

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): **Control in Electrical Power Engineering**  
 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
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MATRIX OF CORRELATION BETWEEN EDUCATIONAL EFFECTS FOR SUBJECT ELR033226 - Fuzzy Logic Control AND EDUCATIONAL EFFECTS FOR MAIN FIELD OF STUDY <b>Electrical Engineering</b> AND SPECIALIZATION <b>Control in Electrical Power Engineering</b>				
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	S2CPE_W16	C.1	Lec1 Lec2 Lec3 Lec4 Lec5	N.1
PEK_W02	S2CPE_W16	C.1	Lec6 Lec7 Lec8	N.1
PEK_U01	S2CPE_U18	C.2	Lab1 Lab2 Lab3 Lab4	N.2 N.3
PEK_U02	S2CPE_U18	C.2	Lab3 Lab4 Lab5 Lab6	N.2 N.3
PEK_K01	S2CPE_K01	C.1 C.2	Lab1 Lab2 Lab3 Lab4 Lab5 Lab6	N.1 N.2 N.3