SYLLABUS OF A MODULE

Polish name of a module	**Sztuczna inteligencja w zastosowaniach kontrolnych**
English name of a module	Artificial intelligence in control applications
ISCED classification - Code	0619
ISCED classification - Field of study	*Information and Communication Technologies (ICTs), not elsewhere classified*
Languages of instruction	*English*
Level of qualification:	*2*
Number of ECTS credit points	*4*
Examination:	*A*
Available in semester:	*A*

Number of hours per semester:

Lecture	Tutorial	Laboratory	Seminar	Project	Others
15	0	45	0	0	0

MODULE DESCRIPTION

Module objectives

O1. To introduce students into implementation of artificial intelligence tools in control application issues. To do this some overview of selected components of artificial intelligence will be presented in terms of their usefulness in typical applications in control systems.

O2. To obtain knowledge and practical skills in designing, running and testing examples of control systems using components of artificial intelligence.

PRELIMINARY REQUIREMENTS FOR KNOWLEDGE, SKILLS AND OTHER COMPETENCES

1. Knowledge of mathematics, artificial intelligence
2. Basic knowledge and skills in computer programming.

LEARNING OUTCOMES

LO 1 - Students have basic knowledge how to use artificial intelligence components in control systems.

LO 2 - Students are able to use suitable artificial intelligence components to implement in selected control system applications

LO 3 - Students are able to prepare report describing implemented application.

MODULE CONTENT

Type of classes – Lectures		Number of hours
Lect. 1	General aspects of using artificial intelligence methods in control systems	**1**
Lect. 2	Feedback control systems	**1**
Lect. 3	Using transfer functions	**1**
Lect. 4	Designing control systems	**1**
Lect. 5	State space-models and controlability	**1**
Lect. 6	Nonlinear control	**1**
Lect. 7	Conventional MLP function approximators	**1**
Lect. 8	Artificial Neural Networks in Control	**1**
Lect. 9	Neurocontrollers	**1**
Lect. 10	Recurrent Neural Networks	**1**
Lect. 11	Fuzzy systems in Control	**1**

Lect. 12	RBF and ANFIS	**1**
Lect. 13	Fuzzy controlers	**1**
Lect. 14	Fuzzy PID controllers	**1**
Lect. 15	Genetic algorithms and new trends in intelligent control	**1**
Type of classes– Laboratory		**Number of hours**
Lab. 1	Introduction to the Matlab-Simulink environment	**3**
Lab. 2	Feedback control systems	**3**
Lab. 3	Using transfer functions	**3**
Lab. 4	Designing control systems	**3**
Lab. 5	Using the Model Reference Controller Block	**3**
Lab. 6	Using the Model Reference Controller Block cont.	**3**
Lab. 7	Using the NARMA-L2 Controller Block	**3**
Lab. 8	Using the NARMA-L2 Controller Block cont.	**3**
Lab. 9	Using the NN Predictive Controller Block	**3**
Lab. 10	Using the NN Predictive Controller Block cont.	**3**
Lab. 11	Fuzzy Logic Controller	**3**
Lab. 12	Fuzzy Logic Controller cont.	**3**
Lab. 13	Fuzzy Logic Controller with Ruleviewer	**3**
Lab. 14	Fuzzy Logic Controller with Ruleviewer cont.	**3**
Lab. 15	Examples of control	**3**

TEACHING TOOLS

1. – lectures using multimedia presentations
2. – reports from laboratory activities
3. – computer stations with software

WAYS OF ASSESSMENT (F – FORMATIVE, S – SUMMATIVE)

F1. – assessment of reports
F2. – assessment of activity and control tests (optional)
S1. – assessment of the project (optional)
S2. – assessment of knowledge - passing the lecture

*) warunkiem uzyskania zaliczenia jest otrzymanie pozytywnych ocen ze wszystkich ćwiczeń laboratoryjnych oraz realizacji zadania sprawdzającego

STUDENT'S WORKLOAD

L.p.	**Forms of activity**	**Average number of hours required for realization of activity**
1.	**Contact hours with teacher**	
1.1	Lectures	15
1.2	Tutorials	0
1.3	Laboratory	45
1.4	Seminar	0
1.5	Project	0
	Total number of contact hours with teacher:	60
2.	**Student's individual work**	
2.1	Preparation for tutorials and tests	10
2.2	Prreparation for laboratory exercises, writing reports on laboratories	10
2.3	Preparation of project	0

2.4	Preparation for final lecture assessment	10
2.5	Preparation for examination	0
2.6	Individual study of literature	10
	Total numer of hours of student's individual work:	40
	Overall student's workload:	100
Overall number of ECTS credits for the module		4
Number of ECTS points that student receives in classes requiring teacher's supervision:		2,4
Number of **ECTS** credits acquired during practical classes including laboratory exercises and projects :		1,8

BASIC AND SUPPLEMENTARY RESOURCE MATERIALS

1. Leszek Rutkowski, Computational Intelligence, Springer-Verlag 2010
2. Vas P.: Artificial-Intelligence-Based Electrical Machines and Drives, Oxford University Press, 1999

MODULE COORDINATOR (NAME, SURNAME, INSTITUTE, E-MAIL ADDRESS)

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