inc., 1994 [2] Driankov D., Hellendoorn H., Reinfrank M, An Introduction to fuzzy control. Springer 2010.

SUBJECT SUPERVISOR
Krzysztof Szabat, krzysztof.szabat@pwr.edu.pl