

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: **ELR033226**  
 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 EDUCATIONAL EFFECTS***relating to knowledge:*

- PEK\_W01 He has knowledge of fuzzy sets, different types of fuzzy controllers
- PEK\_W02 has knowledge of adaptive fuzzy system

*relating to skills:*

- PEK\_U01 Can design different types of the fuzzy controllers, define operations in fuzzyfication, interference and defuzzyfication parts as well as define the base rules.
- PEK\_U02 Can test the control system with fuzzy controller

*relating to social competences:*

- PEK\_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:		<b>15</b>

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 EDUCATIONAL EFFECTS 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)	PEK_W01 PEK_W02	written and/or oral tests
P(W)	P=F1	
F1(L)	PEK_U01 PEK_U02 PEK_K01	reports
P(L)	P=F1	

PRIMARY AND SECONDARY LITERATURE
<b>PRIMARY LITERATURE:</b>
[1] Michels K., Klawonn F., Kruse R., Nurnberger 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.
<b>SECONDARY LITERATURE:</b>
[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

MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT ELR033226 - Fuzzy Logic Control AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY Electrical Engineering AND SPECIALIZATION Renewable Energy 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	S2RES_W16	C.1	Lec1 Lec2 Lec3 Lec4 Lec5	N.1
PEK_W02	S2RES_W16	C.1	Lec6 Lec7 Lec8	N.1
PEK_U01	S2RES_U17	C.2	Lab1 Lab2 Lab3 Lab4	N.2 N.3
PEK_U02	S2RES_U17	C.2	Lab3 Lab4 Lab5	N.2 N.3
PEK_K01	S2RES_K01	C.1 C.2	Lab1 Lab2 Lab3 Lab4 Lab5 Lab6	N.1 N.2 N.3