MODULE DESCRIPTION

Module code	
Module name	**Zastosowanie sztucznych sieci neuronowych w informatyce**
Module name in English	**The Application of Artificial Neural Networks in Computer Science**
Valid from academic year	**2012/2013**

MODULE PLACEMENT IN THE SYLLABUS

Subject	**Computer Science**
Level of education	**1st degree** *(1st degree / 2nd degree)*
Studies profile	**General** *(general / practical)*
Form and method of conducting classes	**Full-time** *(full-time / part-time)*
Specialisation	
Unit conducting the module	**The Department of Computer Science Applications**
Module co-ordinator	**Prof. Aleksander Jastriebow, PhD hab., Eng.**
Approved by:	

MODULE OVERVIEW

Type of subject/group of subjects	**Major** *(basic / major / specialist subject / conjoint / other HES)*
Module status	**Non-compulsory** *(compulsory / non-compulsory)*
Language of conducting classes	**Polish**
Module placement in the syllabus - semester	**7th semester**
Subject realisation in the academic year	**Winter semester** *(winter / summer)*
Initial requirements	**Intelligent Systems** *(module codes / module names)*
Examination	**No** *(yes / no)*
Number of ECTS credit points	**7**

Method of conducting classes	Lecture	Classes	Laboratory	Project	Other
Per semester	**30**		**15**	**30**	

TEACHING RESULTS AND THE METHODS OF ASSESSING TEACHING RESULTS

Module target	The aim of the module is to acquaint students with main methods and techniques of artificial neural networks as well as passing knowledge of application possibilities of artificial neural networks in computer science and computer diagnostics.

Effect symbol	Teaching results	Teaching methods *(l/c/l/p/other)*	Reference to subject effects	Reference to effects of a field of study
W_01	A student has knowledge as regards artificial intelligence; a student also knows the issues of constraint satisfaction problem (CSP), knowledge representation, and inference.	l	K_W13	T1A_W04 T1A_W07 InzA_W02
W_02	A student has knowledge as regards artificial intelligence; in addition, a student knows the issues of constraint satisfaction problem (CSP), knowledge representation, and inference.	l	K_W13	T1A_W04 T1A_W07 InzA_W02
W_03	A student has knowledge as regards artificial intelligence; in addition, a student knows the issues of constraint satisfaction problem (CSP), knowledge representation, and inference.	p	K_W13	T1A_W04 T1A_W07 InzA_W02
U_01	A student has the ability of analysing and explaining the observed phenomena; building and verifying real world models as well as using them in order to predict events and states.	l	K_U10	T1A_U10 T1A_U13 InzA_U05
U_02	A student has the ability of analysing and explaining the observed phenomena; building and verifying real world models as well as using them in order to predict events and states.	l	K_U10	T1A_U10 T1A_U13 InzA_U05
U_03	A student has the ability of analysing and explaining the observed phenomena; building and verifying real world models as well as using them in order to predict events and states.	p	K_U10	T1A_U10 T1A_U13 InzA_U05
U_04	A student is capable of working individually and in a team; in addition, a student can also estimate time necessary for completing the assigned task; moreover, a student can prepare and realise a schedule of work which guarantees meeting deadlines.	p	K_U02	T1A_U02
K_01	A student is aware of the responsibility for his/her own work; a student is also ready to comply with the rules of teamwork and bear responsibility for the collectively realised tasks.	p	K_K03	T1A_K03 T1A_K04

Teaching contents:

Teaching contents as regards lectures

Lecture number	Teaching contents	Reference to teaching results for a module
1	Neural networks as a branch of artificial intelligence.	W_01 U_01
2	The notion of biological and artificial neural networks. Examples.	W_01 U_01
3	Basic structures of artificial neural networks. Examples.	W_01 U_01

4	Selecting the type and structure of one-directional artificial neural network. Learning neural networks together with an academic teacher.	W_01 U_01
5	Learning algorithms (supervised and unsupervised ones).	W_01 U_01
6	One-directional multilayer perceptrons (optimisation, structures, and teaching methods).	W_01 U_01
7	Backpropagation algorithm and its modification.	W_01 U_01
8	Kohonen maps. Learning without an academic teacher (unsupervised).	W_01 U_01
9	Recurrent neural networks.	W_01 U_01
10	Associative and heteroassociative memory.	W_01 U_01
11	Probabilistic artificial neural networks. Examples.	W_01 U_01
12	Artificial fuzzy neural networks (organisation and realisation).	W_01 U_01
13	Genetic algorithms in learning neural networks.	W_01 U_01
14	The application of artificial neural networks in tasks concerning information processing, classification, and recognition.	W_01 U_01
15	A test.	

Teaching contents as regards laboratory classes

Laboratory class number	Teaching contents	Reference to teaching results for a module
1	The preparation and computer realisation of neural networks for recognition.	W_02 U_02
2	The preparation and computer realisation of neural networks for classification.	W_02 U_02
3	The preparation and computer realisation of neural networks for approximation.	W_02 U_02
4	The preparation and computer realisation of neural networks for forecasting.	W_02 U_02
5	The preparation and computer realisation of fuzzy neural networks in classification.	W_02 U_02
6	The preparation and computer realisation of fuzzy neural networks in diagnostics.	W_02 U_02
7	The application of intelligent models in decision systems.	W_02 U_02
8	Obtaining a credit for laboratory classes.	

The characteristics of project assignments

The preparation and computer realisation of neural networks for recognition. (W_03, U_03, U_04, K_01)
The preparation and computer realisation of neural networks for classification. (W_03, U_03, U_04, K_01)
The preparation and computer realisation of neural network for approximation. (W_03, U_03, U_04, K_01)
The preparation and computer realisation of neural network for forecasting. (W_03, U_03, U_04, K_01)
The preparation and computer realisation of fuzzy neural networks in classification. (W_03, U_03, U_04, K_01)

The preparation and computer realisation of fuzzy neural networks in diagnostics. (W_03, U_03, U_04, K_01)
The application of intelligent models in decision systems. (W_03, U_03, U_04, U_05, K_01)

The methods of assessing teaching results

Effect symbol	Methods of assessing teaching results *(assessment method, including skills – reference to a particular project, laboratory assignments, etc.)*
W_01	A test
W_02	Reports from laboratory classes
W_03	A project
U_01	A test
U_02	Reports from laboratory classes
U_03	A project
U_04	A project
K_01	A project

STUDENT'S INPUT

ECTS credit points		
	Type of student's activity	**Student's workload**
1	Participation in lectures	**30**
2	Participation in classes	
3	Participation in laboratories	**15**
4	Participation in tutorials (2-3 times per semester)	**5**
5	Participation in project classes	**30**
6	Project tutorials	**10**
7	Participation in an examination	
8		
9	**Number of hours requiring a lecturer's assistance**	**90** *(sua)*
10	**Number of ECTS credit points which are allocated for assisted work** *(1 ECTS credit point=25-30 hours)*	**3.6**
11	Unassisted study of lecture subjects	**20**
12	Unassisted preparation for classes	
13	Unassisted preparation for tests	**10**
14	Unassisted preparation for laboratories	**20**
15	Preparing reports	**10**
16	Preparing for a final laboratory test	
17	Preparing a project or documentation	**25**
18	Preparing for an examination	
19	Preparing questionnaires	
20	**Number of hours of a student's unassisted work**	**85** *(sum)*
21	**Number of ECTS credit points which a student receives for unassisted work** *(1 ECTS credit point=25-30 hours)*	**3.4**

22	**Total number of hours of a student's work**	**175**
23	**ECTS credit points per module** *1 ECTS credit point=25-30 hours*	**7**
24	**Work input connected with practical classes** *Total number of hours connected with practical classes*	**110**
25	**Number of ECTS credit points which a student receives for practical classes** *(1 ECTS credit point=25-30 hours)*	**4.4**